CONF-940258--

Summary Proceedings

U.S. Department of Energy
Office of Fossil Energy

Clean Coal International Technology Transfer Program Public Meeting

Washington, DC, February 10 & 11, 1994

March 1994

Clean Coal International Technology Transfer Program
Public Meeting

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CHAPTER 1

INTRODUCTION AND OVERVIEW

Chapter 1

1.1 INTRODUCTION

1.1 INTRODUCTION

A public meeting was convened by the Department of Energy (DOE) on February 10 and 11, 1994 in order to discuss government plans for the export of clean coal technologies -- The "Clean Coal International Technology Transfer Program." In the sections that follow, brief descriptions are provided of the background to the solicitation and the public meeting, and how the meeting was conducted. Subsequent chapters of this report present the discussions that ensued at the meeting, and the views, recommendations, and concerns that were expressed by attendees. Chapter 4 consists of the actual text used for presentations, where such text was provided by the presenter.

It should be noted that the agenda for the second day, the session on financing issues, differs from the agenda that was published prior to the meeting. This is due to the fact that a severe snowstorm occurred on the night of February 10 and into February 11. Many of the scheduled speakers were not able to get to the meeting and substitute speakers actually gave presentations. The revised agenda was quite successful. Again, presentations are included in Chapter 4 where the text was provided.

Finally, an appendix contains attendee registration data.

1.2 MEETING PLANNING AND FORMAT

1.2 MEETING PLANNING AND FORMAT

The public meeting was formally announced in the *Federal Register* of December 17, 1993, under the heading, "Notice of Meeting; Clean Coal International Technology Transfer Program." The notice reviewed the purpose of the meeting, provided an agenda for the meeting, and background on the solicitation.

A mass mailing to over 4,000 addresses of individuals who had previously responded to DOE solicitations or notices, or who had expressed an interest in being kept informed of CCT activities was sent. The mailing package included a letter of transmittal to prospective attendees, a copy of the Notice of Public Meeting that appeared in the *Federal Register* of December 17, 1993, and the following draft documents: 1) approach for implementing a possible DOE program for exporting U.S. clean coal technologies, 2) key definitions, and 3) candidate project areas in the region. In addition, a copy of the legislation creating the program and a description of President Clinton's joint implementation program for climate change, a preregistration form, and a detailed agenda were included. Additional publicity was obtained by the issuance of a DOE News Release on January 24, 1994.

Pertinent information of possible use or interest to meeting attendees was compiled into a background information package, which was distributed at the meeting, or provided upon request by mail or telephone. The meeting package included a detailed agenda, the DOE News Release of January 24, 1993, a copy of the Notice of Public Meeting that appeared in the *Federal Register* of December 17, 1993, and the following draft documents: 1) approach for implementing a possible DOE program for exporting U.S. clean coal technologies, 2) key definitions, and 3) candidate project areas in the region. In addition, a copy of the legislation creating the program and a description of President Clinton's joint implementation program for climate change was included.

As was described in the *Federal Register Notice*, the meeting commenced on the first day with a brief plenary session, which included introductory remarks and program overviews by DOE officials. The audience then briefly recessed and reconvened into Regional Discussion Groups led by DOE

officials. All of the groups discussed essentially the same issues. Finally, attendees met in a closing plenary session where the highlights and recommendations of each of the groups were reviewed and summarized. The second day consisted of speeches by experts on impediments to financing clean coal projects in section 1332 countries and the identification of existing and new financial mechanisms to assist U.S. industry participation. Each group cochairman was responsible for preparing notes of the salient aspects of the proceedings. These regional discussion group summaries are provided in Chapter 3 of this report.

CHAPTER 2

BACKGROUND INFORMATION

Chapter 2

2.1 LETTER OF TRANSMITTAL TO PROSPECTIVE ATTENDEES

Department of Energy
Washington, DC 20585

December 20, 1993

NOTICE OF PUBLIC MEETING:
CLEAN COAL INTERNATIONAL TECHNOLOGY TRANSFER
PROGRAM

Enclosed for your information is a copy of the Notice of Public Meeting that appeared in the Federal Register of December 17, 1993. Also enclosed are the following draft documents: 1) approach for implementing a possible Department of Energy (DOE) program for exporting U.S. clean coal technologies, 2) key definitions, and 3) candidate project areas in the region. In addition, a copy of the legislation creating the program and a description of President Clinton's joint implementation program for climate change, a preregistration form, and a detailed agenda are enclosed. This information is provided to stimulate discussion and advice to the DOE.

We have been successful in arranging for the hotel to offer a reduced rate for accommodations. However, DOE cannot be of any assistance with your reservations, and your arrangements must be made directly with the hotel. You are reminded that DOE cannot reimburse those who attend the meeting or for any expenses that may be incurred in responding to this Notice. It is important that you mention that you are attending the DOE Clean Coal International Technology Transfer meeting, and that you observe the deadline listed below, after which date the reduced rate may no longer be available.

Hyatt Regency Washington on Capitol Hill
400 New Jersey Avenue, NW
Washington, DC 20001
Tel. (202) 737-1234 or (800) 882-1234
Meeting Rate: $126/single, $151/double
Reservations must be made by: January 17, 1994

We look forward to seeing you in person but please return the preregistration form by January 31, 1994. Thank you for your interest in DOE's Clean Coal International Technology Transfer Program.

Jack S. Siegel
Acting Assistant Secretary
Fossil Energy

Enclosures

2.2 FEDERAL REGISTER NOTICE OF DECEMBER 17, 1993

CORRECTION

Please note the Opening Plenary Session of the meeting on February 10, 1994, will begin at 9:00 a.m. instead of 10:00 a.m. as stated in the attached Federal Register notice. Also, note that the meeting on February 11, 1994, to address financing will begin at 9:00 a.m. and is scheduled to end at 4:50 p.m.; this is instead of the three-hour panel called for in the attached Federal Register notice. An amendment will be published to reflect this correction.

12-17-93
Vol. 58 No. 241

federal register

Friday
December 17, 1993

United States
Government
Printing Office
SUPERINTENDENT
OF DOCUMENTS
Washington, DC 20402

SECOND CLASS NEWSPAPER
Postage and Fees Paid
U.S. Government Printing Office
(ISSN 0097-6326)

Office of Fossil Energy

Clean Coal International Technology Transfer Program; Meeting

AGENCY: Office of Fossil Energy, DOE.

ACTION: Notice of public meeting.

SUMMARY: The objective of this notice is to notify interested companies, the international community, and the public of the Department of Energy's (DOE) intent to hold a public meeting that will assist DOE in meeting its statutory requirements of section 1332 of Public Law 102–486, the Energy Policy Act of 1992 (EPACT).

DATES: A meeting is planned on February 10–11, 1994, to introduce and explain these objectives to interested companies and the general public.

ADDRESSES: Hyatt Regency Washington on Capitol Hill, 400 New Jersey Avenue, NW., Washington, DC 20001, Tel: 202–737–1234 or 1–800–882–1234.

SUPPLEMENTARY INFORMATION: The agenda for this meeting is as follows:

The first day of the meeting will begin * at 10 a.m. with an opening plenary session in which DOE will provide background on section 1332, and the draft findings of a study of the market potential for export of clean coal technologies. DOE will also present, for comment, a draft approach for implementing the technology transfer program.

Following the plenary session, several breakout sessions will be held. Each breakout session will focus on a region where projects may be supported in host countries. At each breakout session, representatives of U.S. industry and potential host countries are invited to discuss market areas and types of projects for which financial assistance and other types of activities may be of interest to assist U.S. industry to participate in these markets.

Following the breakout sessions, a closing plenary session will be held at which time reports of the findings of the breakout sessions will be presented.

** The second day will consist of one three hour session and will begin at 9 a.m. It will consist of an expert panel discussing impediments to financing clean coal projects in section 1332 countries and will identify existing and new financial mechanisms to assist U.S. industry participation.

FOR FURTHER INFORMATION CONTACT: Background information, a detailed agenda and a pre-registration form may be obtained by contacting Jean Lerch by phone 202–586–7320, fax 202–586–8488 or by writing to: Ms. Jean Lerch, U.S. Department of Energy, FE–20, Room 4G–052, Washington, DC 20585.

If you are interested in participating in the meeting, please send a pre-registration form to Jean Lerch by mail or fax, no later than January 31, 1994.

BACKGROUND INFORMATION: Section 1332 of Public Law 102–486, the Energy Policy Act of 1992, authorizes DOE to conduct an International Clean Coal Technology Transfer Program.

Section 1332 directs the Secretary of Energy to provide financial assistance for projects to improve efficiency and reduce emissions, located in developing countries and in countries with economies in transition for non-market economies. In preparation for these projects, the Department, among other things, is to prepare a list of potential projects and identify host countries.

On November 11, 1993, Public Law 103–138, Appropriations for Interior and Related Agencies was signed by the President. The Conference Report for the law earmarks funds for initial implementation of section 1332. The Report specifically directs the Secretary of Energy to identify potential markets for clean coal technologies in section 1332 countries and to identify existing or new financial mechanisms for financial support to be provided by the Federal Government to enhance the ability of U.S. industry to participate in these markets. To accomplish the above, the Secretary is to consider input from U.S. industry and to submit a report to the Appropriations Committee of the House and Senate by May 12, 1994.

To assist in the preparation of the report and to consider industry input, the Department will sponsor a two-day public meeting that will take place at the Hyatt Regency Washington on Capitol Hill in Washington, DC, on February 10–11, 1994.

Jack S. Siegel,

Acting Assistant Secretary for Fossil Energy.

[FR Doc. 93–30848 Filed 12–16–93; 8:45 am]

BILLING CODE 6450–01–P

*BEING AMENDED TO READ "...at 9:00 a.m."

**BEING AMENDED TO READ "...one session that will begin at 9:00 a.m. and conclude at 4:50 p.m. It will consist..."

2.3 DOE NEWS RELEASE OF JANUARY 24, 1994

DOE NEWS

NEWS MEDIA CONTACTS:
Joe Wagovich, 202/586-5806
Penny Adams, 202/586-5806

FOR IMMEDIATE RELEASE
January 24, 1994

DEPARTMENT OF ENERGY TO HOST INTERNATIONAL CLEAN COAL TECHNOLOGY MEETING

On February 10 and 11, the U.S. Department of Energy will host a public meeting to discuss government plans for the export of clean coal technologies. The "Clean Coal International Technology Transfer Program" is being developed to help improve energy efficiency and reduce environmental emissions overseas and, at the same time, create U.S. jobs and improve the balance of trade.

The meeting's agenda includes discussion of the scope, market, requirements and financing for this program in countries currently supported by the U.S. Agency for International Development or other countries in transition from a non-market to a market economy.

Either by "showcasing" demonstration projects or sponsoring the spread of U.S. technology, the department hopes to expand international use of environmentally-benign processes for producing electric power from coal-fired plants. Two technology transfer programs that address these goals are described in Sections 1332 and 1608 of the Energy Policy Act of 1992.

(MORE)

R-94-006

The meeting, scheduled to begin at 9 a.m. on both days at the Hyatt Regency Washington on Capitol Hill in Washington, D.C., will include representatives from the Department of Energy's Office of Fossil Energy and federal agencies responsible for international financing, including possibly the Overseas Private Investment Corporation, the Export-Import Bank, and U.S. Agency for International Development.

All sessions are open to interested companies and the public at large. Registration will be held on site from 7:30 to 8:30 a.m. Guests may preregister and obtain a detailed agenda by writing to Mrs. Jean Lerch, U.S. Department of Energy, FE-20, Room 3E-042, Washington, D.C. 20585; by phone to 202/586-7320; or by fax to 202/586-8488 or 7085.

- DOE -

R-93-006

2.4 APPROACH FOR IMPLEMENTING A POSSIBLE DOE PROGRAM FOR EXPORTING U.S. CLEAN COAL TECHNOLOGIES (draft)

DRAFT (8/31/93)
APPROACH FOR FOSSIL ENERGY TECHNOLOGY TRANSFER PROGRAMS

BACKGROUND

Sections 1332 Clean Coal Technology, and 1608 Environmental Technology of the Energy Policy Act of 1992 (EPACT) describe two technology Transfer Programs for creating jobs and reducing the trade deficit for the United States, through providing financial assistance for projects to improve energy efficiency and reduce environmental emissions including "Greenhouse Gases." These projects are to be located in countries which are supported by the Agency for International Development (AID) or in countries with an economy in transition from a non-market to a market economy. The legislation requires a very similar approach for the two programs. Working with AID the DOE is to: 1) complete in 150 days an agreement with the appropriate US agencies for conducting the program in the host countries; 2) issue in 240 days a list of potential projects; 3) within one year issue a solicitation and 4) within 120 days after receipt of proposals make selection. In addition, the programs are to develop a procedure for providing financial assistance to projects applying for solicitations in other countries.

After an initial consultation with U.S. Treasury, Export-Import Bank, Overseas Private Investment Corp.(OPIC), and AID concerning Organization for Economic Cooperative Development rules for export credits, and the most appropriate means of financing projects under the Transfer Programs, it became apparent that, in addition to providing financing for projects through DOE programs, a more efficient, economical and prudent approach to implementing a transfer program would involve the financing of projects through organizations already experienced in the development of overseas investments. In order to accomplish this, the following program approach, should be considered.

PROPOSED APPROACH

Implementation of the Transfer Program created by EPACT would consist of a twofold approach to serve two different objectives.

"Showcase" Demonstrations

One objective would be to demonstrate a few advanced "showcase" technologies in key market areas. This would involve demonstrations of advanced technologies (for the purpose of this program advanced technologies are defined as having been demonstrated in the U.S., but have not achieved commercial replication in the U.S.) that both the U.S. Government, U.S. industry and the host countries industrial sector believe to have considerable future replication potential. However due to some of the first-of-a-kind aspects of utilizing the advance technology in the host country and the associated performance risk, the commercial means of financing may not be readily available for these projects. By DOE having a program to provide financial assistance up to 50% (the cost share could

be structured to achieve an acceptable rate of return) of the projected eligible capital and operating costs through cooperative agreements with repayment provisions, the selected "showcase" technologies could be demonstrated for evaluation by potential foreign and U.S. users. The features of this approach for marketing advanced technologies to developing countries includes providing a source of financing not obtainable through the commercial markets, distribution of risk among multiple funding sources, expediting the demonstration through a program involving a single government agency, developing a foundation overseas for market acceptance of future U.S. technologies through participation in the demonstration, and generating goodwill through investing in the development of technologies to satisfy the future needs of the host country. In order to increase U.S. sales abroad, more is involved than just offering the better "mouse trap" and project financing. It is important to demonstrate a willingness to invest in the future of your customer.

Export of Commercial Technology

The second approach would be designed to achieve an objective of resolving near term energy and associated environmental problems in foreign countries through the use of U.S. technology. Through this program technology that is commercial in the U.S., but not in the host country, could become more readily available through DOE sponsoring project definition activities (these could include sufficient engineering and design to support an adequate cost estimate for financing, developing supply and sales agreements, defining risks and approaches to mitigate risks) sufficient to obtained financing through the Export-Import Bank, OPIC, World Bank or commercial sources of financing. This program would encourage the export of commercially available U.S. equipment for meeting the current and near term needs of the eligible nations (as defined in secs. 1332 and 1608) and by doing so help to reduce the U.S. trade deficit and create high skilled U.S.jobs.

The program could be implemented through designating funding to the Export-Import Bank specifically for the financing of projects using the eligible technologies defined by secs. 1332 and 1608. Funds could also be designated to OPIC for providing insurance to projects in the Technology Transfer Program. DOE would provide funds for conceptual designs and definition for projects utilizing eligible technologies. The DOE funds would be cost shared up to fifty percent with U.S. industry for investigating and defining projects in eligible countries. Where appropriate these studies could be conducted in conjunction with the Trade Development Agency (TDA) or AID. DOE could serve as the focal point and lead coordinator among the federal agencies to ensure a smooth transition from the definition phase to the ultimate financing organization. Prior to initiating a study it would be determined that the project represents a development priority for the host country, financing for the project is likely if the study results are attractive and the potential for U.S. exports for subsequent projects is significant. Based on the results of these studies the industrial participant could elect to seek financing from the funds "ear marked" at the other agencies or any other source. Projects with sufficient definition could proceed directly to the Export-Import Bank for financing. The DOE would provide the Export-Import Bank

with the technical experts for evaluating investments and would participate in the monitoring of the technical progress during project implementation.

A small fund could also be earmarked at TDA for feasibility studies for the eligible technologies and for training of host country technical, government and business personnel. TDA provides grants to the host country for conducting very preliminary low cost feasibility studies to determine if the idea merits future investment. These studies may not provide sufficient definition for financing or project control. The definition activities that would be cost shared by DOE would provide this information and would be more costly than the feasibility study, therefore requiring cost sharing to demonstrate commitment by the U.S. firm and host country. Investment in front end definition for projects repeatedly pays off in the long term through reduced technical and business uncertainty resulting in less potential for cost overruns.

There are considerable advantages to structuring the program to use the existing expertise of organizations well versed in overseas financing and the OECD regulations. The DOE does not have the expertise required for international finance nor does the DOE procurement system easily accommodate the issuing of loans and loan guarantees. Financing done through DOE would be very limited in the ability to leverage the government funds and DOE would not have the financing flexibility of the other agencies. Traditionally the Export-Import Bank funds are leveraged twenty-to-one, thus a $600 million fund at the bank could finance over $12 billion of projects when considering the equity invested. Using the Bank and OPIC for financing will provide greater flexibility through having more mechanisms of financing available. The World Bank Global Environmental Fund could also be a source of financing for the projects.

In the international market the financing flexibility and terms maybe more important for equipment sales and services than the merits of the technology being offered. To achieve the objectives of the Technology Transfer Program defined by the Energy Policy Act, there is considerable merit to implementing the program through a marriage of the DOE technical expertise and the financial and business expertise of the agencies created for assisting overseas projects. By structuring the program as described, industry would continue to work with the same organizations as it has in the past for seeking overseas financing.

Applicable Projects and Technologies

Both approaches would be applicable to projects in the host countries where the U.S. firm has an equity interest in the project, this could include grassroots, retrofit or repowering projects. Where appropriate government financing could be packaged for the entire project, for the incremental cost for the portion of the project applicable to energy efficiency or environmental controls, or just for the differential cost of using U.S. technology rather than the conventional technology generic to the host country.

Under sec 1332 the project should use U.S. clean coal technology, and where appropriate U.S. coal resources, in meeting the applicable energy

and environmental requirements of the host country. Under sec. 1608 the project should use a U.S. technology that substantially reduces environmental pollutants, including greenhouse gases, in meeting the applicable energy and environmental requirements of the host country.

Solicitation Structure

There are three basic ways to structure the solicitations for projects under the program 1) one step process, 2) two step process or 3) a program rule. The one step process is exactly the same as the solicitations for the clean coal program. A proposal is submitted and by a certain date selections are made. Usually this approach does not allow for discussions between the proposer and the government prior to selection.

The two step selection process would reduce the proposals to a competitive range and discussions would be conducted with these proposers. This should result in a better selection through gaining a more accurate understanding of the validity of the information contained in the proposals. The winning proposals would be selected from those in the competitive range. By narrowing the field of selection prior to discussions, the two step process would not be significantly longer than the single step process.

If the solicitation were for the showcase demonstrations a variation of the two step process could be used. Proposals could be selected for definition activities followed by a second selection prior to detailed design and construction. This would allow the selection of more projects for definition then there is funding for construction. Since these are demonstrations, there is uncertainty as to the continued viability or attractiveness of the project as the definition activities proceed. By over selecting and having a second screening prior to funding detailed design and construction there is a higher probability of successful demonstrations resulting in future sales of equipment and services.

