U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
COOPERATIVE AGREEMENT
EUR-0030-A-00-5007-00

NEW YORK STATE ELECTRIC & GAS CORPORATION/POLISH ASSOCIATION OF COAL POWER PLANTS CONSULTANCY PROGRAM

FINAL REPORT

DECEMBER 1999

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I. OVERVIEW

A. Program Objectives

New York State Electric & Gas Company's (NYSEG) objective was to provide consulting services in the areas of least-cost and integrated resource planning, financial and accounting system design and management, and environmental technology assessment and financing. The goal was to assist the Association of Hard Coal Generating Companies in developing and implementing a plan for restructuring and complying with environmental regulations through the use of design tools and experience available of NYSEG and the U.S. utility industry.

As this was the first direct partnership between these generating copanies and a U.S. utility, NYSEG provided consulting services in the areas required by the Association of Hard Coal Generating Companies, because all the generating companies are facing major changes with an aggressive time schedule. For the program to be most successful it must deal directly with a larger number of generating companies. This provided several challenges to the consultancy partnership because of the large number of companies and anticipated variability of needs. The approach that was used in this program enabled this to be accomplished by dealing with an association that contains the overwhelming majority of the generation capacity, utilizing a subcontractor as a consultant that is familiar with their issues, and utilizing the iterative approach discussed below. This ensured careful targeting of the consulting and promoted direct utilization of the experience of NYSEG's in the most effective manner. We believe this approach enabled us to achieve the objective of the consultancy partnership which promoted a cost effective and environmentally sensitive program that played a large part in achieving the goal of restructuring the industry and moving the generating stations toward privatization. This is the final report of the Cooperative Agreement.

B. Specific Tasks

1. NYSEG's consultation methodology consisted of an iterative five-phase approach which is illustrated in Figure 1 and discussed below. The iterative approach maximized communication between the Association and NYSEG. Instead of defining the program after a brief interaction, the program was developed through in-depth consultation. The flexibility of the approach assured that the consulting services were both required and desired in addressing the issues of concern. This was particularly important due to the large number of generating companies involved in the Association. To ensure effective transfer of information, it was necessary to prioritize objectives and determine if the consulting should be directed

toward a grouping of plants or use individual plants as examples. The end result of using an iterative process maximized the acceptance of the consultant services and the benefits to the Association members. The two-year program consisted of performing five phases of work. During the first year, Phase I through Phase III were completed and a description of the activities were included in the Annual Report submitted in August 1996. During the second year, Phases IV and V were completed.

II. SUMMARY

Listed below are the activities that transpired from the start of this Cooperative Agreement (EUR-0030-A-OD-5007-00) in 1995 to its conclusion in 1997:

A. January 1995: USAID awards contract to NYSEG.

B. February – March 1995: NYSEG and Managing Directors of TGPE meet at Belchatów to identify areas of interest to the Polish Power Generating sector and sign a Memorandum of Understanding (MOW) between NYSEG and TGPE.

C. June 1995: NYSEG personnel and representatives from Sargent & Lundy, Carnot and CQ, Inc. conduct seminars and workshops at numerous locations in Poland. The topics discussed were those agreed to in the MOU.

D. September 1995: Polish Power Plant Managing Directors visit NYSEG for presentations by senior management and technical staff and visit NYSEG generating facilities to observe operations first hand.

E. October 1995: Technical Directors visit NYSEG (same purpose as above).

F. December 1995: NYSEG and Lockheed Martin employees conduct seminars and workshops on artificial intelligence at five (5) Polish power plants.

G. January 1996: NYSEG senior management and Project Manager meet with TGPE in Poland and provide project update to USAID Warsaw office.

H. March 1996: NYSEG Project Managers update USAID Warsaw office and agree on future activities and areas for continuing the program.

I. March 1996: NYSEG personnel conduct a five day workshop on "Planning, Budgeting and Cost Management - Part I" in Poland.

J. April 1996: NYSEG personnel meet with USAID project in Washington, DC, to provide program update, continuation plans, and proposal for future activities.

TGPE sends letter to USAID strongly recommending the continuation of this program.

K. May 1996: NYSEG personnel again meet with USAID in Washington to finalize continuation activities.

L. May 1996: NYSEG personnel meet with the Polish Embassy's Commercial Counselor's Office in New York City to obtain information on potential markets for combustion by-products (primarily fly ash and gypsum).

M. June 1996: NYSEG delegation travels to Poland and conducts seminars, workshops and meetings on by-product management, boiler operation, assessment and optimization, and an assessment of an existing FGD installation (Skawina).

NYSEG meets with USAID Warsaw office to provide project update, progress reports and plans for continuing the program into the future as requested by TGPE members.

N. July 1996: Mr. Richard Ondreyko, NYSEG's By-Product Utilization Manager, travels to Poland and conducts a series of meetings.

O. August 1996: NYSEG submits proposal to USAID Washington to continue the program which was approved the following month. NYSEG submitted first Annual Report to USAID.

NYSEG issues report for Skawina FGD System.

P. September 1996: NYSEG personnel meet with ModelPol in Warsaw to discuss strategy for marketing by-products by partnering with a small Polish company (SME) per the recommendation of the USAID Warsaw office.

Q. October 1996: NYSEG personnel traveled to Poland to meet with USAID representatives in Warsaw to present an update of the status of the work to date and presented plans for completing the project. NYSEG requested an extension through 1997 at this time and presented a proposal for follow on work. Met with Managing Director of Skawina Power Station to discuss project activities.

R. October 1996: NYSEG hires a Polish engineer for training and to gain experience in American utility operations for the purpose of transferring these technologies and operations to our Polish counterparts.

S. February 1997: NYSEG personnel conducts a five day workshop on "Planning, Budgeting and Cost Management - Part II" in Warsaw, Poland.

T. June 1997: NYSEG personnel travel to Poland, make final presentation of the project activities to date, and discusses future plans with TGPE members. Also, meet with USAID Warsaw office (Jakubowicz, Adamczyk, and Stephens) to review the program and possible future activities.

Meet with the US Embassy in Warsaw (Katherine Monahan) to review the Skawina FGD report and potential future involvement for NYSEG.

Meet with Power Engineering Institute. Discuss NO_X reduction technologies, expert systems (make presentation of InEC), and LOI (Loss on Ignition) control strategies.

III. PROJECT ACTIVITIES

This will serve as the Final Report for the "New York State Electric & Gas Corporation/Polish Association of Coal Power Plants (TGPE)" Consulting Program. The program was conducted for the U. S. Agency for International Development under the Cooperative Agreement-EUR-0030-A-00-5007-00.

The report contains a summary of significant events that occurred during the program describing in detail the events and follow-up activities since the report submitted to USAID covering the first year of the program and culminates with this final report. Phase V discusses the Program's achievements and potential follow-on activities.

Phase IV – Follow-on Activities

Upon completion and submittal to USAID of the Annual Report for the first year of this program in August 1996, NYSEG and USAID personnel met in Washington, DC, in April 1996 to review the first year's progress and activities that transpired. NYSEG provided a program update and identified areas of concentration based on input from the TGPE members that would be covered in the future. In addition, TGPE provided a letter to USAID that identified the benefits obtained from the first year's activities and strongly recommended that the program be continued for the second year (to completion). In May 1996, USAID and NYSEG met to finalize efforts for continuing the Program.

As a result, the following activities occurred during this reporting period.

A. Environmental Control

During the June 1995 visit to Poland by NYSEG, the TGPE Managing Directors visit to NYSEG in September 1995, and TGPE Technical Directors visit to NYSEG in October 1995, the concept of expert systems and artificial intelligence (AI) techniques being used by NYSEG were discussed. These included CQIM (Coal Quality Impact Model), CQEA (Coal Quality Engineering Analysis), and a new system called InEC (Intelligent Emission Control) jointly developed by NYSEG and Lockheed Martin. These tools allow plant operators to optimize plant operations based on varying fuel quality so as to reduce emissions (primarily NO_X) while at the same time minimizing the impact on LOI (loss-on-ignition), heat rate, boiler efficiency and availability, and capacity factor. It is an AI based systems that generates a prediction model for NO_X formation as a function of operating parameters. During the visits to NYSEG in September and October 1995, these tools were demonstrated under actual operating conditions.