The third method is called a program rule, this is an open ended solicitation. Over a period of time proposals are submitted and reviewed based upon in the priority of when received. The open period for submittal could be up to two years. The program rule has not been widely used in the Department. Another difficulty, especially in a political environment, is the pacing of the selections to prevent the entire funding from being awarded to just early submittals.

Staged Solicitations

Considering the experience gained under the Clean Coal Program it might be appropriate to have multiple sequential solicitations. The subsequent solicitations in the Clean Coal Program profited from the learning experience of the prior solicitations resulting in considerable improvements in each round. A prudent approach to successfully implementing the program is to limit the initial solicitation to a few key countries with attractive markets for U.S. technology, that have a practical approach to a free market economy as well as an attractive business climate and acceptable political risks.

After gaining the experience of the first solicitation then issue subsequent solicitations encompassing more countries or dedicated to different countries. Initially the solicitation maybe targeted to projects located in one or two countries in eastern Europe and Asia.

Limited Funding

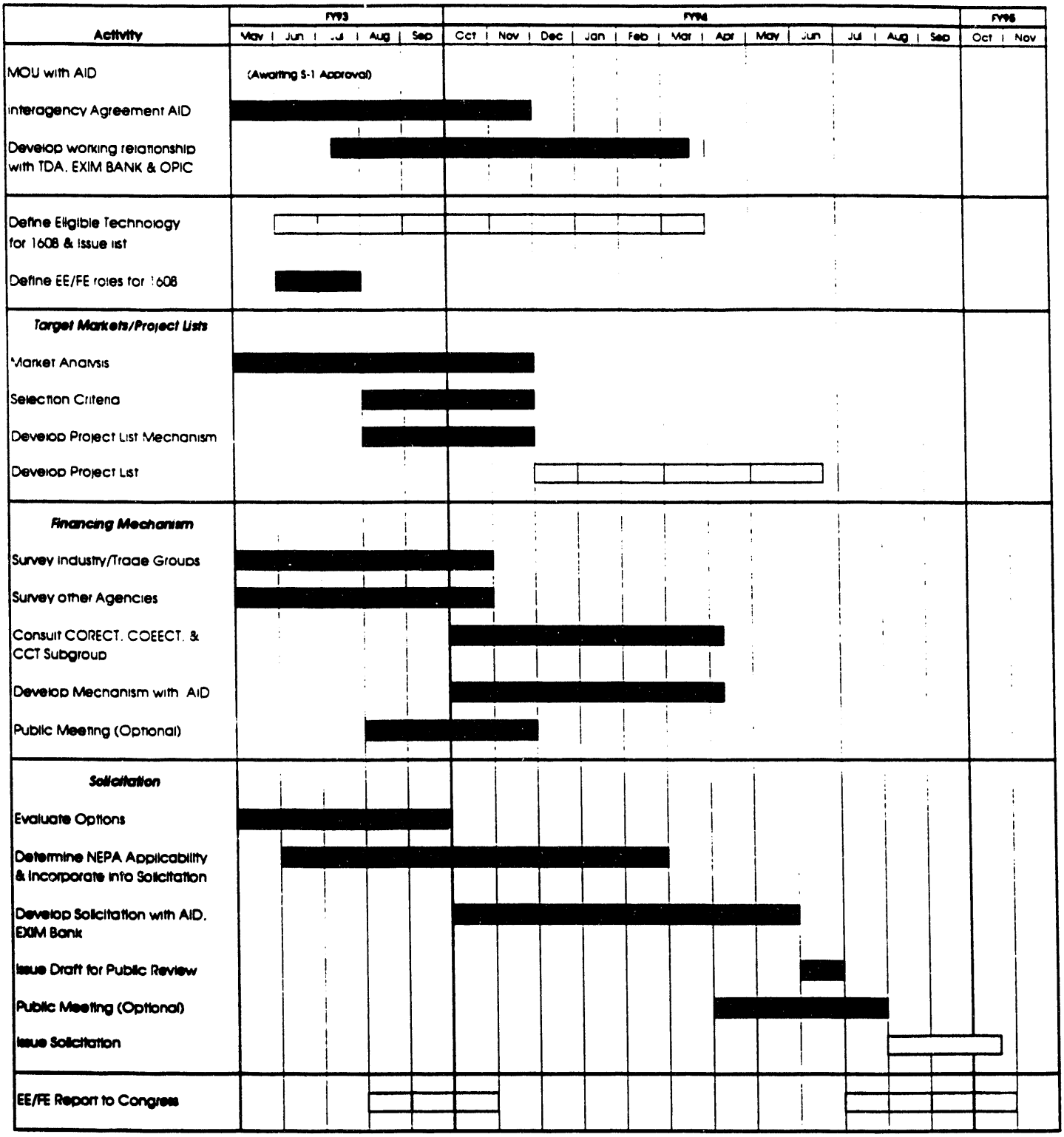
If the funding is significantly less than authorized ($1.2 billion) by 1332 and 1608 (less than $100 million) the most useful program approach maybe to limit the government funds to project definition activities or financing the differential cost of using U.S. technology, or incremental cost of pollution control for smaller projects. The funding of definition activities would reduce the front end costs of project development for industry while enabling activities to proceed that are necessary to obtain the financing of the project through other government programs, World Bank or commercial institutions. The DOE could assist in coordinating with the ultimate project funding agency to ensure the most appropriate actives are being pursued during the definition phase.

Schedule

A schedule of activities for the development and issuing of a solicitation by early Fy 1995 is attached.

Schedule for Innovative Technology

Transfer Program (EPAct secs. 1211, 1332, &1608)



SUGGESTED TOPICS OF DISCUSSION

1. Problems of doing business in developing countries
2. What would be the most useful role of the government?
3. Views on the "straw man" approach towards meeting the needs of industry
4. Appropriate forms of finance or risk mitigation
5. A few "showcase" demonstrations vs maximization of projects through leveraging funding through EX/IM Bank
6. Solicitation structure
7. Definition of United States Firm and United States clean coal technology
8. Countries with the best prospects of success for initially conducting the program
9. Other topics of interest

SEC. 1332. INNOVATIVE CLEAN COAL TECHNOLOGY TRANSFER PROGRAM.

(a) ESTABLISHMENT OF PROGRAM.—The Secretary, through the Agency for International Development, and in consultation with the other members of the CCT Subgroup, shall establish a clean coal technology transfer program to carry out the purposes described in subsection (b). Within 150 days after the date of enactment of this Act, the Secretary and the Administrator of the Agency for International Development shall enter into a written agreement to carry out this section. The agreement shall establish a procedure for resolving any disputes between the Secretary and the Administrator regarding the implementation of specific projects. With respect to countries not assisted by the Agency for International Development, the Secretary may enter into agreements with other appropriate United States agencies. If the Secretary and the Administrator, or the Secretary and an agency described in the previous sentence, are unable to reach an agreement, each shall send a memorandum to the President outlining an appropriate agreement. Within 90 days after receipt of either memorandum, the President shall determine which version of the agreement shall be in effect. Any agreement entered into under this subsection shall be provided to the appropriate committees of the Congress and made available to the public.

(b) PURPOSES OF THE PROGRAM.—The purposes of the technology transfer program under this section are to—

(1) reduce the United States balance of trade deficit through the export of United States energy technologies and technological expertise;

(2) retain and create manufacturing and related service jobs in the United States;

(3) encourage the export of United States technologies, including services related thereto, to those countries that have a need for developmentally sound facilities to provide energy derived from coal resources;

(4) develop markets for United States technologies and, where appropriate, United States coal resources to be utilized in meeting the energy and environmental requirements of foreign countries;

(5) better ensure that United States participation in energy-related projects in foreign countries includes participation by United States firms as well as utilization of United States technologies that have been developed or demonstrated in the United States through publicly or privately funded demonstration programs;

(6) provide for the accelerated deployment of United States technologies that will serve to introduce into foreign countries United States technologies intended to use coal resources in a more efficient, cost-effective, and environmentally acceptable manner;

(7) serve to ensure the introduction of United States firms and expertise in foreign countries;

(8) provide financial assistance by the Federal Government to foster greater participation by United States firms in the financing, ownership, design, construction, or operation of clean coal technology projects in foreign countries;

(9) assist foreign countries in meeting their energy needs through the use of coal in an environmentally acceptable manner, consistent with sustainable development policies; and

(10) assist United States firms, especially firms that are in competition with firms in foreign countries, to obtain opportunities to transfer technologies to, or undertake projects in, foreign countries.

(c) IDENTIFICATION.—Pursuant to the agreements required by subsection (a), the Secretary, through the Agency for International Development, and after consultation with the CCT Subgroup, United States firms, and representatives from foreign countries, shall develop mechanisms to identify potential energy projects in host countries, and shall identify a list of such projects within 240 days after the date of enactment of this Act, and periodically thereafter.

(d) FINANCIAL MECHANISMS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, shall—

(A) establish appropriate financial mechanisms to increase the participation of United States firms in energy projects utilizing United States clean coal technologies, and services related thereto, in developing countries and countries making the transition from nonmarket to market economies;

(B) utilize available financial assistance authorized by this section to counterbalance assistance provided by foreign governments to non-United States firms; and

(C) provide financial assistance to support projects, including—

(i) financing the incremental costs of a clean coal technology project attributable only to expenditures to prevent or abate emissions;

(ii) providing the difference between the costs of a conventional energy project in the host country and a comparable project that would utilize a clean coal technology capable of achieving greater efficiency of energy products and improved environmental emissions compared to such conventional project; and

(iii) such other forms of financial assistance as the Secretary, through the Agency for International Development, considers appropriate.

(2) The financial assistance authorized by this section may be—

(A) provided in combination with other forms of financial assistance, including non-United States funding that is available to the project; and

(B) utilized to assist United States firms to develop innovative financing packages for clean coal technology projects that seek to utilize other financial assistance programs available through other Federal agencies.

(3) United States obligations under the Arrangement on Guidelines for Officially Supported Export Credits established through the Organization for Economic Cooperation and Development shall be applicable to this section.

(e) SOLICITATIONS FOR PROJECT PROPOSALS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, within one year after the date of enactment of this Act, and subsequently as appropriate thereafter, shall solicit proposals from United States firms for the design, construction, testing, and operation of the project or projects identified under subsection (c) which propose to utilize a United States technology. Each solicitation under this section shall establish a closing date for receipt of proposals.

(2) The solicitation under this subsection shall, to the extent appropriate, be modeled after the RFP No. DE-PS01-90FE62271 Clean Coal Technology IV as administered by the Department of Energy.

(3) Any solicitation made under this subsection shall include the following requirements:

(A) The United States firm that submits a proposal in response to the solicitation shall have an equity interest in the proposed project.

(B) The project shall utilize a United States clean coal technology, including services related thereto, and, where appropriate, United States coal resources, in meeting the applicable energy and environmental requirements of the host country.

(C) Proposals for projects shall be submitted by and undertaken with a United States firm, although a joint venture or other teaming arrangement with a non-United States manufacturer or other non-United States entity is permissible.

(f) ASSISTANCE TO UNITED STATES FIRMS.—Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, and in consultation with the CCT Subgroup, shall establish a procedure to provide financial assistance to United States firms under this section for a project identified under subsection (c) where solicitations for the project are being conducted by the host country or by a multilateral lending institution.

(g) OTHER PROGRAM REQUIREMENTS.—Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, and in consultation with the CCT Subgroup, shall—

(1) establish eligibility criteria for countries that will host projects;

(2) periodically review the energy needs of such countries and export opportunities for United States firms for the development of projects in such countries;

(3) consult with government officials in host countries and, as appropriate, with representatives of utilities or other entities in host countries, to determine interest in and support for potential projects; and

(4) determine whether each project selected under this section is developmentally sound, as determined under the criteria developed by the Development Assistance Committee of the Organization for Economic Cooperation and Development.

(h) SELECTION OF PROJECTS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, shall, not later than 120 days after receipt of proposals in response to a solicitation under subsection (e), select one or more proposals under this section.

(2) In selecting a proposal under this section, the Secretary, through the Agency for International Development, shall consider—

(A) the ability of the United States firm, in cooperation with the host country, to undertake and complete the project;

(B) the degree to which the equipment to be included in the project is designed and manufactured in the United States;

(C) the long-term technical and competitive viability of the United States technology, and services related thereto, and the ability of the United States firm to compete in the development of additional energy projects using such technology in the host country and in other foreign countries;

(D) the extent of technical and financial involvement of the host country in the project;

(E) the extent to which the proposed project meets the goals and objectives stated in section 1301(a);

(F) the extent of technical, financial, management, and marketing capabilities of the participants in the project, and the commitment of the participants to completion of a successful project in a manner that will facilitate acceptance of the United States technology for future application; and

(G) such other criteria as may be appropriate.

(3) In selecting among proposed projects, the Secretary shall seek to ensure that, relative to otherwise comparable projects in the host country, a selected project will meet 1 or more of the following criteria:

(A) It will reduce environmental emissions to an extent greater than required by applicable provisions of law.

(B) It will increase the overall efficiency of the utilization of coal, including energy conversion efficiency and, where applicable, production of products derived from coal.

(C) It will be a more cost-effective technological alternative, based on life cycle capital and operating costs per unit of energy produced and, where applicable, costs per unit of product produced.

Priority in selection shall be given to those projects which, in the judgment of the Secretary, best meet one or more of these criteria.

(i) UNITED STATES-ASIA ENVIRONMENTAL PARTNERSHIP.—Activities carried out under this section shall be coordinated with the United States-Asia Environmental Partnership.

(j) BUY AMERICA.—In carrying out this section, the Secretary, through the Agency for International Development, and pursuant to the agreements under subsection (a), shall ensure—

(1) the maximum percentage, but in no case less than 50 percent, of the cost of any equipment furnished in connection with a project authorized under this section shall be attributable to the manufactured United States components of such equipment; and

(2) the maximum participation of United States firms.

In determining whether the cost of United States components equals or exceeds 50 percent, the cost of assembly of such United States components in the host country shall not be considered a part of the cost of such United States component.

(k) REPORTS TO CONGRESS.—The Secretary and the Administrator of the Agency for International Development shall report annually to the Committee on Energy and Natural Resources of the Senate and the appropriate committees of the House of Representatives on the progress being made to introduce clean coal technologies into foreign countries.

(l) DEFINITION.—For purposes of this section, the term "host country" means a foreign country which is—

(1) the participant in or the site of the proposed clean coal technology project; and

(2) either—

(A) classified as a country eligible to participate in development assistance programs of the Agency for International Development pursuant to applicable law or regulation; or

(B) a developing country or country with an economy in transition from a nonmarket to a market economy.

(m) AUTHORIZATION FOR PROGRAM.—There are authorized to be appropriated to the Secretary to carry out the program required by this section, $100,000,000 for each of the fiscal years 1993, 1994, 1995, 1996, 1997, and 1998.

SEC. 1608. INNOVATIVE ENVIRONMENTAL TECHNOLOGY TRANSFER PROGRAM.

(a) ESTABLISHMENT OF PROGRAM.—The Secretary, through the Agency for International Development, and in consultation with the interagency working group established under section 256(d) of the Energy Policy and Conservation Act (in this section referred to as the "interagency working group", shall establish a technology transfer program to carry out the purposes described in subsection (b). Within 150 days after the date of the enactment of this Act, the Secretary and the Administrator of the Agency for International Development shall enter into a written agreement to carry out this section. The agreement shall establish a procedure for resolving any disputes between the Secretary and the Administrator regarding the implementation of specific projects. With respect to countries not assisted by the Agency for International Development, the Secretary may enter into agreements with other appropriate Federal agencies. If the Secretary and the Administrator, or the Secretary and an agency described in the previous sentence, are unable to reach an agreement, each shall send a memorandum to the President outlining an appropriate agreement. Within 90 days after receipt of either memorandum, the President shall determine which version of the agreement shall be in effect. Any agreement entered into under this subsection shall be provided to the appropriate committees of the Congress and made available to the public.

(b) PURPOSES OF THE PROGRAM.—The purposes of the technology transfer program under this section are to—

(1) reduce the United States balance of trade deficit through the export of United States energy technologies and technological expertise;

(2) retain and create manufacturing and related service jobs in the United States;

(3) encourage the export of United States technologies, including services related thereto, to those countries that have a need for developmentally sound facilities to provide energy derived from technologies that substantially reduce environmental pollutants, including greenhouse gases;

(4) develop markets for United States technologies, including services related thereto, that substantially reduce environmental pollutants, including greenhouse gases, that meet the energy and environmental requirements of foreign countries;

(5) better ensure that United States participation in energy-related projects in foreign countries includes participation by United States firms as well as utilization of United States technologies;

(6) ensure the introduction of United States firms and expertise in foreign countries;

(7) provide financial assistance by the Federal Government to foster greater participation by United States firms in the financing, ownership, design, construction, or operation of technologies or services that substantially reduce environmental pollutants, including greenhouse gases; and

(8) assist United States firms, especially firms that are in competition with firms in foreign countries, to obtain opportunities to transfer technologies to, or undertake projects in, foreign countries.

(c) IDENTIFICATION.—Pursuant to the agreements required by subsection (a), the Secretary, through the Agency for International Development, and after consultation with the interagency working group, United States firms, and representatives from foreign countries, shall develop mechanisms to identify potential energy projects in host countries that substantially reduce environmental pollutants, including greenhouse gases, and shall identify a list of such projects within 240 days after the date of the enactment of this Act, and periodically thereafter.

(d) FINANCIAL MECHANISMS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, shall—

(A) establish appropriate financial mechanisms to increase the participation of United States firms in energy projects, and services related thereto, that substantially reduce environmental pollutants, including greenhouse gases in foreign countries;

(B) utilize available financial assistance authorized by this section to counterbalance assistance provided by foreign governments to non-United States firms; and

(C) provide financial assistance to support projects.

(2) The financial assistance authorized by this section may be—

(A) provided in combination with other forms of financial assistance, including non-Federal funding that may be available for the project; and

(B) utilized in conjunction with financial assistance programs available through other Federal agencies.

(3) United States obligations under the Arrangement on Guidelines for Officially Supported Export Credits established through the Organization for Economic Cooperation and Development shall be applicable to this section.

(e) SOLICITATIONS FOR PROJECT PROPOSALS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, within one year after the date of the enactment of this Act, and subsequently as appropriate thereafter, shall solicit proposals from United States firms for the design, construction, testing, and operation of the project or projects identified under subsection (c) which propose to utilize a United States technology or service. Each solicitation under this section shall establish a closing date for receipt of proposals.

(2) The solicitation under this subsection shall, to the extent appropriate, be modeled after the RFP No. DE-PS01-90FE62271 Clean Coal Technology IV, as administered by the Department of Energy.

(3) Any solicitation made under this subsection shall include the following requirements:

(A) The United States firm that submits a proposal in response to the solicitation shall have an equity interest in the proposed project.

(B) The project shall utilize a United States technology, including services related thereto, that substantially reduce environmental pollutants, including greenhouse gases, in meeting the applicable energy and environmental requirements of the host country.

(C) Proposals for projects shall be submitted by and undertaken with a United States firm, although a joint venture or other teaming arrangement with a non-United States manufacturer or other non-United States entity is permissible.

(f) ASSISTANCE TO UNITED STATES FIRMS.—Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, and in consultation with the interagency working group, shall establish a procedure to provide financial assistance to United States firms under this section for a project identified under subsection (c) where solicitations for the project are being conducted by the host country or by a multilateral lending institution.

(g) OTHER PROGRAM REQUIREMENTS.—Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, and in consultation with the interagency working group, shall—

(1) establish eligibility criteria for countries that will host projects;

(2) periodically review the energy needs of such countries and export opportunities for United States firms for the development of projects in such countries;

(3) consult with government officials in host countries and, as appropriate, with representatives of utilities or other entities in host countries, to determine interest in and support for potential projects; and

(4) determine whether each project selected under this section is developmentally sound, as determined under the criteria developed by the Development Assistance Committee of the Organization for Economic Cooperation and Development.

(h) ELIGIBLE TECHNOLOGIES.—Not later than 6 months after the date of the enactment of this Act, the Secretary shall prepare a list of eligible technologies and services under this section. In preparing such a list, the Secretary shall consider fuel cell powerplants, aeroderivitive gas turbines and catalytic combustion technologies for aeroderivitive gas turbines, ocean thermal energy conversion technology, anaerobic digester and storage tanks, and other renewable energy and energy efficiency technologies.

(i) SELECTION OF PROJECTS.—(1) Pursuant to the agreements under subsection (a), the Secretary, through the Agency for International Development, shall, not later than 120 days after receipt of proposals in response to a solicitation under subsection (e), select one or more proposals under this section.

(2) In selecting a proposal under this section, the Secretary, through the Agency for International Development, shall consider—

(A) the ability of the United States firm, in cooperation with the host country, to undertake and complete the project;

(B) the degree to which the equipment to be included in the project is designed and manufactured in the United States;

(C) the long-term technical and competitive viability of the United States technology, and services related thereto, and the ability of the United States firm to compete in the development of additional energy projects using such technology in the host country and in other foreign countries;

(D) the extent of technical and financial involvement of the host country in the project;

(E) the extent to which the proposed project meets the purposes of this section;

(F) the extent of technical, financial, management, and marketing capabilities of the participants in the project, and the commitment of the participants to completion of a successful project in a manner that will facilitate acceptance of the United States technology or service for future application; and

(G) such other criteria as may be appropriate.

(3) In selecting among proposed projects, the Secretary shall seek to ensure that, relative to otherwise comparable projects in the host country, a selected project will meet the following criteria:

(A) It will reduce environmental emissions, including greenhouse gases, to an extent greater than required by applicable provisions of law.

(B) It will be a more cost-effective technological alternative, based on life cycle capital and operating costs per unit of energy produced and, where applicable, costs per unit of product produced.

(C) It will increase the overall efficiency of energy use.

Priority in selection shall be given to those projects which, in the judgment of the Secretary, best meet these criteria.

(j) UNITED STATES-ASIA ENVIRONMENTAL PARTNERSHIP.—Activities carried out under this section shall be coordinated with the United States-Asia Environmental Partnership.

(k) BUY AMERICA.—In carrying out this section, the Secretary, through the Agency for International Development, and pursuant to the agreements under subsection (a), shall ensure—

(1) the maximum percentage, but in no case less than 50 percent, of the cost of any equipment furnished in connection with a project authorized under this section shall be attributable to the manufactured United States components of such equipment; and

(2) the maximum participation of United States firms.

In determining whether the cost of United States components equals or exceeds 50 percent, the cost of assembly of such United States components in the host country shall not be considered a part of the cost of such United States component.

(l) REPORT TO CONGRESS.—The Secretary and the Administrator of the Agency for International Development shall report annually to the Committee on Energy and Natural Resources of the Senate and the appropriate committees of the House of Representatives on the progress being made to introduce innovative energy technologies, and services related thereto, that substantially reduce environmental pollutants, including greenhouse gases, into foreign countries.

(m) DEFINITIONS.—For purposes of this section—

(1) the term "host country" means a foreign country which is—

(A) the participant in or the site of the proposed innovative energy technology project; and

(B) either—

(i) classified as a country eligible to participate in development assistance programs of the Agency for

International Development pursuant to applicable law or regulation; or

(ii) a developing country; and

(2) the term "developing country" includes, but is not limited to, countries in Central and Eastern Europe or in the independent states of the former Soviet Union.

(n) AUTHORIZATION FOR PROGRAM.—There are authorized to be appropriated to the Secretary to carry out the program required by this section, $100,000,000 for each of the fiscal years 1993, 1994, 1995, 1996, 1997, and 1998.

2.5 KEY DEFINITIONS

DEFINITIONS

"UNITED STATES FIRM"

For the purposes of this solicitation, a "United States Firm" is one of the following:

(a) An individual possessing United States Citizenship, or

(b) A corporation incorporated under the laws of the United States, or

(c) Indian tribes located in the United States, or

(d) A joint venture or partnership organized under the laws of the United States, in the case of the joint venture each partner must meet the criteria in (a), (b), or (c).

"UNITED STATES TECHNOLOGY"

(a) For the purpose of this solicitation, a "United States Technology" is any technology which is either owned (50% or more) by a United States firm or which is in the public domain. An offeror who is a United States firm may propose a technology owned by another United States firm provided the offeror is licensed to use such technology.

(b) Technology refers to the intellectual property embodied in the process and in the Furnished Equipment being demonstrated.

(c) Components of Furnished Equipment which embody other than United States Technology shall comprise not more than 50 percent of the total cost of Furnished Equipment. In determining if the cost of the components exceeds 50 percent, the cost of delivery to and assembly in the Host country of the components shall be excluded from the total cost of the Furnished Equipment.

"MANUFACTURED IN THE UNITED STATES"

For the purposes of this solicitation, furnished equipment shall be considered manufactured in the United States if the cost of its manufactured U.S. components exceeds 50 percent of the total cost of all its components. In determining if the cost of the components exceed 50 percent:

(a) The cost of delivery to and assembly in the Host country of the components shall be excluded from the total cost of the furnished equipment, and

(b) The cost of manufacture of the components in the Host country shall be excluded from the total cost of the Furnished Equipment.

Manufacture in Host country of a component as contemplated in (b) above shall occur only if there is no adequate United States capability to manufacture that component.

"BUY AMERICAN"

Implementation of a China and Eastern Europe Clean Coal Demonstration program will ensure:

(1) The maximum percentage, but in no case less than 50 percent, of the cost of any equipment furnished in connection with financial assistance provided by the U.S. government to a project shall be attributable to the manufactured United States components of such equipment; and

(2) the maximum participation of United States firms.

In determining whether the cost of United States components equals or exceeds 50 percent, the cost of assembly of such United States components in the host country shall not be considered a part of such United States component.

2.6 CANDIDATE PROJECT AREAS IN THE REGION

POTENTIAL INTERNATIONAL CLEAN COAL TECHNOLOGY TRANSFER PROJECT AREAS

ASIA-PACIFIC

Repowering and Retrofit Technologies

CHINA

1. Coal beneficiation
2. Coal gasification for:
   - fuel gas (town gas)
   - synthesis gas (chemicals/feedstocks)
3. Fluidized-bed combustion:
   - circulating fluidized-bed
   - pressurized fluidized-bed
4. Retrofit SO_2 and NO_x control technologies
5. Coal-fired diesel engines
6. Integrated gasification combined cycle (IGCC)

THAILAND

1. Coal beneficiation
2. Fluidized-bed combustion
3. Retrofit SO_2 and NO_x control technologies

INDONESIA

1. Coal beneficiation
2. Fluidized-bed combustion
3. Coal-Water fuels

EASTERN EUROPE AND THE NEWLY INDEPENDENT STATES (NIS)

Retrofit Technologies

1. Coal beneficiation
2. Low cost SO_2 and NO_x control
3. Fluidized-bed combustion:
   - power generation
   - district heating
4. Integrated gasification combined cycle (IGCC)
5. Power plant refurbishment (modernization)

2.7 DESCRIPTION OF PRESIDENT CLINTON'S JOINT IMPLEMENTATION PROGRAM FOR CLIMATE CHANGE

JOINT IMPLEMENTATION

Efforts undertaken cooperatively between countries or entities within them to reduce net greenhouse gas emissions -- called joint implementation -- hold significant potential for combatting the threat of global warming and promoting sustainable development. Joint implementation is recognized under the Framework Convention on Climate Change (the Climate Convention) and is an approach open to all Parties to the Convention.

Joint implementation could potentially achieve greater emission reductions than might be possible if each country pursued only domestic actions, and could achieve these reductions more cost-effectively. Joint implementation may also spur technology cooperation -- increasing developing countries' access to energy efficiency and renewable energy technologies while stimulating export markets for industrialized countries. At the same time, significant questions arise about what kinds of activities might take place under the rubric of joint implementation: whether these would produce real reductions; whether they would be "new and additional" to ongoing development assistance or private business transactions; how to measure and track net emission reductions achieved; how to assure that reductions in one place do not give rise to increases in another; and how to assure that net reductions will not be lost or reversed through time.

The Intergovernmental Negotiating Committee, the body that negotiated the terms of the Climate Convention, took up the issue of joint implementation for the first time during its Eighth Session in August 1993. The Climate Convention calls upon the Conference of the Parties to adopt international criteria for joint implementation at its first session, tentatively scheduled for late March 1995. International efforts to develop criteria for joint implementation will clearly benefit from real world experience. At the same time, a number of U.S. firms, especially electric utilities considering voluntary emission reduction commitments, have indicated their interest in international projects.

Joint Implementation Strategy

The Climate Change Action Plan will achieve the goal of returning U.S. greenhouse gas emissions to 1990 levels by the year 2000 with domestic actions alone. However, the Administration recognizes the enormous potential for cost-effective greenhouse gas emission reductions in other countries, and the promise of joint implementation can only be realized if pilot projects are evaluated under workable criteria that avoid the pitfalls mentioned above. The Administration is therefore announcing a pilot program -- the U.S. Initiative on Joint Implementation (USIJI). The primary purpose of the U.S. initiative is to help establish an empirical basis for considering approaches to joint implementation internationally and thus help realize the enormous potential for joint implementation both to combat the threat of global warming and to promote sustainable development.

PRESIDENT CLINTON IS DIRECTING:

- The Department of State, in consultation with other Agencies, to develop the U.S. Initiative on Joint Implementation (USIJI) as a pilot program.

- The Department of State to publish the initial guidelines for the USIJI in the Federal Register for public comment. The USIJI groundrules are found in Appendix II and include the following key features:

- The USIJI will provide a mechanism for investments by U.S. firms and potential government assistance to be evaluated for net greenhouse gas emission reductions.

- The USIJI will establish an interagency evaluation panel to certify net emission reduction estimates from qualified projects

- The USIJI will adhere to strict criteria to evaluate potential emission reductions in order to maximize international acceptance of emission reductions.

- Net emission reductions achieved as a result of projects developed under the USIJI will be measured, tracked, and scored. An accounting of these reductions will be part of the U.S. National Action Plan.

- The U.S. Initiative will be evaluated and assessed within two years of its inception or within six months of adoption of international criteria for joint implementation by the Conference of the Parties under the Climate Convention, whichever is earlier.

APPENDIX II

GROUNDRULES FOR U.S. INITIATIVE ON JOINT IMPLEMENTATION

The following describes the U.S. Initiative on Joint Implementation (USIJI), which shall be established as a pilot program.

Section 1 - Purpose

The purpose of the pilot program shall be to:

(1) encourage the rapid development and implementation of cooperative, mutually voluntary projects between U.S. and foreign partners aimed at reducing net emissions of greenhouse gases, particularly projects promoting technology cooperation with and sustainable development in developing countries and countries with economies in transition to market economies;

(2) promote a broad range of cooperative, mutually voluntary projects to test and evaluate methodologies for measuring, tracking and verifying costs and benefits;

(3) establish an empirical basis to contribute to the formulation of international criteria for joint implementation;

(4) encourage private sector investment and innovation in the development and dissemination of technologies for reducing net emissions of greenhouse gases; and

(5) encourage participating countries to adopt more complete climate protection programs, including national inventories, baselines, policies and measures, and appropriate specific commitments.

Section 2 - Evaluation and Reassessment of Pilot Program

The pilot program shall be evaluated and reassessed within two years of its inception or within six months of adoption of international criteria for joint implementation by the Conference of the Parties to the United Nations Framework Convention on Climate Change, whichever is earlier.

Section 3 - Eligible Participants

A. Domestic

(1) Any U.S. citizen or resident alien;

(2) any company, organization or group incorporated under or recognized by the laws of the United States; or

(3) any U.S. federal, state or local government entity.

B. Foreign

(1) Any country that has signed, ratified or acceded to the United Nations Framework Convention on Climate Change;

(2) any citizen or resident alien of a country identified in B(1) of this section;

(3) any company, organization or group incorporated under or recognized by the laws of a country identified in B(1) of this section; or

(4) any national, provincial, state, or local government entity of a country identified in B(1) of this section.

Section 4 - Evaluation Panel

A. An Evaluation Panel is hereby established.

B. The Evaluation Panel shall consist of eight members, of whom:

(1) one shall be an employee of the Department of Energy, who shall serve as Co-Chair;

(2) one shall be an employee of the Environmental Protection Agency, who shall serve as Co-Chair;

(3) one shall be an employee of the Agency for International Development;

(4) one shall be an employee of the Department of Agriculture;

(5) one shall be an employee of the Department of Commerce;

(6) one shall be an employee of the Department of the Interior;

(7) one shall be an employee of the Department of State; and

(8) one shall be an employee of the Department of the Treasury.

C. The Panel shall be responsible for:

(1) Advising and assisting prospective U.S. and foreign participants on the technical parameters (including with respect to baselines, measuring and tracking) of projects submitted for inclusion in the USIJI;

(2) accepting project submissions from eligible U.S. participants and their foreign partners;

(3) reviewing and evaluating project submissions;

(4) approving or rejecting project submissions for inclusion in the USIJI, based on criteria contained in section 5;

(5) providing written reasons for its decisions, which shall be made publicly available, within 90 days of receipt of a complete submission or resubmission;

(6) certifying net emissions reductions estimated to result from projects; and

(7) preparing an annual report of its activities, including a summary of approved projects.

Section 5 - Criteria

A. To be included in the USIJI, the Evaluation Panel must find that a project submission:

(1) is accepted by the government of the host country;

(2) provides data and methodological information sufficient to estimate current and future net greenhouse gas emissions in the absence of, and as the result of, the project;

(3) will produce net reductions in greenhouse gas emissions that would not reasonably be likely to occur, based on available information, but for the proposed project, and if federally funded, is or will be undertaken with funds in excess of those available for such activities in fiscal year 1993;

(4) contains adequate provisions for tracking the actual net greenhouse gas emissions resulting from the project, and on a periodic basis, for modifying net greenhouse gas emissions reduction estimates and for comparing actual results with those originally projected;

(5) contains adequate provisions for external verification of the actual net greenhouse gas emissions resulting from the project;

(6) identifies any associated non-greenhouse gas environmental impacts/benefits;

(7) provides adequate assurance that actual net greenhouse gas reduction benefits accumulated over time will not be lost or reversed;

(8) provides for registration of the project in the national inventory established under section 1605 of the Energy Policy Act of 1992*; and

(9) provides for annual reports to the Evaluation Panel on the actual reduction achieved in net greenhouse gas emissions and on the share of such reduction attributed to each of the participants, domestic and foreign, pursuant to the terms of voluntary agreements among project participants.

B. In determining whether to include projects under the USIJI, the Evaluation Panel shall also consider:

(1) the potential for the project to lead to net changes in greenhouse gas emissions elsewhere;

(2) the potential positive and negative effects of the project apart from its effect on net greenhouse gas emissions;

(3) whether the U.S. participants are net emitters of greenhouse gases within the United States and, if so, whether they are taking measures to reduce such net emissions; and

(4) whether efforts are underway within the host country to ratify or accede to the United Nations Framework Convention on Climate Change, to develop a national inventory and/or baseline of net greenhouse gas emissions, and whether the host country is taking measures to reduce its net emissions of greenhouse gases.

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* With respect to information received about such projects under section 1605, the Department of Energy will coordinate with the Environmental Protection Agency to enable it to fulfill its responsibilities under the Global Climate Protection Act of 1987 and the Clean Air Act, as amended.

CHAPTER 3

SUMMARY PROCEEDINGS OF THE REGIONAL DISCUSSION GROUPS AND FINANCIAL ASSISTANCE SESSION

Chapter 3

3.1 EASTERN EUROPE AND NIS

3.1 Eastern Europe and NIS

Thursday, February 10, 1994

Howard Feibus, Chairman
Joeseph P. Strakey, Co-chairman

The organizations represented at this session were as follows:

Rosebud Syncoal Partnership
Institute of Gas Technology
Custom Coals Corporation
H. Zinder & Associates
Science Applications International Corporation
Coal Tech Corporation
Usibelli Coal Mine Inc.
Resource Dynamics Corporation
Viking Systems International
EERC/University of North Dakota
Coal & Synfuels Technology
Burns & Roe Services Corp.
EG&G Technical Services
West Virginia University
Donlee Technologies, Inc.
Clean Coal Technology Coalition
Gilbert/Commonwealth
Edison Electric Institute
U.S. General Accounting Office
ABB Combustion Engineering
Kennecott Corporation
Allison Engine Company
U.S. Environmental Protection Agency
Air Products & Chemicals
Westinghouse Electric Corp.
Energotechnology Corporation
Senate Committee on Energy
Duke Engineering & Services, Inc.
U.S. Agency for International Development
Virginia Department of Economic Development
NRG Energy Inc.
APCI/Pure Air
Nalco Fuel Tech
VORTEC Corporation
CQ Inc.
ER3 Inc.
Department of Labor
Bechtel
U.S. Energy Assoc.
E.F.H. Coal Company
Stone & Webster
Babcock & Wilcox
AEC
Intratech Inc.
ABB Susa, Inc.
Texaco, Inc.
Power International
Pulse Point, Inc.
AEA O'Donnell, Inc.
Intersean Group
Czech Embassy
VTI, Russia
NYSEG
Cirrito Association
Halliburton NUS
Lotepro Corporation
Embassy of Romania
Stamoulis, Inc.
ABB Lummus Crest
Sales Builders, Inc.
Catholic University
EC Delegation
William Bartok, Inc.
Journal of Commerce
RusSon, Inc.

After opening remarks by the Chairperson, Howard Feibus, representatives of several embassies from the region made brief presentations on the needs of their countries for clean coal technologies and some of the difficulties in financing projects. Their remarks are summarized below.

Poland. Andrzej Rabcezenko, Counsellor of Scientific Technological Office, Embassy of Poland. Poland is heavily dependent on coal for its electric power needs. Only 2.5 percent of power stations do not use coal. About 40 percent of the SO2 and NOx emissions come from these coal-fired plants. Poland will continue to rely heavily on coal, but must upgrade many of the power plants. Plans call for upgrading 11 blocks in four stations followed by another 20 blocks in six stations.

To upgrade these plants, Poland will rely mostly on Polish and U.S. technology. They have a good history of cooperation with the U.S. and a strong interest in continuing the cooperation with the appropriate parties in the U.S. to both 1) clean the environment and 2) increase efficiency.

Czech Republic. Jana Simonova, Second Secretary, Embassy of the Czech Republic. The Czech Republic has a healthy economy, conducive to investment. The inflation rate was 12 percent last year (after correction for a new Value Added tax). The unemployment rate is a low 3.5 percent. Eight percent of GNP is exported to the west. The currency is stable. Labor costs are low. Bonds are rated as "BBB" by Standard and Poors. As a result, over $2 billion of foreign investment was made in Poland last year.

CEZ, the state utility that operates the power plants is being privatized in two steps, the first of which has already been accomplished. No new electric generation capacity is anticipated in the near future. Poland is a small net exporter of electric power. The majority of this capacity is coal-fired and is located in the north. Most of these plants are seriously outdated and in need of refurbishment.