Because of the great interest shown in this newly developed technology and approach to boiler operation, NYSEG and Lockheed Martin personnel, at the request of TGPE, traveled to Poland in December 1995. During the week of December 11, 1995, presentations and demonstrations of the InEC system were made at the following power stations.

Kozienice – December 11, 1995
Polaniec – December 12, 1995
Lagisza – December 13, 1995
Opole – December 14, 1995
Ostroleka – December 15, 1995

Three power stations (Polaniec, Lagisza, and Ostroleka) expressed a very strong interest in this system and indicated the possibility of purchasing it in the future.

In addition, and as a result of the activities that took place in 1995, Mr. Lapinski, the Managing Director of the Skawina Power Station (after a preliminary visit by NYSEG to Skawina in June 1995 and his first hand inspection and review of the NYSEG FGD Systems at Kintigh and Milliken Stations (a DOE Clean Coal Round IV project) requested that NYSEG return to inspect the existing FGD system installed at Skawina, which was experiencing operating difficulties. On June 11 and 12, 1996, NYSEG personnel met at Skawina to review the system and discussed the construction and start-up of the system as well as its operation and performance. As a result, NYSEG was asked to prepare a report for this project. This report was provided to USAID offices in Washington and Warsaw, Mr. Lapinski the Managing Director of the Skawina Power Station, Modelpol in Warsaw and the U.S. Embassy Office (Katherine Monahan) in Warsaw. The report, based on NYSEG's operating experience with FGD systems, contained an analysis and recommendations for corrective actions (remedial measures).

B. By-Product Utilization

On May 30, 1996, NYSEG met with the Polish Embassy's Commercial Counselor's Office (Ms. Ewa Gorecka and Ms. Zofia Scnnitzer) in New York City to determine the best way to approach the appropriate Polish agencies for them to recommend the use of combustion by-products in Poland as was currently being done in the U.S. Since NYSEG had been doing this for years, it had the technology and experience to effectively transfer these activities to Poland. NYSEG requested the Embassy's assistance in this effort.

On June 10, 1996, NYSEG met with Ms. Wolska-Lotanska of the Technical Building Institute in Warsaw. The Building Institute issues technical approval for the use of all combustion by-products in building applications. After the

meeting and information exchange, she indicated she and her department would be available and ready to approve uses for these materials. In addition, the use of gypsum produced from Polish FGD installations is a top priority and she would accept NYSEG test data to support the approval for its use in Poland.

On June 13 and 14, 1996, meetings and presentations were conducted at Belchatów and Opole Power Stations. Belchatów was extremely anxious to identify uses for its ash because of the voluminous amount produced and the associated cost of disposal. Recommendations of the best markets and uses based on the ash quality and the plant's location were provided

Opole has a proprietary process called EMULGAT that utilizes its coal combustion by-product and requested assistance in further marketing the process and product produced. Information was provided and NYSEG agreed to review the process and provide its assessment and decision. Upon further review, it was concluded that there were other uses best suited for these by-products, and NYSEG declined to participate. Opole was also given recommendations for use(s) of the gypsum it will be producing from its FGD installations.

In July 1996, NYSEG's Coal Combustion By-Product Utilization Manager traveled to Poland to further efforts in this area. Visits, discussions, presentations, and recommendations for Coal Combustion By-Product (CCBP) utilization were made to a cement plant in Warsaw, four power stations (Kozienice, Rybnik, Halemba, and Skawina), an ash marketing firm (UTEX) and a central heating plant (CHP) in Warsaw. Because of the large volumes of ash being produced and gypsum that will be produced, the Polish Generating Stations were very interested in identifying markets for these materials as an alternate to disposal. The strong road construction and housing programs currently underway are ready markets for these materials. NYSEG, with its experience in marketing its ash for beneficial uses for many years as well as the gypsum from its recent Clean Coal IV Project offered to provide assistance if so requested.