The local coal is high in ash, sulfur, and air toxics. Air quality regulations will go into effect in 1996 and there may be some extensions until 1998 for exceptional cases. The strategy adopted by the Czech Republic calls for retirement of older units; installation of cleanup equipment including flue gas

desulfurization, NOx controls, and electrostatic precipitators. The total cost will be close to $2 billion (53 billion Czech Crowns). This program will upgrade all coal-fired units not scheduled for retirement before 1998.

Romania. Marian Voicu, First Secretary (Economic), Embassy of Romania. The Romanian electric authority, RENEL, operates 19, 159 MWe of electric generation capacity, including 7,558 MWe that is coal-fired. Unfortunately, 2,823 MWe of this capacity is constantly unavailable, the rest operates at a load factor of 50 percent. The problem is that much of the capacity is aged and is very unreliable.

The short-term strategy involves no additional coal-fired capacity, with all the funding directed to upgrading/ rehabilitation of existing units. A rehabilitation program is in place for four large boilers and 11 smaller boilers are being considered for upgrading, but capital for the projects is required. Romania is seeking funding from the World Bank and other international funding sources.

Environmental regulations will be implemented requiring control of SO2, NOx, and particulates for both new and existing units (details were given in a hand-out). Typically, 50 percent reduction of SO2 will be required for existing units, with more stringent levels required for any new capacity.

Romania is very interested in the technologies represented in the Department of Energy's Clean Coal Technology Program, especially those that can be applied in rehabilitation projects, those that can meet their environmental requirements, and those that can find financial support.

Russia. G. G. Olkhovsky, The All-Union Thermal Engineering Institute. Russia uses coal for both electric power production and heating needs. Of the fossil fuels used for these purposes, 27 percent is coal-based, 60 percent is from natural gas, and 13 percent is from heavy oil.

Clean coal technologies are considered to be very important to Russia's future. State-of-the-art supercritical, pulverized coal-fired units of 800 and 1200 MWe have been built. There is little use of flue gas desulfurization or NOx removal presently, but it has been a subject of a lot of Russian

research. The R&D has focused on improved combustion, reburning for NOx control, fluidized bed combustion in small bubbling beds and large circulating beds (now in the design stage). Flue gas desulfurization has focused on capture of SO2 by high-calcium coal ash, duct injection of high-Ca ash, furnace limestone injection, and some wet limestone scrubbing (considered too expensive). NOx control R&D has looked mainly at ammonia injection for selective non-catalytic reduction and testing of catalysts for selective catalytic reduction. Particulate capture research has been conducted on all three major methods--electrostatic precipitators, baghouses, and wet scrubbing of ash.

Open Discussion.

- Market-Based Pricing

  The countries in Eastern Europe are moving towards market-based pricing of electric power. For the consumer, this will likely represent quite a shock since in the past, the consumer did not bear the full cost. The consumers' desire for a cleaner environment is strong, and the cost of clean-up will add to the burden. One option will be to pass the burden to industrial power customers rather than residential consumers.

- Costs-Importance of Capital vs. Operating vs. Life-Cycle Costs

  Many felt that low-capital cost retrofit technologies will play a significant role in this region, considering the shortage of needed capital, and the capability of these moderate removal technologies for retrofit applications in older power plants with limited space, and their ability to achieve a significant improvement in environmental quality relative to the current situation. The technologists in these countries are very aware of the latest technologies and have a strong interest in CCTs. In many cases, the availability of support for specific projects from outside the region may dictate the technology choice. It was noted that many companies use an undeveloped country model to analyze opportunities in Eastern Europe, and these countries are technically sophisticated, but "broke." What they need is

project financing. Another participant noted that the financing problem sometimes causes the best long-term solutions to be sacrificed for more bankable short-term solutions.

- Importance of a Demonstration Project

  It was noted that a demonstration can play a critical role for future commercialization of U.S. technology in the region. By providing part of the financing for the project, we can give U.S. industry an opportunity to showcase U.S. technology, U.S. management practices, and our innovative approaches to financing projects. DOE can also structure the demonstration program to persuade the governments of Eastern Europe to implement reforms that can pave the way for bankable projects. This will be a key to future installations, even if not supported financially by the U.S. Government. We need to get contracts with credit-worthy purchasers started and a partially funded demonstration can help in this.

- Role for Small Firms

  Small firms are finding it very difficult to get into the international marketplace because they do not have the money available for market penetration. However, the small firms with a simple technology would do well in Eastern Europe where there is demand for simple technologies. In order to penetrate the market, the smaller firm might consider teaming up with a larger U.S. firm that can provide the required financial and marketing needs to be successful in bringing the technology to the marketplace. As an example, Westinghouse has spent $3 to $5 million in marketing in Poland over the past few years.

- Commercially Available Technology

  Related to the market, commercially available technology is easier to finance. U.S. firms have been successful with commercial technology in Krakow. The comment wasmade that 90 percent of the firms fail because they do not look at the business aspects or the market correctly. Failure is not related to technology.

- Obstacles to Foreign Market Penetration

  It is hard to play when the rules of the game are not established for private financing of power projects. In some cases, the environmental regulations will require so much capital outlays, that delays or postponements are likely. It is also very difficult to finance projects in a country that does not have market pricing. Other countries are going into Eastern Europe with money and technology. How are the U.S. firms going to finance their U.S. technology? Attendees were encouraged to sign up for a copy of DOE/FE-0286, "Clean Coal Technology Export Finance Programs," dated September 30, 1993, to obtain detailed information about financing mechanisms.

- Need for Sovereign Guarantees

  Privatization is not a panacea, because there is little capital. Under the previous government system, the government provided all of the capital. Without government support, no financing is available. In the U.S., for example, capital is provided by pensions and insurance companies. To get a World Bank loan available at 7 percent, requires a government guarantee. Therefore, to do business in an Eastern European country, a firm must almost insist on the host country's government providing the guarantee.

- Solution In Search of Problem

  DOE should determine the dollars it has available to spend and develop its criteria. Then let the private sector (U.S. firm) and the Eastern European country choose the best U.S. technology at that time. According to one attendee, the DOE definition precludes pre-combustion technologies. The DOE chairperson pointed out that there is no such DOE definition that precludes pre-combustion technologies, nor is such definition contemplated. Another attendee stated that the DOE approach does not consider the Eastern European countries independently and the motivations driving each country, even though each country has dramatically different strategies. The key issue for DOE policy would include using the CCT model, i.e., a

broad solicitation, and let teams come in with proposals of the technologies that they want to demonstrate and the financial mechanisms for funding their share.

3.2 ASIA AND INDIA

3.2 Asia and India

Thursday, February 10, 1994

Theodore D. Atwood, Chairman
John W. Byam, Jr., Co-chairman

The organizations represented at this session were as follows:

Air Products & Chemicals
U.S. General Accounting Office
Institute of Gas Technology
Eavenson, Auchmuty & Greenwald
Westinghouse Electric Corporation
Donlee Technologies
Viking Systems International
Allison Engine Company
A. D. Little, Inc.
Ministry of International Trade and Industry
Burns & Roe Services Corp.
Koleda Childress Inc.
DOW Chemical/Destec Energy Inc.
Novem BV Netherlands
Hydrocarbon Research, Inc.
Gilbert/Commonwealth, Inc.
Electric Power Development Company, Ltd.
Coal Tech International/ McGraw Hill
Foster Wheeler International Corporation
Science Applications International Corporation
Clean Coal Technology Coalition
Shell Synthetic Fuels Inc.
W. R. Grace & Company
Ahlstrom Pyropower, Inc.
Overseas Private Investment Corporation
ABB Combustion Engineering
Roberts & Schaefer Company
Resource Dynamics Corporation
World Bank
EnTEC
Texaco, Inc.
Stone and Webster
Bechtel
Babcock & Wilcox
SIMTECHE
Combustion Power Co.
MIT
The Energy Daily
KFx Atlantic Partners
Pioneer Energy
Brown & Root Inc.
Midwest Environmental Industries
Antares Group Inc.
BOC Process Plants
Catholic University
Embassy of India
Custom Coals Corp.
Morrison Knudsen
Nalco Fuel Tech
The Delta Group
EER Corporation
Sargent & Lundy
General Electric
Embassy of Myanmar
Embassy of China
NAETECH
Black & Veatch
Energy Policy Center

Japan Electric Power
Information Center
K&M Engineering & Consultants
US-ASEAN Business Council
Government of Canada
Coal Technology Corporation
Core International Inc.
Technology and Management
Services, Inc.
Energy, Economics and Climate
Change
Committee on Energy & Natural
Resources
LeBoeuf, Lamb, Green & MacRae

After opening remarks by the Chairperson, Ted Atwood, representatives of several embassies from the region made brief presentations on the needs of their countries for clean coal technologies and some of the difficulties in financing projects. Their remarks are summarized below.

India. Mr. Ravi Prakash, Scientific Attache, Embassy of India gave a short overview of the Energy situation in India. He indicated that the need for power has the highest priority in India. However the power sector is not able to meet full power demands in India. India has much high ash coal(approx 45% ash), but it is located far from the power needs. The Ministry of environment is planning to issue many regulations in 1994 concerning emissions control. There are many Green concerns in India at this time.

China. Mr. Pan Baozheng, Minister, from the Embassy of the People's Republic of China presented a paper on the prospects for Cooperation between China and the USA in Clean Coal Technology.

Mr. Pan also addressed questions from the audience and his responses included the following information:

- There is a need to focus energy development activities on industrial areas along the coastal provinces.

- US Government cooperation with China is important. Demonstrations help the Chinese to understand new technologies. The Chinese only use commercially what they fully understand technically.

- The priorities of proven technologies, versus advanced technologies, was given. They include:

  1. Coal washing and prep
  2. New boilers
  3. Flue gas cleaning and waste treatment
  4. Advanced Technologies

- In response to a question as to whether it had been predetermined that the technology of choice for the Chinese Demonstration was IGCC, the answer was yes ant the choice had been made by China.

Discussions followed to include comments and questions from the audience. The following suggestions and comments were made by the industrial participants:

- It was recommended that funding for the Feasibility/Development projects be awarded on the basis of recycling the monies that result in follow-on projects. If a project goes forward the money should be returned to the funding source, if the project does not proceed, no payback is needed. This will expand the capability to fund studies of this type without additional appropriations.

- There was extensive discussion on the question of licensed technology as U.S. Technology. Comments indicated that there is a need to tie the license to a direct relationship with a U.S. firm.

- In response to a question regarding eligible technologies - it was clarified that only technologies not in commercial operation would be eligible.

- A comment regarding U.S. content stated that any restriction should not skew the economics of the project. The equipment should be procured where the economics are best as long as quality controls are met. The least

number of constraints initially placed will benefit the process developers, they will be better able to define project content that gives best cost. Cheapest suppliers may be off shore.

- DOE should be directly involved in the process of selecting projects. DOE's knowledge of the process will help to allay concerns of developing countries. Credibility plus dollars is key to success. Also key is a quick approval process for project selection.

- A Program approach has more flexibility than time restricted specific solicitations. Not all projects ready for submittal at the same time. However, when projects are identified, the team must be able to move quickly in obtaining funding.

- U.S. government support in gaining sovereign guarantees from host countries is needed.

- First of a kind projects will need grants. However, guarantees rather than direct grants or loans will suit industry best.

- Demonstration projects can help to justify tighter environmental laws in developing countries and economies in transition.

- The International Clean Coal Technology projects will encourage enforcement of environmental regulations. Also expands markets.

- The "Buy American" issue is not a factor at this time. A decision on the scope of "Buy American" can be delayed as it won't be a factor until 1996 when equipment procurement begins. The definition does not address services. What if the total content of the project is services? Section 1332 does not address services as buy american.

- "Which do not add unnecessary risk" clause is necessary to protect against lessening the value of a project.

- Ownership of the project and guarantees are a key issue. Do the Chinese have practice of participation in risk for new technologies?

- Repayment: No specific comments were made. The only suggestions related to repayment for development studies.

- Intellectual Property: Enforcement as well as setting regulations is needed.

General Comments:

- Using Commercial Officers, etc. to provide direct support to local governments and agencies in host countries will assist in building confidence in new technologies.

- DOE must provide further technical support to other U.S. government agencies.

- It is DOE's intent to conduct the Chinese Demonstration outside of section 1332 of the Energy Act.

- U.S. manufacture is only requirement of 1332, and 1608, etc.

- Clarification: Can 1332 monies be used for technologies currently operational in a country. Answer: yes, monies are intended for higher technical risk activities but can replicate existing projects. IGCC could qualify for 1332 monies as demonstration does not define "commercial"

3.3 SOUTH AMERICA AND AFRICA

3.3 South America and Africa

Thursday, February 10, 1994

Barbara N. McKee, Chairman
Arthur L. Baldwin, Co-chairman

The organizations represented at this session were as follows:

Tennessee Valley Authority
Resource Dynamics Corporation
Technology and Management Services, Inc.
Edlow International Company
Joint Venture Services, Inc.
Energy and Environmental Research Corporation
Burns & Roe Services Corp.
Science Applications International Corporation
K&M Engineering & Consulting
LeBoeuf, Lamb, Green & MacRae
Clean Coal Technology Coalition
Penn State University
ABB Combustion Engineering
Senate Energy Committee
South African Embassy
Embassy of Mexico
Embassy of Zimbabwe
Merrill Lynch
Industrial Contractors
Embassy of Namibia
Embassy of Angola
J. Makowski Company
The Delta Group
Brazilian Embassy
Embassy of Peru
Radian Corporation
Rolls-Royce Inc.
Lotepro Corporation
Embassy of Cape Verde
E.F.H. Coal Company
Energy Policy Center
PSI Energy

After introduction of attendees, the morning session was devoted to presentations on Mexico, Brazil, and Peru and was followed by a general discussion on the coal resources and the need for United States clean coal technology in South America. The afternoon session featured presentations on the Republic of South Africa (RSA) and one on the Southern African Development Community (SADC). After these presentations were made, the session attendees discussed the coal resources of Africa and the need for United States clean coal technology in this region. The session was concluded with a general discussion on energy needs of and opportunities within Africa

and South America. A period prior to adjourning the meeting was devoted to generating additional recommendations that had not been brought out during the above discussions.

Copies of the presentations on Mexico, Brazil, The Republic of South Africa and the Southern Africa Development Community are included in Chapter 4.2. Peru's representative gave a verbal presentation without handouts. Some highlights of all of the foreign representatives presentations are included, however, as a part of this session's summary.

The following represents some of the key summary points and recommendations of session attendees.

SUMMARY AND RECOMMENDATIONS

Meeting attendees stated that the United States historically has not been proactive in its approach to markets in South America and Africa. The meeting participants all agreed that the U.S. posture towards these markets needs to change, since the current posture leaves the advantage for these markets to the Europeans, the Japanese, and others. These countries are showing considerable interest in both markets. There were general comments that the U.S., in this post cold war era, could have an advantage over other competitor countries in both continents if a proactive approach to these markets are taken. The possible United States advantage over competitors for these regions stems from a desire to have good trading relationships with the United States and the perception that United States clean coal technology is superior quality, especially since the United States has for a number of years spent extensive time and money on developing and demonstrating an impressive array of clean coal technologies.

One of the key conclusions of the session was that the potential for United States clean coal technology activities that would be beneficial for United States energy technology trade and investment is potentially large. The basis for this conclusion is briefly discussed in the "South America and Africa - Key Points" sections of this presentation and the reader is also referred to the presentations by Foreign embassy personnel contained in Chapter 4.2 on South America and Africa.

First, one of the key conclusions of session attendees was the fact that comprehensive, factual studies on fossil energy

resources of and United States energy technology use potential for both Africa and the Americas (especially South America) do not exist at this time and are badly needed. This was especially evident to session attendees upon review of the information provided to them regarding this public meeting. Session attendees were particularly concerned with the fact that the information that was sent to them prior to the meeting had much information about the Pacific Rim and the former USSR countries, but, there was a lack of information was available on Africa and South America.

The session attendees thought that the DOE could especially be helpful to the United States private sector regarding Africa and South America in (1) identifying countries where major potential for United States private sector participation should occur, (2) identifying locations of coal reserves, (3) identifying quality of coal reserves, and (4) assisting the United States private sector in sorting out the type of U.S. clean coal and related technologies that would be applicable to each country, region, and continent.

It was suggested that DOE's involvement in a clean coal international demonstration program should be balanced from the standpoint of assessment of project potential versus minimizing project risk during the life of the project. Based upon the information provided as a part of the public meeting, attendees perceive that the DOE has placed its emphasis on assessment. It was stated that this Clean Coal International Technology Transfer Program may be better served if some of the emphasis be placed on sharing and minimization of risk to the United States suppliers, especially for those projects that are larger dollar value and those that have long timeframes for completion.

The meeting attendees suggested that the DOE set up a follow-up meeting with ministry of energy individuals of foreign governments from both Africa and South America to assist the DOE and the United States private sector in defining the needs of and types of projects that make sense for both regions. Through this interactive approach it was stated that DOE could play a useful role in assisting emerging countries identify and assess their resources and fossil energy needs specifically tailored for the country/region.

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The meeting attendees suggested that the DOE set up a follow-up meeting with ministry of energy individuals of foreign governments from both Africa and South America to assist the DOE and the United States private sector in defining the needs of and types of projects that make sense for both regions. Through this interactive approach it was stated that DOE could

play a useful role in assisting emerging countries identify and assess their resources and fossil energy needs specifically tailored for the country/region.

It was suggested that the DOE consider instituting a cross-cutting approach for recommending technologies for emerging countries within both regions that take into account the specific needs and logical solutions for the area. As an example, it may be that a country/region may be best served by a combination of coal utilization along with hydropower and/or renewables (e.g. solar power). Furthermore, it was suggested that an integrated DOE program which assists U.S. businesses meet energy and other needs, such as infrastructure requirements, should be considered.

It was strongly suggested that a one-stop shop that will allow access to multiple sources of funds (DOE, U.S. AID, World Bank, TDA, etc.) earmarked for this Clean Coal Technology International Transfer Program be set up. Attendees felt that it was necessary to create a single solicitation pool that consisted of large dollars, similar to the United States Clean Coal Technology Program to create the incentive for U.S. firm involvement.

Another suggestion was to create a trading and banking credit system within South America and Africa that would assist in creating the environmental driving forces that could assist creation of markets for clean coal technology.

It was suggested that DOE involvement should not end with the definition phase of projects, but, that DOE involvement should include creation of energy and supportive data bases and include ongoing support of United States private sector initiatives within the countries and regions.

For both South American and African countries, it was suggested that bilaterals with the United States be modified to emphasize energy cooperation. Several attendees stated that the United States bilaterals associated with weapons supply by the United States be de-emphasized and examined to extract the successful features for possible use in the Clean Coal International Technology Transfer Program. Weapons credit arrangements were cited as one example to consider. It was

also suggested that United States aid to the various countries be tied to this Clean Coal International Technology Transfer initiative.

A unanimous recommendation by session attendees was for the DOE to immediately begin an effort to comprehensively define the coal resources and technological needs of both Africa and South America and to define the U.S. clean coal technologies that would be useful for the U.S. private sector to follow through within these regions.

Mexico. Mexico has in place a self sufficiency energy policy and has energy initiatives in fossil (oil, gas, coal), geothermal, nuclear, solar, hydro-power, and wind power.

Mexico's current electrical generating capacity, as of the end of 1993, is 29,204 MW (27.98% hydro, 60.66% hydrocarbons, 6.51% coal, 2.31% nuclear, and 2.53% geothermal). The Federal Electricity Commission (CFE), a decentralized agency of the federal government, estimates that between now and the year 2001 that 12,217 MW of new electrical generating capacity will be required. This 12,217 MW of new capacity includes 700 MW of coal-fired capacity (Carbon II Project) and 700 MW of dual-fired capacity (two 350 MW plants) at Petacaleo in Lazaro Cardenas, Michaocano.

The key questions regarding the additional electrical power that is required is what will be the fuel source for and timeframe of installation. The answer to these questions, according to the Mexican government, will be answered a modified mechanism which will involve an expanded role for the private sector. First, the Mexican government is in the process of ending CFE's monopoly in the power industry and is moving ahead on it privatization efforts. The effort to privatize the electricity industry has been underway for about two years. Currently three approaches are available for the private sector involvement as far as electricity generation in Mexico and they are power producing, cogenerating, and self-supplying.

Mexican environmental laws on emissions appear to be similar to United States laws. A review of these regulations and their enforcement was asked to be included as a part of DOE's comprehensive study of coal resources and demands in South

America. Mexico is particularly interested in addressing particulate, NO_x, and SO_x emissions and stated significant interest in United States clean coal technology.

Mexico has two major coal reserves: the basins of Rio Escondido and Colombia-San Ignacio, both located in the state of Coahuita. Recoverable reserves of Rio Escondido and Columbia-San Ignacio are estimated to be 640 and 91 Million Ton (MT), respectively.

In 1992, Mexico produced 8.7 MT of coal, 62% of which was consumed in electrical production. Mexico coal production is sufficient to cover their existing needs, however, they do import about 10% U.S. Wyoming coal. Mexican coal is high in ash content (ave 42%) and can get as high as 50%. United States clean coal technology may apply here.

Marcela Serrato, Mexico's representative, Ministry of Energy, Mines and State Industry, Embassy of Mexico, stated that updated energy plans and environmental laws regulations will be supplied to the DOE.

Brazil. According to Brazilian officials it has 32 billion tons of proven coal reserves. This coal represents 60% of the non-renewable energy potential of Brazil. Brazilian coal has a heat content between 3100 to 6000 kcal/kg, 1.3 to 4.2% sulfur content and 22-50% ash content and is particularly suited for electrical power generation.

Although coal consumption in Brazil amounts to only 2% of the total energy consumption, there are several important trends that give rise to a promise for clean coal technology use in Brazil. First, Brazil expects an increase in coal to 4% of the total energy consumption by the year 2010 which corresponds to an increase from 3 million ton/year current consumption to 25 million ton/year by 2010. Correspondingly coal based electrical power generation, currently amounting to 1,050 MW, is expected to increase to 7,150 MW. This growth in coal consumption in Brazil is significant given the fact that other fuel/energy sources are expected to either decline in use or be sluggish in growth over the timeframe. As an example, Brazil projects that although hydroelectric power retains predominance, a gradual increase in the role of thermal generation through use of coal is planned as outlined above.

Brazil has passed important environmental laws governing coal-powered energy plants. Brazil has also developed a policy that emphasizes the use of clean technologies for use on existing and planned coal fired facilities. Brazil's existing thermo electric power capacity utilizes pulverized coal technology. They are interested in retrofitting these facilities with clean coal technology. Brazil is generally interested in United States clean coal technology, including fluidized bed, applications to future capacity.

Brazil's coal is not now, nor are there plans to, subject it to price controls. Because of Brazil's low grade of coal, internal use for metals manufacture generally is not competitive with foreign import coals. Due to debt considerations, Brazil is interested in increasing the local use of coal in their steel (metals) industry. Currently there is at best use of only 10% of Brazilian coal for metallurgical purposes. There may be a market in this industrial sector for United States clean coal upgrading technology.

The representative from Brazil (Manuel Montenegro, Head, Science & Technology Section, Brazilian Embassy) stated that Brazil is very much interested in cooperating with the United States regarding use of clean coal technology. They are seeking private investors and, also, interested in energy research and development cooperation.

Peru. Peru is in the process of assembling their energy development plans and expect that their updated plan will be ready in about two months. These plans will be shared when available, along with their environmental laws, with the DOE. According to A. Valencia, Embassy of Peru's representative, Peru has both anthracite and bituminous coal deposits.

The anthracite known deposits amount to 320 thousand metric ton and with know reserves Peru has estimated 1.1 billion metric ton of coal anthracite potential. Known Peruvian bituminous reserves are 6 million metric ton and Peru estimates total bituminous potential to be 115,000 metric ton. Most of Peru's coal reserves are located in the Andes mountains in remote difficult to reach locations.

Peru is interested in the United States sending a mission to Peru to explore the possible use of coal. Peru believes that its liberal investment policies could be attractive for American private sector investment.

The Peruvian government historically has been the owners of mining, sugar, electrical power generation, etc., however, they are in the process of privatizing these industries.

The main source of power within Peru is hydropower. Peru is considering the use of coal for power generation. However, Peru is most interested in acquiring assistance in exploring their coal reserves and producing coals through use of clean coal technology for possible export to Columbia, other surrounding countries and Latin America.

There were several questions by meeting attendees regarding how Peru plans to deal with eliminating problems associated with the "Shining Path" activities. Attendees felt that this organization's activities was a hindrance to U.S. private sector participation in Peru.

Other South American Countries. Besides the above South American countries, it was noted that sizable coal reserves are contained in the following countries: Columbia, Chile, Venezuela, and Argentina. It was suggested that coal reserves and clean coal technology potential use in these countries be reviewed along with other South American countries.

The Republic of South Africa. The Republic of South Africa (RSA) has the largest known coal reserves (estimated to be about 100 billion ton) in Africa. It is estimated that the RSA recoverable reserves are about 55 billion tons. The RSA produced 175.9 million tons of coal in 1992 of which 126.3 million tons were consumed within the RSA (82% of total country energy consumption) and 49.6 million tons were exported. The export coal is beneficiated prior to export. RSA export coal is a competitor to U.S. export coal in some foreign markets.

Electrical power generation consumes about 60% of the coal that is utilized within the RSA. Coal is beneficiated for RSA internal use in metallurgical and small local industries that require a high grade of coal.

The RSA possesses significant coal technological know-how in the following areas: coal beneficiation, liquefaction, gasification, integrated gas combined cycle (RSA developed small scale IGCC, which has been determined to not be financially feasible), and low smoke coal (briquette) production.

Although the RSA has developed coal technology to a high degree, they are seeking United States cooperation in the following areas: (1) IGCC, (2) electric power generation, (3) small scale appliances, (4) green coal technology, (5) mining: clean coal beneficiation, (6) liquefaction, and (7) gasification. Discussions that took place with the First Secretary (Paul Bryant) of the Embassy of the RSA indicated that U.S. technology associated with IGCC, electrical power generation, flue gas clean-up, coal beneficiation and briquette manufacture may have opportunities for the United States. Some of these possibilities are briefly discussed later.

First, however, Eskom is the RSA's principal producer of electricity (97.9%) and 92.1% of the electrical power production is through utilization of coal. Eskom has a total electrical power generation capacity of 36,856 MW. Typical coal quality for Eskom coal is 21GJ/ton, 45% ash, and 1% sulfur.

Current power plant utilization is about 60%; however, only 30% of households in the RSA have access to electrical energy. Eskom plans to electrify 300-500,000 households per year within the RSA will force utilization of existing and expansion of electrical power capacity. Coupled with the fact that the RSA a population of 42 million people with a real population growth rate of 2.6%, a potential large market for clean coal technology exist.

Development of pilot electrification projects in urban areas in combination with the construction of local small to medium sized power plants that employ the latest clean coal technologies may prove to be important. To illustrate the potential, although there are large coal-fired power plants located in Soweto, the power that is generated is consumed by Johannesburg residents, not Soweto residents. If significant electrification of Soweto is undertaken, it is likely that a new unit would have to be added to the existing plants to meet this new demand or some sort of non-fossil fuel site-based generation process would be required. In this case, the

technology transfer would go beyond clean coal technologies and involve other production, transmission, and distribution technologies.

RSA environmental considerations in two areas were discussed as potential driving forces for use of United States clean coal technology. The first possibility is associated with providing flue gas clean up technology for existing and future power generation capacity. The second possibility is associated with cleaning up the numerous, massive mounds/piles of coal dust/fines that have been produced from coal mining activities. These mounds are not only an eye sore, but environmental problems (e.g. potential fire hazards and water run off acidify the aquifer) for the RSA.

The RSA representative discussed a briquetting program to produce low smoke coal from coal fines for use in residential areas. The United States Clean Coal Technology Program has technology that is directly related to resolution of both of the above problems. RSA environmental laws, however, must provide the driving force to address these issues.

Southern African Development Community. The Southern African Development Community (SADC) was established in April of 1980 to promote regional cooperation by synchronizing development plans and reducing economic dependence upon the Republic of South Africa. SADC member nations consist of Angola, Botswana, Lesoto, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, and Zimbabwe.

Although the Republic of South Africa (RSA) is not a member of SADC, post-Apartheid and free elections it is expected to become a member of this Community. Inclusion of the RSA would expand and strengthen the already large resource and economic base of the SADC.

The SADC is recognized by the World Bank and other important lending institutions as one of the most effective regional groupings of African Nations. Including the RSA, this southern region of Africa has nearly 130 million inhabitants.

The initial focus of SADC was on rehabilitation and expansion of transport corridors to facilitate movement of goods from the interior of the region without use of routes through the RSA. Currently, the focus is on further industrialization of its largely agricultural regional economies.

The SADC and member countries are adjusting their policies to promote and attract trade and investment. SADC has initiated a comprehensive global drive to strengthen ties, trade, and investment within the SADC region.

The SADC region has abundant energy resources, large reserves of coal and oil, enormous hydro electric power resources and significant deposits of a wide range of strategic minerals.

Coal reserves can be found in significant commercial amounts in Botswana, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. This region has been under-explored for its true mineral (including coal) potential, therefore, the SADC and its member nations have undertaken a significant reexamination of all known and potential reserves and deposits of any economically exploitable mineral resources. Coal reserves are expected to significantly expand.

SADC and its member countries have already formally requested the DOE to enter into a bilateral arrangement to explore their energy potential. The focus of this Bilateral Agreement would be in three areas as follow: United States technical assistance in creating individual and regional energy development plans, joint energy research and development projects, and technical information and personnel exchange.

The SADC has an estimated installed electricity capacity of 8.04 million kilowatts with a population of 87 million inhabitants. Only 10% of the SADC population are directly tied to the electrical power systems of the region, however. Several of the SADC countries have electrical grid interties and there are also electrical interties between the RSA and several of the SADC countries. Two way trade of electricity occurs between a number of the Nations that are intertied.

The SADC, the SADC member nations, and the RSA are pursuing electrification of the entire sub-Sahara region of Africa. Sub-Sahara Africa has about 150 million people within its borders and only about 10% of this population is tied to electrical supply. If electrification of this region is realized, a large demand for clean coal and related technology could be created. The demand for clean coal technology will have to be weighed, however, against expansion of power supply by other means, such as hydropower. These nations will also need to address environmental laws that will allow environmentally responsible expansion of coal utilization within the region.

Although the primary thrust of much of the discussion of the export of clean coal technologies focused on production (electrical power) and extraction (coal mining), one possible non-production/extraction application that could generate significant developmental outcomes in selected African countries/regions is the clean coal briquette technology discussed by the South African representative. This is a technology initiative targeted at consumption as opposed to production activity, but it could have significant potential to improve the quality of life of residents of other southern African countries by reducing exposure to environmental hazards. By expanding this approach it could lessen the pressures on deforestation and desertification of the region.

Attached is the "Executive Summary" and "Review of the Regions" sections copied from the Document "Energy-Southern African Development Community" SADC Energy Conference, held in Harare, Republic of Zimbabwe, 27th - 29th January 1993.

Other African Countries. The majority of the known reserves of coal in Africa are located in the Southern portion of Africa as outlined above. However, significant coal deposits have been identified in Madagascar (east coast of Africa).

In the central African sub-region coal mining is still limited and there are large unexplored possibilities.

In Nigeria (west coast) coal supplies the needs for the metallurgical manufacturing sector. There are lignite deposits located in Niger, which supply needs of mining activities. Coal also exists in Benin, Upper Volta, Mali, and Sierra Leone.

In North Africa, with the exception of Morocco, the reserves of lignite and coal in Algeria and Eqypt have not been fully evaluated. Some coal has been identified, but the potential has not been fully explored in Ethiopia and the Sudan. As a whole, it was stated that African coal resources and potential are both not fully explored.

Attendees concluded that similar arguments which apply to the southern part of Africa on electrification concerns also apply to the entire continent. Africa's needs in these areas strengthens the argument for support of U.S. Clean Coal initiatives in Africa.

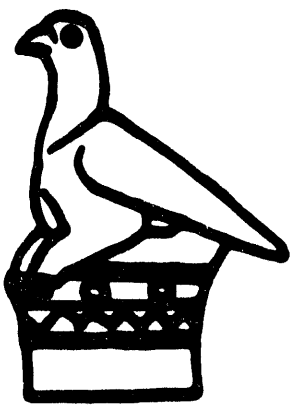
It was strongly recommended that the DOE evaluate resources and clean coal technology potential country by country and regionally to assist the private sector in determining how it should get involved in Africa.

General Comments:

It was suggested that the DOE should consider (1) support of U.S. private sector in these markets, (2) harnessing the technical competence of interested parties in support of these regional efforts, (3) getting involved with energy plan development, (4) including as a part of its efforts via supportive programs for the regions, cross cutting technologies (e.g. renewables, biomass, solar, coal, oil, and gas) tailored specifically for the countries/regions, (5) assisting in acquiring the proper environmental push, through organizations such as the World Bank, that will spur on the use of clean coal technology, (6) support under this program use of clean coal technology that has already been demonstrated in the U.S.

ENERGY

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY



Harare, Republic of Zimbabwe
27th — 29th January 1993

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PROJECT NUMBERING SYSTEM

Projects are identified using an alphanumeric numbering system:

The first three letters indicate the member State:

AAA	-	Regional	NAM	-	Namibia
ANG	-	Angola	SWA	-	Swaziland
BOT	-	Botswana	TAN	-	Tanzania
LES	-	Lesotho	ZAM	-	Zambia
MAL	-	Malawi	ZIM	-	Zimbabwe
MOZ	-	Mozambique			

The first digit defines the Sector:

0	-	Overall Coordination/Multimodal
1	-	Petroleum
2	-	Coal
3	-	Electricity
4	-	New and Renewable Sources of Energy
5	-	Woodfuel
6	-	Energy Conservation

The second digit is a serial number.

ABBREVIATIONS

ADB	=	African Development Bank
AGIP Spa	=	AGIP Spa
AIDAB	=	Australian International Development Aid Bureau
ANG	=	Angola
AUS	=	Australia
AUSt	=	Austria
BADEA	=	Arab Bank for Economic Development in Africa
BEL	=	Belgium
BOT	=	Botswana
BRA	=	Brazil
CAN	=	Canada
CBI	=	Confederation of British Industries
CFTC	=	Commonwealth Fund for Technical Cooperation
CHI	=	Peoples Republic of China
CITES	=	Convention on International Trade in Endangered Species
DEN	=	Denmark
EEC	=	Commission of the European Communities
FAO	=	Food and Agriculture Organisation of the United Nations
FIN	=	Finland
FRA	=	France
FRG	=	Federal Republic of Germany
IBRD	=	International Bank for Reconstruction and Development
ICAO	=	International Civil Aviation Organisation
ICE	=	Iceland
IDA	=	International Development Association
IDRC	=	International Development Research Centre
IDU	=	Industrial Development Unit of the Commonwealth Secretariat
IFAD	=	International Fund for Agricultural Development
ILO	=	International Labour Organisation
IMPOD	=	Import Promotion Office for Products From Developing Countries
IRE	=	Ireland
ISNAR	=	International Service for National Agricultural Research
ITA	=	Italy
ITB	=	International Tourism Board
ITU	=	International Telecommunications Union
JAP	=	Japan
KUW	=	Kuwait Fund
LES	=	Lesotho
MAL	=	Malawi
MOZ	=	Mozambique
NAM	=	Namibia
NET	=	Netherlands
NOR	=	Norway
NORDICS	=	Nordic countries
OPEC	=	Organisation of Petroleum Exporting Countries
POR	=	Portugal
PTA	=	Preferential Trade Area for Eastern and Southern Africa
SADCC	=	Southern African Development Coordination Conference
SAFTTA	=	Southern African Federation of Travel and Tour Associations
SAREC	=	Swedish Agency for Research Cooperation With Developing Countries
SATEP	=	ILO Southern African Team for Employment Promotion
SPA	=	Spain
SWA	=	Swaziland
SWE	=	Sweden
SWI	=	Switzerland
TAN	=	Tanzania
TAZARA	=	Tanzania Zambia Railway Authority
UAPTA	=	Unit of Account of the Preferential Trade Area
UK	=	United Kingdom
UNDP	=	United Nations Development Programme
UNIDO	=	United Nations Industrial Development Organisation
USA	=	United States of America

USSR	=	Union of Soviet Socialist Republics
WB	=	World Bank
ZAM	=	Zambia
ZIM	=	Zimbabwe

1. EXECUTIVE SUMMARY

1.1 A severe drought has developed in the upper Zambezi catchment area, threatening power generation. The situation requires careful consideration of the implications of this to SADCC's electricity dependent industries.

1.2 Although the Kafue Gorge Power Station is fully back on stream (second half of 1991), generation there and at the Victoria Falls and Kariba Power Stations, is expected to be severely constrained due to reduced flow of water.

1.3 What this could mean to member States' own longer term power strategies need be analyzed and discussed. Some very important lessons arising from this are the importance of interconnecting the region's grid in order to allow for flow from surplus to deficit areas, and that present power import policies need to be reviewed.

1.4 There is need to assess what long term effects the drougnt could have on expansion and refurbishment of thermal power generation in the region. This will be done as part of the ongoing Phase II of project AAA.3.8 Coordinated Utilisation of Regional Generation and Transmission Capacities.

1.5 Progress in the Energy sub-sectors:

1.5.1 The interconnection of electricity grids cc s to be central in the Electricity sub-se strategy. Work on the crucial project AAA..8 Coordinated Utilisation of Regional Generation and Transmission Capacities, is in Phase II, and is expected to provide the analytical basis for a SADC generation and transmission plan leading well into the next century. The Sector has devoted much time to the resolution of tariff issues relating to the important project BOT.3.1 Interconnection of the Botswana and Zimbabwe Grids. The required tariffs were put in place late 1991 after a spirited cooperation among BPC, ZESA and ZESCO.

1.5.2 Work in Petroleum and Coal sub-sectors has moved forward. The design of Phase I of the important long term Joint SADC Petroleum Exploration Programme (AAA.1.5) is near completion.

1.5.3 In the Woodfuel sub-sector a number of projects have received financing, and implementation is due to start. The projects involved include (AAA.5.11) Assessment of Environmental and Socio Economic Impacts of Woodfuel Scarcity and (AAA.5.9) Identification and Support to NGOs and Women's Groups Dealing with Woodfuel and Environmental Protection.

1.5.4 NRSE sub-sector contains only two pilot projects, namely:

LES.4.2 Solar Photovoltaic Power Generation in Rural Areas - Lesotho Pilot Project, and

ZIM.4.1 Prefeasibility Study on the Utilization of Solar Water Heating for Reduced Power Utility Demand Costs.

1.5.5 Energy Conservation: The protracted financial negotiations on the major project AAA.6.5 Energy Management in Industry are about to be concluded.