C. Boiler Operation and Optimization

In June 1996, meetings were held with the Institute of Power Engineering where software assessing the boiler condition and potential maintenance programs were described and demonstrated. In addition, presentations and demonstrations were made at the Siersza and Blachowina Power Stations and a Central Heating Plant (CHP). Strong interest in the tools and methods available (identified in the Annual Report previously submitted) and a proposal for their implementation and use was requested.

Also, during this June 1996 (6/10/96) visit, the USAID Warsaw office was given a presentation updating the program, progress made to date and identify activities in specific areas for continuing the program, if mutually agreed to.

D. Budgeting, Planning, Cost Control (Management) and Accounting

In June 1996, personnel from NYSEG's Accounting and Financial departments traveled to Poland to make a presentation on Financial and Accounting System Design and Management. The presentation covered an assessment of the generating companies' current status of accounting systems and their future needs. A round table discussion was conducted to encourage everyone's participation. Based on the information gathered during this visit, NYSEG developed a comprehensive training program for "Planning, Budgeting and Cost Management."

In March 1996, a five-day workshop was conducted by NYSEG for power plant directors, at the Polaniec Power Plant. Part I of the "Planning, Budgeting and Cost Management" Seminar was presented to Financial and Accounting Directors representing 15 Polish generating companies.

In February 1997, Part II of the "Planning, Budgeting and Cost Management" Seminar was conducted in a five-day workshop held in Warsaw for the same group referenced above.

IV. PHASE V

A. Conclusion

In June 1997, NYSEG traveled to Poland to meet with and update the USAID Warsaw office and the TGPE members of the Program's accomplishments. On June 23rd, NYSEG met with Ms. Maryla Jakubowicz, Mr. Mirek Adamczyk, and Mr. Tom Stephens at USAID's Warsaw office. Ms. Jakubowicz was given an update of the program and its accomplishments. She advised us of the following:

1. NYSEG must submit a final report for this effort with TGPE, essentially completing the program.

2. Future activities in Poland will be primarily with municipalities and not power plants or generating companies.

3. Washington's focus is still on privatization of the Energy Sector but no longer with USAID.

4. Warsaw office is phasing out old contracts and will not be issuing any new contracts.

5. The USAID office in Warsaw will not exist after the year 2000.

6. The new focus for their office is to work with Polish GMYNA's in the areas of economic growth, housing planning, financial management, land management, etc. Also, energy efficiency, DSM (Demand Side Management) and other conservation measures will be highlighted.

7. NYSEG's assessment, evaluations and recommendations of the Skawina FGD system were entirely correct.

8. NYSEG was encouraged to submit an unsolicited proposal with a Polish company for a new USAID target.

9. NYSEG should start thinking about perhaps focusing on the power sector's in other countries. (The Ukraine was specifically mentioned.)

10. On June 24, 1997, NYSEG met with Ms. Katherine Monahan at the U.S. Embassy in Warsaw. She was given NYSEG's August 1996 report (sent to Mr. Mark Madland on August 16, 1996) assessing the Skawina FGD project as well as discussing activities currently occurring there.

Ms. Monahan agreed to add NYSEG to the project distribution list for all future Skawina activities.

On June 25, 1999, the final meeting with TGPE took place at the Polaniec Generating Station. NYSEG reviewed the program and its accomplishments as well as some suggestions for future activities with the members either individually or collectively.

On June 26, 1997, NYSEG met with Skawina personnel to discuss our report submitted in 1996 and how many of the recommendations provided in the report were being adopted.

B. Additional Activities

1. Provided a report for the assessment, technical evaluation and recommendations for the Skawina FGD system. (Asked for this by Mr. Lapinski as a result of his September 1995 visit to NYSEG's Kintigh and Milliken Stations.)