1.5.6 Energy Planning can report the commencement of AAA.0.8 Establishment of a Regional Energy Planning Network in SADC, and has moved ahead with its series of economic and financial evaluation of major projects.

1.6 The table of funding status, as at June 30, 1992 shows that the current portfolio consists of 83 projects, with a total value of US$755.67 million, including the new projects approved by the SADC Committee of Energy Ministers at their meeting in Windhoek, on 12 June 1992. Funding has been secured for 27 projects amounting to US$248.07 million with US$9.45 million under negotiation. The Sector has five completed projects, while eight projects have been suspended for reformulation. Four projects has been withdrawn and one project transferred to other Sectors and two projects have been included into other projects in the Energy Sector. The Energy Sector's funding gap is at 66.00%.

2. REVIEW OF THE REGIONAL SITUATION

2.1 As to main events in the region during the reporting period 1991-92, seen from the point of view of the Energy Sector, the following need be mentioned:

2.1.2 Petroleum prices have stabilized at pre Gulf Crisis levels.

2.1.2 The Kafue Gorge Power Station in Zambia (the largest hydropower station in the SADC region) has been fully recommissioned after the fire accident in 1989.

2.1.3 An unprecedented drought, affecting the upper Zambezi basin, leading to substantially reduced flow of water in the upper Zambezi and its tributaries, is threatening to reduce the firm energy capacity of power stations at Kafue Gorge, Victoria Falls and at Kariba, by almost 50% for the next 2-3 years.

2.2 While the two first points indicated that normalcy has been re-established after specific supply shocks - a positive development - the final point will have less desirable effects for energy supply, economic activity and welfare in the region in the years to come. The detailed effects of this would be picked up in next year's energy balance, although the alterative outcomes possible are known already today: (i) reduced power supply in the SADC area; (ii) normal situation, but with increased imports from Zaire and RSA, including increased emphasis on the utilization of existing thermal stations; and (iii) a combination of the above. For large imports to take place, the required interconnectors need be in place or strengthened. Failing this, alternative (i) would weigh heavy, with implications for economic activity in the SADC area.

2.3 The enclosed 1990 SADC Energy Balance (Table 1) summarizes the main regional aggregates for primary energy supply, process conversion and final consumption of the main types of energy commodities, during 1990. The energy balance has been constructed from the TAU 1990 energy database. More details may be found in the SADC Energy Statistics Yearbook 1990. All information has been supplied by member States. Some of the figures are provisional, and might be revised, based on further inputs from member States, before the final version will be available by the end of 1992.

2.4 While the current Yearbook is the fourth in a series - some caution should nevertheless be exercised in interpreting as significant minor (plus/minus 1-2%) changes in supply/consumption, from one year to another for individual energy commodities.

2.5 Woodfuel dominates energy use in rural areas. Estimates of consumption (level and rate of change) are imprecise and of variable quality among member States, and would at times increase sharply as woodfuel statistics become more reliable and updated more regularly, as is the case this time.

2.6 For reasons of accuracy, the comments below therefore refer only to commercial energy, excluding woodfuel. The main tendencies comparing the 1990 and 1989 energy balances, are as follows:

2.6.1 Consumption of total commercial energy, in comparable units (Peta Joules - PJ) records an increase of about 4%, reversing the decline recorded during the previous year. The overall economic movement in the SADC area - as measured through the use of commercial energy, was positive during 1990.

2.6.2 Overall electricity generation measured in PJ, increased by about 4% - in spite of the Kafue Gorge Power Station (Zambia) having not yet come back on stream after the 1989 fire accident. In spite of the aftermath of the Kafue Gorge fire accident however, SADC hydro-electricity generation during 1990 was kept at the same high level as during 1989. Thermal generation increased by about 16%, increasingly using also diesel and jet fuel in addition to coal.

2.6.3 The overall consumption of petroleum products has increased by some 9%: Gasoline consumption by about 5%, jet fuel by 20%, and kerosene by more than 20%. (Therefore, the possible negative effects of the Gulf Crisis during the second half of 1990 cannot be traced in consumption of petroleum products.)

2.6.4 Coal production has stabilised during 1990 at the level of 1989, after a sharp decline during 1988. While the use of coal in mining remains the same, direct industrial use of coal has declined, compensated by a parallel increase in the use of coke. The production of coke has increased sharply - almost quadrupled.

2.7 The conversion factors used in the 1990 energy balance (Table 1 below) are as follows:

Coal	29.3 G/t	Diesel	42.5 G/t
Botswana coal	24.0	Fuel oil	41.5
Coke	26.4	Charcoal	33.1
Crude oil	42.6	Biomass	13.3
LPG	45.5	Ethanol	16.54
Gasoline	44.0	Electricity	3.6 J/Wh
Jet-fuel	43.2	Woodfuel	11.4 G/cm
Kerosene	43.2		

TABLE 1

SADCC - ENERGY BALANCE 1990

COUNTRY	SADCC																
YEAR	1990																
COMMODITY	COAL	COKE	CRUDE OIL	FUEL OIL	DIESEL	KEROSENE	JET FUEL	LPG	GASOLINE	ETHANOL	ELECTRICITY	TOT.COM.	WOOD	DUNG	CHARCOAL	BIOMASS	TOTAL
UNIT	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ
PRODUCTION	177		1005					1			55	1238	1641	5		50	2939
IMPORTS SADCC	2			0	0			0	1		3	6					6
IMPORTS NON SADCC	15	3	62	2	65	9	11	1	30		6	204	2		0		207
EXPORTS SADCC	2			0	0			0	1		3	6					6
EXPORTS NON SADCC	6	3	938	21	2		1		0		1	970	0		0		970
STOCK CHANGE (+/-)	1			0	0		0	0	1	0		1					1
TOTAL PRIM. SUPPLY	187	0	131	-19	83	9	11	2	30	0	60	473	1643	5	0	50	2177
OIL REFINERIES			-134	40	34	5	21	2	15			-16					-16
POWER PLANT	-88			0	-6		-1				28	-67					-67
COKE OVENS	-22	15										-7					-7
KILNS													-483		90		-392
ETHANOL PLANT										1		1					1
OTHER *											1	1				-6	-6
LOSSES	0			0	0	0			0		9	10					10
TOTAL NET SUPPLY	79	15	-4	20	86	14	31	4	45	1	80	374	1160	5	90	49	1679
ERRORS & OMISSIONS	-4		4	-1	0	0	-1	0	0		-1	-2	-41				-43
FINAL CONSUMPTION	75	15		20	86	14	30	4	45	1	79	372	1119	5	90	49	1636
AGRICULTURE	12			3	9	0	0	0	1		5	30	27			9	66
MINING	8			4	5	0	0	0	0		28	44	0				44
INDUSTRY	36	15		12	14	0	0	1	2		28	105	103			8	214
TRANSPORT	7	0		1	50	1	11	0	40	1	0	110					110
OTHER	10	0		1	8	0	17	0	3		9	49	30				79
HOUSEHOLD	2			0	2	12	2	3	0		13	34	859	5	90	35	1123

3.4 FINANCIAL ASSISTANCE

3.4 Financial Assistance

Friday, February 11, 1994

The session was opened with remarks by Mr. Peter Cover of the Office of Planning and Environment, Office of Fossil Energy, U.S. Department of Energy. Mr. Cover gave a presentation on Clean Coal Technology Export Programs of the U.S. Government and introduced the speakers for the day. The program was then opened for comments from industry. This summary briefly reviews the points made in the formal presentations and the industry response.

Peter Cover, U.S. Department of Energy

The Government is already aware that financing is crucial to international clean coal technology (CCT) projects due to the large investments required and the complexity and lengths of the transactions. The potential worldwide capital requirements are very large and most of this capital will be required in the Pacific Rim area (especially China) and in countries in transition.

These large investments present both benefits to the countries involved and business opportunities for U.S. industry. Benefits for the countries involved include advancing energy and electricity supply, increasing efficiency, lower pollution, economic development and energy self-reliance. Business opportunities are for U.S. project developers, architect engineer/constructor firms, equipment vendors, service suppliers, financial institutions and fuel suppliers.

Project financing is difficult in many of the key CCT markets both because CCT investments must compete for funding with other potential investments throughout these economies and the risk profile of some of these countries is poor. As a result, a large gap in foreign exchange needs, on the order of $28 billion per year, may arise beyond what can be provided by traditional lenders such as multilateral and bilateral organizations. The gap can only be filled by private investment.

The U.S. Government is committed to helping solve these problems by helping countries adapt to the requirements of private power and by working with U.S. industry to close the gap. Closing the gap will require developers focusing on key markets, encouraging private funding and making U.S. export finance programs more effective.

The key question is how the Government can stimulate private investment. Industry input is invited.

William Franks, Southern Energy International

Southern Energy International, a subsidiary of Southern Company Services, has been working for several years to develop power projects in Central Europe. Like other investors, they have found this to be difficult. Of a total of 25 independent power projects under development in the region since 1989, only two have gone to financial closure and these have been in the former East Germany, now part of the unified Germany. (Some other projects, however, are close to closure.) Difficulties are presented by barriers in the commercial and legal structures, economic impediments, political issues and differences in business culture.

Legal and commercial barriers include:

- Gaps in the legal system in terms of requirements for special approvals for foreign owned companies and unusual accounting treatments.

- Lack of experience with project finance and the amount of documentation required.

- Lack of transparency in commercial arrangements.

One major economic problem is low price of electricity, which makes it difficult to sell power profitably. These prices are estimated as below:

Representative Electric Prices in Central Europe
(U.S. Cents per kWh)

	Household	Industrial
Czech Republic	2.7	5.3
Germany (East)	13.8	15.0
Hungary	4.1	6.0
Poland	5.5	4.0
Slovakia	2.7	5.3

It is no coincidence that the only country where IPP projects have closed is the former East Germany.

Other economic problems include inflation, devaluation and convertability risk. There is also no track record with which to project costs.

Political obstacles include the need to resolve political priorities, government agencies that lack coordination and delayed privatizations.

Isolation from market economies which has led to unfamiliarity with Western free market principles and lack of understanding of the financing process. Central Europeans need advice, but they are often reluctant to pay for it.

A wide variety of stakeholders, including workers, managers and politicians are involved in power projects. This means that a wide variety of concerns and national and political pride are often issues.

In the long run, opportunities are substantial, but patience and staying power are required.

Earl R. Osterstock, Air Products and Chemicals, Inc.

Air Products and Chemicals is part of a consortium of U.S. and Czech companies that are working together to develop the Synchem Gasification Combined Cycle plant in Litvinov, Bohemeia, part of the heavily polluted "Black Triangle" of the Czech Republic. Other members of the consortium include Texaco, Mission Energy, General Electric, and Chemitrol (a Czech petroleum refiner) and Doly & Upravny and Komorany (DUK, a Czech mining company).

The project will burn a mixture of locally-mined lignite and excess residual oil from the nearby refinery. The project has several factors favoring it: a large local coal supply, available residual oil (disposal of which was becoming a problem), large cogeneration potential at the refinery and strong public support due to the economic and environmental advantages.

The project is unique because it is the first application of a state-of-the-art slagging gasifier on Central European brown coals. It will greatly reduce emissions in the region, removing 75 percent of all major emissions.

The feasibility study, just completed, was financed by DOE's FIETOP program. The partners are now working towards financial closing and hope to have the project in commercial operation in 1998. The U.S. partners will absorb the major risks. The project will generate 6,000 to 8,000 jobs in the U.S. through $300 million of U.S. involvement.

The developers face several major challenges in developing the project:

- Project finance is new to the Czech Republic.
- Establishment of long-term contracts in midst of a transitional economy.
- Major partners and customers are in the middle of privatization.
- 1997 environmental compliance requirements mandates impose a tight schedule.

The partners are now working to structure the project financing. It uses a mix of debt and equity from a variety of sources, including private funding, multilateral banks and export credit agency. The Czech government's position will be critical; some guarantees will be required.

A 25-year contract was just signed for the project. Cash flows from the project will cover debt service and the project assets will be collateral for the loan.

Several financing challenges are faced, including: securing Czech government guarantees, developing secure contracts (for fuel, power, steam and grid sales) and mitigating the concerns of lending institutions about exchange rates and privatization.

The U.S. Government can help in several ways:

- Expressing interest and support for environmental technologies and their transfer.
- Expressing confidence in U.S. CCTs.
- Having local embassies help with local contacts.
- Urging host governments to facilitate necessary commercial contracts and guarantees.
- Assisting in structuring appropriate longer-time financing consistent with terms of the specific deal and the needs of the host country.

Howard Feibus, U.S. Department of Energy

The U.S. Department of Energy has been working with Poland since 1989 in a cooperative program with the U.S. Agency for International Development. This effort has included a project to reduce sulfur dioxide emissions at the Skawina Power Plant near Krakow. Through a competitive procurement, a U.S. wet flue gas desulfurization (FGD) process was selected for demonstration on one of the Skawina plants 11 x 50 MW boilers. As part of this project, the Polish Government accepted an option to add an additional desulfurization unit to a second boiler with the additional cost paid for by Poland.

The Polish cost was funded by the Ecofund of Poland. This fund was created by the Club of Paris by allocating 10 percent of forgiven debt to environmental investments. Much of the debt forgiven was by the U.S. and so American firms may do a significant share of the work funded by the Ecofund.

Power plants in Poland and the rest of Central Europe are often seriously overstaffed. Skawina has over 1000 employees. Labor issues are crucial.

The cost of electricity has increased in recent years and is now adequate to pay for the project and coal prices are realistic.

Since the project was initiated in 1989, the Government has changed in Poland, and this change has had a significant impact on the Polish power industry. One major impact has been that free funding is no longer available from the Polish government and plant, and regional managers now have different incentives.

Owen Cylke, Agency for International Development

Mr. Cylke works with the U.S.-Asian Environmental Partnership, which works on energy efficiency and pollution prevention projects in Asia.

The Partnership is working with India to examine the applicability of coal beneficiation and to attract private investors to coal beneficiation.

They are working to make the case for U.S. technology in Thailand and Indonesia. In Thailand, the Partnership is working with the Electric Power Research Institute to develop a long-term relationship with the utility EGAT. Also, a $1 billion water treatment fund has been created for Thailand.

The Agency for International Development (AID) has established a $1 million fund at the Overseas Private Investment Corporation (OPIC) for pre-investment studies for international environmental projects. OPIC financing is concentrating on efficiency improvement and pollution abatement projects.

AID itself may soon have credit authority. A key question is what additional incentives are needed for U.S. technology? How can AID best obtain financing leverage? The U.S. Government needs advice from industry on how to structure financial assistance to help U.S. products and services. It is already clear that there is a need to develop local capital markets.

Richard Stern, U.S. Environmental Protection Agency

The Environmental Protection Agency (EPA) has just launched a major international Environmental Technology Initiative, details which were published in the January 28 Federal Register (Page 4067). This involves a $1.8 billion commitment over 5 years.

EPA has extensive international studies. For example, EPA is working with Poland and the Ukraine to develop demonstrations of FGD. It also has a NOx control reburning project in the Ukraine, is supporting the Indian government in particulate control and is involved in remediation projects on abandoned Soviet airfields in East Germany.

The U.S. Environmental Training Institute (ETI), under funding from EPA, has programs to determine environmental and technology needs in developing and transitional countries. ETI is also developing to fund the part of project between feasibility assessment and commercial operations.

EPA is funding 10 elements of the U.S. TIES program at $7 million.

EPA wants to do a FGD project in China under ADEPT funding.

Zack Allen, Coastal Power Production

Coastal Power is an independent power producer with offices and activities in Poland. His firm is now negotiating a power plant project in Poland.

The major problem his firm has is that they are working in an undeveloped private sector to develop major infrastructure projects and the Poles are not yet ready for that.

The Poles are having trouble coming to grips with the reality of realistic energy prices.

Poland has established stringent missions regulations effective January 1, 1998, but nothing has been built yet to meet them.

Central Europeans do not understand how business works. They have many misconceptions that make it difficult to negotiate with them. For example, they cannot understand why developers would need a 25-30 percent return to account for the large risk. A major problem is that many managers do not know what to do now that "free money" is no longer available from the central government.

A U.S. Government program is needed for American business school teachers to show top officials in transitional countries how Western capital markets work.

Labor is a major problem; the threat of strikes and complaints is omnipresent.

People in Poland are having trouble paying electricity bills, which have skyrocketed out of the capability of many individuals or businesses to pay. Poland is broke, but there are cash flows that do cover costs of many operations.

It is important to set precedents so that projects can be replicated.

Other Industry Comments

Government can help by working with other countries to create conditions where industry knows what the "rules of the game" are. Several areas are important: utility regulations, fair bidding procedures, and known environmental standards. Even though utilities may be privatized, the rules are so uncertain that government guarantees are still needed that they will not change the rules on which the projects are developed.

Governments can work with developing and transitional countries to develop local capital markets from which financing for projects can be obtained.

World market is limited if there is no one to take overall risk of plant performance; would government involvement help?

A problem with IGCC overseas at the present time is technical risk. Government must help.

An engineering firm representative said that getting paid after project completion is a problem.

Industry people need to go into plants and offer service; it's an effective marketing tool. With regard to permitting in Asia, the Czech Republic, Former Soviet Union, it is often not clear whether to go to the central or local government; it was suggested that all bases be touched.

Help host transition country develop standard offer contracts; help host country establish "transparent" emissions standards.

CHAPTER 4

PRESENTATIONS

Chapter 4

4.1 OPENING PLENARY SESSION

4.1.1 Presentation by Jack S. Siegel
Acting Assistant Secretary for Fossil Energy
U.S. Department of Energy

Presentation by Jack S. Siegel
Acting Assistant Secretary for Fossil Energy
Clean Coal International Technology Transfer Program
February 10, 1994

It's obvious from the turnout here that there is an interest in the export of technology and, in this case, clean coal technology. I very much appreciate all of you coming to this workshop. A lot of you are old friends and it's great to see you again. We have representatives from at least 13 embassies that I know of that are here as well who will join in discussions adding a lot to this workshop.

Over the past 15 years, about $10 billion dollars of U.S. government and U.S. industries monies have been spent on research and development of clean coal technologies. Those technologies have advanced dramatically since the late 70s, early 80s. In fact on top of that $10 billion dollars, another $7 billion has been spent or made available for the 45 projects that are in our Clean Coal Technology Program. That program too is progressing. Three of the projects have been completed. Twenty of them are in operation throughout the United States. Quite a number of others are in construction and the rest in design. Besides those being demonstrated, many of the CCTs now are being deployed commercially throughout the United States and other parts of the world. Pollution control and advanced coal preparation technologies, as well as, circulating fluidized beds and now, integrated gasification combined cycle are rapidly moving into the commercial marketplace.

Today, the largest markets for these technologies are outside the United States. U.S. electricity growth has slowed dramatically. Baseload power generation is not being built at the pace it was back in the 70s here in the United States but in other parts of the world, the developing world in particular, many thousands of megawatts, are being built and are planned for the future. In countries like Eastern Europe and the former Soviet Union other market needs exist. Although their demands for electricity are not growing, their interest in refurbishing existing plants and controlling the emissions from those existing plants are growing and, therefore, opening up markets for these technologies. As a result we, the Federal Government, feel that there are things that we could probably do to help you get a large market share in this growing world market.

(VIEWGRAPH 1)

There are a number of driving forces behind our interest in the export of clean coal technology and they are summarized on this chart. The Energy Policy Act, which was passed a couple of years ago, contains several sections that deal with the transfer of clean coal technologies abroad. It also has some provisions that deal with the transfer of renewable energy and environmental technologies abroad. Those programs also are being worked in conjunction with ours, but today's meeting is focused on clean coal technology. The President's Global Climate Action Plan, which you will hear more about in just a few minutes from Sue Tierney, contains a section dealing with joint implementation, consistent with our program. In addition, this Administration has determined that export of U.S. technology is a key element of its economic strategy. Lastly, Congress, in our fiscal year 1993 appropriations for the Clean Coal Program, requested that we prepare a report by May of this year on how much money we have left over in that program and what our intentions are for the use of that money, including our intentions for using some of the money for clean coal export initiatives. So all of these factors are driving us to focus our attention today and in the future on the export of clean coal technologies.

(VIEWGRAPH 2)

We have been working over the last year and a half to develop a strategy for a clean coal export program. That strategy is based upon a lot of input that we have received from our stakeholders. For example, we are required by the Energy Policy Act to prepare a couple of reports on the export finance programs for clean coal technologies and on foreign markets for U.S. clean coal technologies. Those interagency reports were prepared and submitted to Congress. The Department of Energy's Clean Coal Technology Export Program is coordinated through the Trade Promotion Coordination Committee of the Department of Commerce.

As a result, every federal agency that has an interest in export is involved in the discussions that we have been having on our program. There is a sub-group of the Trade Promotion Coordination Committee that focuses strictly on clean coal technologies and the Department of Energy is the chair for that sub-group. There have been a lot of discussions in that group on the proper role of the

VIEWGRAPH 1

DRIVING FORCES

- Energy Policy Act Sections 1331 and 1332
- President's Climate Change Action Plan Joint Implementation Initiative
- Administration Strategy for Economic Security
- FY 1993 Appropriations - Report on Status of CCT Funds

VIEWGRAPH 2

BASIS FOR PROPOSED PROGRAM APPROACH

- Reports to Congress Required by Section 1331
  - Clean Coal Technology Export Finance Programs
  - Foreign Markets for U.S. Coal Technologies
- TPCC Clean Coal Subgroup Support
- Trade Missions for U.S. Clean Coal Technology Firms
  - Eastern Europe
  - China
  - Pacific Rim
- Meetings with U.S. Trade Agencies
- Meetings with Industry and Trade Groups
- Industry Recommendations for "Showcase" Demonstration in China

federal government in promoting and supporting U.S. industry in the export of these technologies and those discussions have been key to defining a proposed program that we want to outline for you and discuss with you today.

We have been involved in a number of trade missions that also are focusing our views on the proper Federal role in exports. In fact, many of you have been involved in those trade missions with us throughout Eastern Europe, to China, and to other countries in the Pacific Rim. Those trade missions have taught us a lot about the markets, opportunities, and the barriers that exist as well and how the federal government can help deal with those needs. We have had a number of meetings with the U.S. Trade Agencies, like the Export Import Bank, the Commerce and State Departments, AID, the Trade Development Agency, and others to talk about how we might want to structure a program like this; how we could use the programs that are available within the federal government as a team to help support the industry in the export of these technologies. Finally, out of our China electric power mission was a recommendation to do a showcase demonstration project in China and that too we are building into our strategy which I'll discuss in a minute.

(VIEWGRAPH 3)

The export market for clean coal technologies is very large. Between now and the year 2010, the market for clean coal technologies for new and retrofit applications is expected to be somewhere between $600 and $800 billion dollars. That's a lot of money. Making the assumption that about a quarter of those sales will be sales that come from outside of the countries that need the equipment, that converts to about a $200 billion dollar export market for countries throughout the world. Converting that into jobs equates to about 90,000 jobs per year during that time period. You can see at the bottom of this chart where the primary markets are and where our focus of attention has been China stands out as the number one market but Eastern Europe, South Asia, and the Pacific Rim are also large opportunities. In addition, this chart doesn't show other large potential markets like Mexico and South America.

(VIEWGRAPH 4)

I am going to talk a couple of minutes about the proposal that we want to discuss with you. Our export proposal for clean coal technologies is a three part program. The first part is for the

VIEWGRAPH 3

MARKET SUMMARY (1993-2010)

- Foreign CCT Market for New & Retrofit Facilities $600-$800 Billion
- Approximately $200 Billion of Exports for CCT Exporting Nations
- Approximately 90,000 Person Years of Employment Per Year
- Largest Markets - Developing Countries

- China	126 GW Retrofit	200 GW New Growth
- E. Europe	170 GW Retrofit	10 GW New Growth
- S. Asia	50 GW Retrofit	75 GW New Growth
- Pacific Rim	35 GW Retrofit	10 GW New Growth

VIEWGRAPH 4

PROPOSED THREE PART PROGRAM

- Technical Support for U.S. Export Agencies, Multilateral Banks and U.S. Industry
  - Trade Missions
  - Reverse Trade Missions
  - Provide Access to Foreign Officials
  - Training
  - Evaluation of Projects
  - Identify Market Opportunities

Many of These Activities Are Already Underway

Department of Energy to provide technical support to U.S. export agencies and multi-lateral banks and to U.S. industry to do things like organize or be part of trade missions. As I mentioned already, we have done a lot of those and we intend to do many more. We intend to be involved in reverse trade missions where we bring people from foreign countries over here to see your facilities, to see what capabilities you have, what equipment you have and to work with them to help them decide what their needs are so we can match suppliers with the needs of the foreign countries. We see as one of our roles, along with other federal agencies, providing access for you to foreign officials. In addition, some agencies offer money for training of people. For example, we have brought over here, using funds from the Agency for International Development, people from Eastern Europe to get trained on how utilities in the United States make decisions; how they make decisions on technologies, and how management decisions are made in a free market society. We have offered training in a wide variety of areas associated with individual technologies and financing, among other things. Again, we usually use other agency's money and in coordination with other agencies to develop these programs. There is also training available in countries offered by organizations like the Overseas Private Investment Corporation.

We propose to expand our involvement in providing technical support to international financial institutions in the evaluation of projects. For example, we have a program with the World Bank where when the World Bank is trying to scope out a project that deals with coal technology, they will ask us to be a part of their evaluation team and provide technical guidance to them and help them write the specifications for the project. We have a similar arrangement with the Trade Development Agency and with the Export Import Bank. So the Department of Energy acts as a technical arm to those organizations and along with many of the other government organizations, most specifically Commerce, we are helping to identify market opportunities for these technologies. As I mentioned, all of these activities we are doing today and want to continue in the future, and we would like your feedback as to whether these are effective programs and how we can make them more effective.

(VIEWGRAPH 5)

The second element of this program is to provide limited financial assistance for showcase demonstration projects. We have learned in discussions with you and discussions with representatives from the foreign countries that the best way to transfer advanced technology

VIEWGRAPH 5

PROPOSED THREE PART PROGRAM (Continued)

- Provide Limited Financial Assistance to "Showcase" Demonstrations

  - China - Advanced Power Systems (IGCC)
  - Eastern Europe - Upgrade of Existing Plants

- Provide Cost Sharing for Project Development Definition Activities

  - Expand Foreign Market for U.S. Participation
  - Reduce Project Risk Through Improved Definition
  - Improve Ability to Raise Financing

is to actually get a few plants built and in operation in those countries. We are proposing a demonstration project in China, an integrated gasification combined cycle plant. Also, we are proposing a project that would likely be a refurbishment of an existing coal-fired power plant in Eastern Europe. Again, we'd like your views on the idea.

The third part of our program deals with providing cost-sharing money, not for feasibility studies, there is plenty of money available from other agencies to do feasibility studies, but to go further than that and do project definition. Those of you that are familiar with our Clean Coal Technology Program know that the first phase of our program is project definition where you will not only do a feasibility study, but obtain your financing, get your team together, and address all the issues that are associated with being in a position to determine whether or not you feel this project can move out on its own. We have had discussions, with and obtained the support of, the Export Import Bank and the Trade Development Agency on this concept, if funds are available. We recognize that you are at great risk at the front end of a project where you are spending your own money not knowing at all whether you are going to be able to pull it together. We are looking at sharing that risk and putting you in a position where you are going to have all the data you need at the end of that project definition period to go to the Export Import Bank, or the World Bank or wherever with a package that hopefully you can sell to them and get the financing you need for the project.

Those are the three elements of our proposed plan and those are the things we would like to discuss with you at this meeting.

(VIEWGRAPH 6)

One last point, the President submitted the fiscal year 1995 budget on Monday afternoon. There are three pieces of that budget associated with our plan that I want to bring to your attention. First of all, we requested a first piece of funding for the China integrated gasification combined cycle demonstration project. We also asked for the first piece of the Eastern European refurbishment project. And, we gave Congress a heads up that in our fiscal year 1996 budget we are going to be asking for some funds for the project definition part of our program. All of these funds are going to come from the existing Clean Coal Technology Demonstration Program excess funds. That's our proposal to Congress. Taking these funds from the existing Clean Coal Program is going to have absolutely no impact on the forty-five projects already in the program. That's

SEEKING AUTHORIZATION FOR FY95 AND FY96

	($millions) FY95	FY96
China Demonstration	19	31
Eastern Europe	1	24
Project Development Fund (Sec. 1332)	0	25
Totals	20	80

Source of Funds - Reprogram Funds from CCT Program No impact on Completing Current CCT Program

clearly our highest priority. We want to make sure that those projects are fully funded and successful but we think we have enough additional funds that we could initiate this export initiative as well.

(VIEWGRAPH 7)

Now for the purpose of this meeting, I have briefly summarized our proposal. Now we need to hear from you. We want to know if this is the way we ought to be focusing our resources. If not, how should we do it? Where should we be focusing our resources? Are there specific countries that should be our highest priority? Obviously, we don't have the resources to cover the entire world so we need your help in focusing us on those markets that make the most sense to concentrate on. You are going to hear from a number of people from foreign embassies about the market opportunities that exist in their countries and, hopefully, that will help us in the discussion. We are looking for your input on a lot of very tricky issues; issues like whether we limit this program to U.S. companies and what a U.S. company is -- how do we define that? What is the most useful form of assistance? Should it be a grant? Should it be a cooperative agreement? Should it be some other form of financial assistance? And a wide variety of other issues that are laid out in the materials that Howard Feibus handed out to you.

I think there is a lot we have to do in the next couple of days. It's a very ambitious agenda, but I think with the expertise we have in the audience, there is no doubt in my mind that we are going to get out of this what we need and hopefully you will as well. So I look forward to a very fruitful next couple of days and again I thank you very much for participating in this very important meeting.

VIEWGRAPH 7

PURPOSE OF THIS PUBLIC MEETING

- Provide Forum for Comments from Industry, Government, Host Countries
  - Confirm Findings from Prior Meetings with Industry Regarding China and Eastern Europe Priorities
  - Opportunity for New Information from New Sources
- Seeking Suggestions & Direction
  - Priority Markets
  - Most Effective Impact of Program - Limited Funding
  - Possible Solicitation Approach
  - Most Useful Form of Assistance
  - Definitions - U.S. Firms, U.S. Technology, Etc.

4.1.2 Presentation by Susan F. Tierney
Assistant Secretary for Policy, Planning and Program Evaluation
U.S. Department of Energy

Presentation by Susan F. Tierney
Assistant Secretary for Policy, Planning
and Program Evaluation
February 10, 1994

Good morning everybody. I thought I would talk a little bit about the Clinton Administration's environmental initiatives in climate change. This is important for understanding our position in international energy and environmental policy. It is relevant to you, in addition, because it's the framework in which to describe to you our proposal and ideas for what we call "joint implementation", that is, programs that would enable U.S. firms along with firms in other countries to get together to make investments that would lead to greenhouse gas emission reductions, some of which could involve clean coal technology. So I want to talk about the framework in which such clean coal technology projects could operate. I'm also going to talk about other aspects associated with our program for greenhouse gas emission reductions.

Let me start with a very big picture. To do so, I must reference as the starting point the international global environmental agreements that were made in Rio in 1992. In these agreements, the signatory countries to the framework convention on climate change made commitments to do what they could to reduce greenhouse gas emissions to the point at which concentration of greenhouse gases in the atmosphere would not be damaging to the global environment. Under this international framework, the U.S., and other countries around the world, must prepare action plans, due to be delivered to the international community this fall.

In anticipation, President Clinton asked the Administration last year to begin to develop a strategy to cost effectively reduce our own greenhouse gas emissions this decade. He set the goal of having the U.S. reduce its emissions of greenhouse gases to 1990 levels by the year 2000. **(VIEWGRAPH 1)** In practical terms, that goal means that we would have to cut our emissions of greenhouse gases by 10 percent by the year 2000. To meet the President's commitment, we had to figure out what this country needs to do to reduce its emissions growth so that it's back to 1990 levels, and that's about a 10% reduction compared to what things would otherwise be. The President asked the agencies, which included the White House, the Department of Energy, the Environmental Protection Agency, and many others to figure out how to do this cost effectively, to do it in ways that would use market incentives and market mechanisms, as opposed to command and control strategies. We set off to work; we

VIEWGRAPH 1

CLIMATE CHANGE ACTION PLAN

- Rio Convention: National Action Plan (Due 9/94)
- President's Committment: 1990 Levels by 2000
- Climate Change Action Plan Strategy:
  - 44 Cost-Effective Actions
  - Sources (Carbon, Nitrous Oxides, Methane, HFCs)
  - Sinks (Forestry)
  - Sectors
- Climate Challenge

met with lots and lots of people; we turned every possible stone to uncover ways in which we could reduce greenhouse gas emissions using market forces. In the fall, the President presented the plan, in which we identified 44 programs in which we could domestically reduce our greenhouse gas emissions by the target year, the year 2000. Those strategies essentially use partnerships in which we leverage U.S. Federal investments, principally in the form of technical assistance, with private funds to yield energy savings, reduced energy costs, and resultant greenhouse gas emissions reductions. About two-thirds of the emissions reductions will come through energy efficiency improvements; that's improvements in energy use, as well as energy generation and transmission systems.

The programs focus on improvements in end uses of electricity and other fuels in homes and in businesses. Additionally, we include new technologies and fuel switching in combustion of fossil fuels; in doing so, we avoid greenhouse gas emissions production. The 44 programs we came up with touch all the greenhouse gases, whether methane or CO2. We are trying to reduce all of them collectively. We are not only focused on sources of production of emissions, but we also looked at programs that would enable us to sequester or hold carbon in plants, so some of these programs involve improvements in agricultural techniques that increase production of biomass for use in energy production. Finally, we looked at how to reduce greenhouse gas emissions in all sectors. That means not only the electric and natural gas utility sectors involving the production and distribution of energy, but also in the end-using sectors. We have a major program to improve the efficiency of motors in the industrial sector, as one of the ways in which we would avoid combustion of fossil fuels. Additionally, we looked to see how we could improve emissions growth, especially in the transportation sector. We have work ahead of us to continue to figure out how to do that effectively. In this country, as you know, we have not been fond of enacting gasoline taxes and we have to figure out other ways to reduce the growing emissions associated with the transportation sector.

Let me talk for a minute about the utility sector where we have a very exciting program. In this "Climate Challenge" program, we are trying to get the utilities themselves to make commitments to reduce their own greenhouse gas emissions. The Secretary of Energy in the past year has signed agreements with about 75 utility companies and power suppliers around the country. These companies and the Department are in the midst of drawing up agreements under which individual companies would commit to taking actions to inducing the

VIEWGRAPH 2

JOINT IMPLEMENTATION

- Concept

  - Cooperate Efforts Between Countries to Reduce Greenhouse Gas Emissions

  - Greater Range of Options for Reductions

  - Market Opportunities Through Technology Cooperation with Developing Countries

- International Criteria

  - Currently Being Negotiated in Geneva

  - U.S. Position

    -- Pilot Projects to Gain Experience
    -- Strict Criteria Necessary

countries in transition to make investments in projects that will reduce greenhouse gas emissions. The other way for countries to act together under the global climate convention is joint implementation. Today, in Geneva, the parties are discussing what terms and conditions countries will agree to in order to jointly implement climate change under this joint implementation approach.

Let me give you an idea, by example, of what is meant by joint implementation. Please remember as I give you these examples, that these are hypothetical possibilities, since the rules of the road are not set. One could imagine the following kinds of examples being possible joint implementation strategies in the future.

Let's choose as the first one a clean coal technology approach. Let's say a developing country has planned in its electric supply plan to develop a coal plant. In my hypothetical case, assume that the plan it not for a clean coal plant. Let's say it is a relatively dirty, high sulphur coal plant, and would not utilize advanced technology. In a joint implementation scenario, one could imagine that a U.S. firm, whether it is an equipment vendor, or a utility that has made commitments to reduce its greenhouse gas emissions, decides to come up with an investment to cover the incremental costs above what the country would otherwise have had to pay to install the traditional coal plant. With this incremental investment, the efficiency of that plant increases through a clean coal technology, and there are related improvements in greenhouse gas emissions for the given electrical output of the plant. One of the questions that is now the subject of the international agreements is who gets to count those emission gains, in terms of keeping credit on the international roster for greenhouse gas emissions reductions. One of the thoughts on the table is that the investor, which in my hypothetical was the utility company in the U.S., who is seeking to reduce its own emissions tab, would make the investment, track the efficiency improvements, track the expected greenhouse gas emissions reductions and count it on the U.S. roster and its own company-specific ledger as one of its actions. That's one kind of approach that people have in mind. As you might imagine, there are enormous issues associated with how you make sure that you don't double count. The clean coal technology wouldn't have happened anyway. You may need to work out an appropriate sharing of the emissions reductions between the host and investing countries and the host and investing firms.

Let me talk about a second example. This is an example that exists today, although it is not today counted as a joint implementation plan or program. This is an example of a real live agreement, one that

exists between a U.S. utility company and foreign entities: New England Electric Systems forestry program in Malaysia. New England Electric System has made commitments to reduce its greenhouse gas emissions, and in so doing has looked for ways to offset its local sources of emissions. One way is through sequestering carbon internationally through improvements in forestry and logging practices in a large plantation in Malaysia. A number of concrete agreements exist, agreements among NEES and the Malaysian's forestry program that make sure that the improvements in the forestry practices are maintained over time. There are agreements and analyses that make very clear what is the difference in the amount of carbon sequestered in this plantation as opposed to the traditional forestry and logging practices. There are very clear tracking systems set up so that the New England Electric System is confident that what they have invested in will last for a known period of time.

Let me give you a third example, which is a project under discussion today. Like the other examples, this one of course does not get credit in the joint implementation scheme because, again, the rules of the road have not been decided. In this hypothetical, U.S. utility companies who are interested in offsetting their own greenhouse gas emissions reductions are interested in exploring investing in activities in the Czech Republic. Today, there is a relatively dirty electric generating source; there are very dirty local sources of heat in a nearby cluster of apartment buildings and commercial office space. The proposal is for the U.S. investors to fund the creation of a district heating system, fuel switching and the at the power plant, and a co-generation plant. The result will be less ground level pollution and greenhouse gas emissions associated with the fuel switching efficiency gains in the upgraded power plant, and a co-generation system that will create district heating enabling the locality to shutdown their very dirty local boilers. This is apparently an investment that would otherwise not take place because the local government could not fund this on its own. The idea is that the parties involved would share in the greenhouse gas emissions reductions.

These are examples of what people have in mind when they talk about joint implementation. There are enormously complex, controversial and important policy and technical questions that need to be resolved so that countries gain confidence that these approaches are viable and fair. The roles must avoid double counting, to make sure that what is done through joint implementation wouldn't have happened otherwise, to ensure that

greenhouse gas emissions are quantifiable and don't lead to increases elsewhere. There are questions again associated as to who will "own" the reductions. There were questions associated with how transparent the emissions reductions must be, so that people in the international community will know what happened.