2. Institute of Power Engineering – August 1996: Options for NO_X control using InEC. Discussions for new generation FBC, Combined Cycle and use of refuse derived fuel.

3. EPRI involvement for identifying EPRI products and technology(ies) that may be implemented via a NYSEG/EPRI Tailored-Collaboration (T-C) effort.

4. Met with Polish Academy of Science in Krakow to discuss Coal Cleaning and the potential of its applications and use of Polish Generating Stations (CQEA, CQIM tools developed and used at NYSEG).

5. Met with the Institute of Construction Technology (Technical Building Institute) to determine what actions need to be taken to have combustion by-products approved for use in construction activities (roads, housing, fill material, etc.).

6. PAK initiative. Submitted proposal for a feasibility study for the Patnow Power Station Repowering Project per invitation to do so; the only U.S. utility selected to participate in the privatization of this 2700 MW complex.

7. Wallboard plant constructed at Opole, per discussions and visits by NYSEG and TGPE personnel.

8. Low NO_X burners in plants to meet 2003 NO_X limits at Kozienice Units 2 and 4, resulting from low NO_X burners installed and operating at NYSEG facilities.

9. Jaworzno 3 and new Belchatów FGD's are functioning well. Jaworzno installation is producing gypsum.

10. Ash is being sold and used in cement and concrete.

11. Rybnik #5 FGD is a semi-dry system.

12. Rybnik #4 turbine upgrade running beautifully.

13. Provided up-to-date NO_X control technologies, options and operating efficiencies to the PEI and TGPE members for immediate implementation which were ultimately utilized.

14. Informed, provided, and made TGPE members aware of EPRI developed tools such as CAT, BMW, Tubepro, LIFECODE, NOXPERT, etc. ready for immediate use and implementation.

15. Update to PEI on NO_X control technologies installed in US ranging from combustion modification like low NO_X burners. Overfire Air (OFA), and reburning and post combustion technologies such as SCR and SNCR.

16. As a result of the Planning, Budgeting and Cost Management Program, and based on NYSEG's financial and budgeting programs, NYSEG worked with the Polish generating companies to develop software programs that would meet their needs. The software was provided to all of the companies that participated in the workshops.

17. Some examples of the changes that have occurred that have been directly related to the concepts and ideas that have been presented in the program are as follows:
    - Stations are able to perform their own evaluation of control technologies for the control of sulfur dioxide emissions,
    - Stations have become aware of new US based techniques for the control of nitrogen oxides,
    - Stations are taking new initiatives toward the utilization of FGD and fly ash as by products instead of as waste products,
    - Stations are investing new methods to achieve boiler optimization including advance US computer based systems,
    - Stations developed an understanding of how pooling and power purchase contract will function in wholesale price competition,
    - Stations are applying new techniques to improve manpower utilization,

- Stations are installing systems to account for cost on a department basis,
- Stations have become aware of new improved coal purchasing procedures,

The above have resulted in improved environmental compliance and lower energy costs. Each station has elected to utilize the program differently.

The program also had a very significant impact on the privatization of the generation sector.

Tools for boiler inspection, analysis and operation, some of which are EPRI products (transferred EPRI technology and tools to TGPE, Institute of Power Engineering, Polish Academy of Sciences, and Technical Building Institute. These included Inspection Works, BMW, Tubelife, DMW Life, Creep Fatigue Pro, and BLESS Code.

C. Follow On Activities

None via this program. This was determined as a result of the June 23, 1997 meeting with the USAID office in Warsaw.

V. PROJECT COST FOR 1995

USAID Share	$346,445.00
NYSEG Share (Including Cost Share)	$ 53,023.00
TOTAL	$399,468.00

Project Cost for 1996 through Completion:

USAID Share	$218,681.00
NYSEG Share (Including Cost Share)	$130,180.00
TOTAL	$348,864.00

TOTAL VALUE OF PROGRAM $748,332.00