Working out answers to those questions is very important to the U.S. for lots of different reasons. For example, there isn't likely to be enough government-to-government funding via the Global Environment Facility to make the needed level of investment. If we can use markets to advance investment in cost-effective and creative solutions to greenhouse gas emission reductions, there will truly be win-win solutions. There will be solutions that work for the environment. There will be solutions that work for the sending and receiving country in terms of technology cooperation, in terms of technology transfer, in terms of export and import, in terms of investment that might not otherwise take place. We think that the U.S. has an enormous responsibility as the largest emitter of greenhouse gases in the world to do what's necessary inside our borders to take care of our own emissions levels. We recognize, however, that even if we did everything perfectly to reduce our own greenhouse gas emissions, the growth in greenhouse gas emissions internationally would still be growing rapidly in other parts of the world. We can be helpful through investing in cost-effective, creative, low-marginal-cost reduction approaches internationally and help solve this problem together. So we are very interested in having the terms and conditions of joint implementation work in ways for all countries in the world, including our own.

(VIEWGRAPH 3)

The last overhead slide shows our proposal for how we think we could help enable the world community gain confidence in this joint implementation approach. In the President's plan presented this fall, there is a joint implementation pilot. In it, companies may make proposals for joint implementation projects to a team of evaluators in the U.S.. These projects in fact could be offered by a private company, or a local government, or a federal agency, such as DOE's Clean Coal projects. The federal review committee would approve them, and set up protocol under which we would track what's going on. We would see what the investment is; we would see what the greenhouse gas reductions are; we would set up a system under which we would know what is happening over time. With that we

VIEWGRAPH 3

U.S. INITIATIVE ON JOINT IMPLEMENTATION

- Pilot Projects with Developing Countries and Countries in Transition
- Draft Guidelines Out for Public Comment Until 2/25
- Initiatives to be Led by Private Sector
- U.S. Government
  - Technical Assistance
  - Evaluation Panel
  - Seed Money for Feasibility Studies

would inventory what is happening. We would set up a way for the public to see what's going on and get confidence that this system can work.

Our proposal in pilot form has just been published in the Federal Register. We are receiving comment until the end of this month. There are many who have commented to date who believe that the system, as proposed, is unnecessarily complicated. We will look to see how we can ensure that our objectives, which are to show the world that this can work and therefore that it's transparent, are balanced with the incentives needed to motivate people to develop projects.

We think this pilot approach is a sensible one. It is what we are proposing today in Geneva as the strategy that the international community should also use in order to become comfortable with allowing joint implementation schemes. We think that without this opportunity, the world will collectively spend more money on reducing greenhouse gas emissions than otherwise. Without it, we could crimp investment opportunities from host and investor countries, and crimp win-win technology transfer, which would be a shame for economic growth in countries all around the world. Therefore we hope very much to work with other countries to determine how we can all cost-effectively reduce greenhouse gas emissions while attending to all countries' needs for economic growth and competitiveness.

Thank you.

4.2 REGIONAL DISCUSSION GROUPS

4.2.1 Eastern Europe and NIS

Chapter 4

Assessment of the Clean Coal Technology Application Possibilities in RENEL and Presentation of Financing Possibilities for the Rehabilitation Works Considered at Present

Marian Voicu
First Secretary (Economic)
Embassy of Romania

RENEL

Romanian Electricity Authority
Division for Strategy and Economic
Development

ASSESSMENT OF THE CLEAN COAL TECHNOLOGY APPLICATION POSSIBILITIES IN RENEL AND PRESENTATION OF FINANCING POSSIBILITIES FOR THE REHABILITATION WORKS CONSIDERED AT PRESENT

1/ Short overview of RENEL update situation with emphasis on the coal fired thermal power plants.

The overall capacity installed at present in the electric power plants operated by RENEL is of 19,159MW , of which 7558 MW are generated on coal, 5923 MW on hydrocarbons and 5718 MW in hydropower plants with a shorter operating time, meant to cover the peak demand.mainly Out of the total installed capacity, about 2838 MW is constanrtly unavailable , The rest of the installed capacity is used only partially, at smaller loads, owing to the technical unavailability of the units, to the scarcity of fuel or even due to a smaller energy demand. Thus, the average operating power is of 8000 to 8,500 MW. The operating strategy is aiming at an exhaustive utilization of the capacities generated on domestic coal, in so far the available power and time of the existing units allows this; the electric power generated on hydrocarbons being largly associated with the local supply of industrial steam and hot water for heating purposes extracted from cogeneration power units.

Most of the power generated on coal is based on domestic lignite with the characteristic features given under Appendix 1.
The rest of power generated on coal is obtained from coal mix which is an outcome of the domestic hard coal mixed up with a make-up of imported hard coal . The characteristic features of this fuel is listed under the same Appendix.
For starting and flame support, heavy fuel oil or gas is used.
The boilers running on lignite use preparation plants with fan mills, combustion with direct blowing, burners with parallel jets and tangential air blowing combustion. Most of the boilers are provided with after - combustion grates because of the very high xylite content of the lignite.
The boilers running on hard coal are provided with hammer mills and direct blowing combustion plants with vortex burners. Some installations have been retrofitted to enable the use of the crushing mills.
The initial design did not provide FGD and nox removal procedures. All boilers were provided with electrostatic precipitators for the retention of suspended matters. In most cases, because the coal quality decreases below the design value (due to the increase of the ash content) the performance of the electrostatic precipitators also drops below thedesign

value.

The situation of the existing generating capacities might be charecterised as follows:
- with some of the capacities the forecast life-time has expired or is very close to the limit.
- from the rest of the existing capacities a large part is operating with specific consumption rates and an availability degree much below those forseen in the design.
- the domestic extraction of the power coal and especially of lignite if we were to consider the forecasts on the restructuring of the mining sector does not cover the demand of the existing capacities.
The utilization factor of the installed power has been reduced mainly due to the decline of the industrial sector, persuant to the social and political changes after 1989.
That is why, the short- term strategy on the generating capacities, developed by RENEL, which was based on studies conducted by specialized Romanian institutes and by foreign consultancy firms does not provide major investments in the area of generating capacities in general (except for the nuclear programme) and is mainly focused on rehabilitation works meant to extend the life time and to increase the economic efficiency of the existing capacities.

2/ Short presentation of the rehabilitation programme for the generating capacities on coal and financing solutions considered

A preliminary assessment of the funds required for rehabilitation has been performed within an inspection based feasibility study conducted by the English company Merz and Mc Lellan which has been selected by international bidding in cooperation with the World Bank.
The specific objectives provided for the period to come are the following:

- 2 x 315 MW on lignite with full condensing, manufactured by MAN Germany and GEC Altshom - France;
- 2 x 210 MW running on residues resulting from the preparation of hard coal in full condensation , manufactured by CIS; the rehabilitation also provides the heat supply for district heating.

- conversion of 11 boilers of 420 t/h, manufactured by Vulcan - Romania from operation on domestic lignite to operation on imported hard coal with the specific features listed under Appendix 1. Considering the shortage of the above mentioned lignite and the distance of the location as to the mining fields these boilers are still kept in operation and are at present included into the operating frame of the cogeneration plants, but run on hard coal from the import.

Since RENEL does not have the necessary funds to financially back-up these works especially the equivalent part to be financed in hard currency, negotiations with the World Bank and other international bodies are in progress to involve these into the financing , besides the Romanian party.

According to the present philosophy, considering both the funds available and RENEL"s possibility of the subsequent pay back of loans. the problem of environment protection to meet the existing requirenment but less the fitting into the SOx emission values (in so far this asks for FGD installations) has been considered.

At present, Romania is going to pass the law for environment protection which stipulates the observance of the "technical conditions concerning the protection of the atmosphere " elaborated by the Ministry of Waters Forestry and Environment . Appendix 2 is giving an abstract of the se norms, namely the part relating to the emissions from the electric power plants.

3 / Estimation of the necessary amount of clean coal technology for RENEL

So far, we have indicated the installations running on coal which need to be rehabilitated and have been included into RENEL's short term strategy, the financing problems associated with these rehabilitation works as well as the relationshiop existing between the rehabilitation program and the legislation for the environment protection which imposes the same conditions on the units to be rehabilitated in the future as those considered for the already rehabilitated ones, but which cannot be fully met because of the scarecity of financing sources.

On this background, RENEL shows its interest for the employment of clean coal technologies which have been developed by the Department of Energy , especially for those which can be applied in the above mentioned rehabilitation projects and which meanwhile are able to solve the conformity with the environment protection requirements as well as the problem of finding the necessary financial support for these works.

drawn - up by
Octavian Pavnotescu
Head of Rehabilitation Department

Anexa 1

Romanian lignite
(raw material)

Calorific value Q_i = 6,49 MJ/kg

(5.65 - 7.54 MJ/kg)

C = 2o,2 %
H = 1.9 %
O + N = 9.6 %
A = 24.5 % (2o ÷ 31) %
Wt = 43 % (37 ÷ 46) %
Volatile = 19.6 %
S = o,8 %
- softening point °C = 1,15o
- melting point °C = 1,18o
- flow point °C = 1,22o
xilitex = lo % (5 ÷ 18) %

Grindability

Sise 0 - 8o mm
Hardgrove
Test : 35° H

Ash analysis

SiO_2 = 45 %
Al_2O_3 = 18 %
Fe_2O_3 = lo %
MoO = 3.5 %
CaO = 12 %
TiO_2 = 1 %
P_2O_5 = o.2 %
SO_3 = 8 %
Mg = o.ol %
V = o.o2 %
K_2O = 1.7 %

.. // ..

Na_2O = o.5 %

Romanian hard coal

Q_i = 16.33 MJ/kg

C = 41.57 %
H = 3.15 %
O + N = 9.48 %
A = 33.7
W = 1o.o %

Volatile = 28 %

S_2 = 2,o9 %

Softening point ^oC = 132o
melting point ^oC = 1335
flow point ^oC = 1365

Grindability Hardgrowe 46,5 ^oH

Ash analysis

SiO_2 = 4o.46 %
Al_2O_3 = 16.74 %
Fe_2O_3 = 13.88 %
FeO = 1.15 %
CaO = 1o.22 %
MgO = 2.82 %
SO_3 = 1o.54
$Na_2O + K_2O$ = 3.25 %

Imported hard coal

Calorific value Qi = 25.o MJ/kg

W 1o %
A 16 %
S 1 %
Volatile 25 - 3o %
Grindability 5o ^oH

ANNEX 2

The main values for new and retrofitted power plants are summarized in Table 6.2.2. For new installations the MAPPM-standards are about the same as those published by the European Community.

Table 6.2.1 Romanian emission standards for existing power plants

type of fuel	heat input	concentration (mg/m_0^3)*		
	MW(th)	SO_2	NO_x	part
coal, lignite	150-500	50% FGD	800	150
	>500	50% FGD	800	100
oil**	>150	1700 3400	600	50
natural gas	>150	50	500	5

in dry flue gas, coal and lignite 6% O_2, oil and natural gas 3% O_2
** SO_2 1700 mg/m_0^3 in Bucuresti and Constanta, 3400 mg/m_0^3 for other places

Table 6.2.2 Romanian emission standards for new and retrofitted power plants

type of fuel	heat input	concentration (mg/m_0^3)*		
	MW(th)	SO_2	NO_x	part
coal, lignite	<100	2000	500	100
	100→500	2000→400	400	100
	>500	400	400	100
oil	<100	1700	450	50
	100-300	1700	450	50
	300→500	1700→400	450	50
	>500	400	450	50
natural gas	>100	35	350	5

in dry flue gas, coal and lignite 6% O_2, oil and natural gas 3% O_2
means that the maximum SO_2-level and the heat input are correlated

LIST
of
I-st priority projects

Ord. No.	Department Field Project Denomination	Term to carry out the project - months -	Companies proposed to carry out the project
0	1	2	3
	ENERGY SECTOR		
1.	Investment carrying out at the 700 MW Unit 2 of CNE Cernavodă	46	CNE Cernavodă (Nuclear Power Plant)
2.	Rehabilitation on the expiration of the planned lifetime at 150 MW Group 4	20	CTE Paroşeni (Thermal Power Plant)
3.	Rehabilitation on the expiration of the planned lifetime of the groups:		
	- 50 MW Group 5	24	CET Isalniţa
	- 315 MW Group 7	24	(Cogeneration
	- 315 MW Group 8	24	Power Plant)
4.	Rehabilitation within the planned lifetime of the groups:		CET Brazi I
	- 200 MW Group 8	24	(Cogeneration
	- 200 MW Group 9	24	Power Plant)
5.	Rehabilitation within the planned lifetime of 2x210 MW Groups 1 and 2	2x18	CET Brăila (Cogeneration Power Plant)
6.	Rehabilitation within the planned lifetime of (4x50MW) groups 1 - 4.	8 months for each group	CTE Brăila CTE Drobeta Tr. Severin (Thermal Power Plant)
7.	Rehabilitation on the expiration of the planned lifetime of groups:		
	- 210 MW Group 1	12	CTE Mintia
	- 210 MW Group 2	12	(Thermal Power Plant)

0	1	2	3
8.	Rehabilitation within the planned lifetime of: - 120/150 MW Group 3 - 2x50 MW Group 1 and 2	 8 2x18	**CET Palas (Cogeneration Power Plant)**
9.	Substitution of three hydraulic power units with increased power ones at CHE Porţile de Fier I (3x175 MW).	8 months for each group	**CHE Porţile de Fier I (Hydro Power Station)**
10.	Rehabitation within the planned lifetime at Retezat Râul Mare hydroelectric power plant (2x167.5 MW).	8 months for each group	**CHE Retezat Râul Mare (Hydro Power Station)**
11.	Rehabilitation within the planned lifetime of the 3x172.5 MW Group at CHE Ciunget - Lotru.	8 months for each group	**CHE Ciunget Lotru (Hydro Power Station)**
12.	Modernization of EMS/SCADA system in S.E.N. (implementation of informatics in the national energetic dispatching).	48	**DEN (National Energetic Dispatching**

LIST
of
II - nd priority projects

Ord. No.	Department Field Project Denomination	Term to carry out the project - months -	Companies proposed to carry out the project
0	1	2	3
	ENERGY SECTOR		
	Completion of the construction - assembly works for the following energetic groups		
1.	Group 2 of 50 MW	24	**CET Bacău**
2.	Group 2 of 50 MW	24	**CET Arad**
3.	Group 1 of 120/150 MW Group 2 of 120/150 MW	30 30	**CET Timişoara**
4.	2 groups of 90 MW	30;30	**CHE Bistra Poiana Mărului**
5.	2 groups of 21.3 MW	5;10	**CHE Olt Făgăraş Avrig**
6.	2 groups of 53 MW	5;10	**CHE Olt Slatina Dunăre**
7.	2 groups of 7.7 MW	5;10	**Mihăileşti - Canal Dunăre - Bucureşti**
8.	2 groups of 26 MW	10;15	**CHE Mâneciu Vălenii de Munte**
9.	2 groups of 16.5 MW	5;10	**Jiu-Vădeni-Tg.Jiu**
10.	5 groups of 145.1 MW	20;20;25; 25;25	**CHE Olt Cornetu Avrig**
11.	6 groups of 84 MW	20;25;25; 25;25;25	**STREI Subcetate Simeria**

0	1	2	3
13.	3 groups of 186 MW	60;25;25	**Buzau Siriu-Surduc**
14	2 groups of 28 MW	48;25	**Runcu Firiza**
15.	1 group of 12 MW	42	**Paşcani pe Siret**
16.	1 group of 25 MW	72	**Cerna-Belarca-Herculane**
17.	2 groups of 71 MW	60;25	**Sirei Cosmeşti**
18.	2 groups of 45 MW	72;25	**Bistriţa Borca Poiana Teiului**
19.	Hard coal operation conversion works 2 x 50 MW	6 , 6	**CET Iaşi**
20.	2 x 50 MW	6 , 6	**CET Suceava**
21.	3 x 50 MW	6 , 6 , 6	**CET Borzeşti II**
22.	2 x 50 MW	6 , 6	**CET Bacău**
23.	2 x 50 MW	6 , 6	**CET Giurgiu**
24.	Completion of the construction assembly works	20	**Works for high voltage electric lines and stations**

4.2.2 Asia and India

Chapter 4

Prospects of Cooperation Between China and USA in Clean Coal Technology

Pan Baozheng
Minister-Counsellor for Science and Technology
Embassy of the People's Republic of China

PROSPECT OF COOPERATION BETWEEN CHINA AND USA IN CLEAN COAL TECHNOLOGY

BY CHINESE EMBASSY IN USA

1. China need to Develop clean coal technology

- Coal is the principal source of energy in China in terms of both production and consumption. Coal occupies 76% of the total primary energy consumption in recent years, which is 25% of the total consumption in the world. And this situation will not change substantially in a relatively long period in future. Actually both production and consumption of coal in China are predicted to exceed the amount of 1.4 billion tons per year.

- Coal fired power stations are the main electrical generation facilities in China, which account for about 70% electrical power.

- There is an uneven distribution of coal resource, about 90% of coal reserves are in the west and north of China, far away from the energy consumption center -- developed eastern areas. At present coal transportation occupy more than 40% of total transport by rail in China, putting heavy burden to the rail transportation.

- The environmental pollution caused by the use of coal is serious. In 1991 China's raw coal production reached 1.088 billion tons. Using coal produces large amount of smog, ash and SO2.

- Next several decades, with the high speed economic development, China is inescapable to face the large scale increase of energy demands. Pressured by the need for development and environment protection, China must change its energy structure, that is, to develop towards environment sound clean energy system. Clean coal technology is the base to realize this change.

2. The priorities of Clean coal technology in China

In recent ten years R & D of clean coal technology has been always one of the priorities in national science and technology plan. The State, various government agencies and industries have input substantial amount of capital and manpower to raise coal utilization efficiency and to control the environmental pollution in China. However the big gaps still exist between China and the industrialized countries in coal utilization technology. In the policy aspect, China need to strengthen and improve the necessary laws and regulations in order to stipulate and encourage the development and application of CCT. It is especially necessary to study measures for promoting CCT development in following areas:

- Coal wash and selection technology, such as new type physical washing techniques
- Briquette coal processing technology
- Application of coal water mixture, such as commercialization
- Circulate fluidized bed combustion burning technology
- High efficient and low pollution powder coal burning technology, flue gas cleaning and comprehensive use of coal ash, desulfurization and new flue gas cleaning technology. Such as pressurized circulate fluidized bed combustion(PFBC) and integrated gasification circulated combustion(IGCC)
- Coal gasification technology, such as indirect coal liquefaction technology and IGCC
- Fuel cell technology, coal liquefaction technology and MHD electrical generation

Now Chinese government is drafting the National Plan for development of the CCT. The Plan will strengthen the research and development, demonstration and extension, and international cooperation in CCT. This is an important measure for the sustainable economic development in conjunction with the environmental protection.

3. The prospect for cooperation between China and USA

It is in the interests of both China and US to actively promote the cooperation in CCT among industries and technological communities. This cooperation will be mutual benefit. China can upgrade its clean coal technology level in a fast pace, and American companies can gain opportunities to expend overseas technology market. Through the

cooperation, we could realize the goal of environment sound sustainable economic development.

China is not only a large coal consumption country but also a large potential market for clean coal technology utilization. Just take the electric power market as the example:

-- Total national installed capacity by the end of 1993: 177GW
-- To the year of 2000, new installed capacity is about 125GW
-- Coal fired power plants account for more than 70% of total capacity.
-- Clean coal technology could be used for both old plants' technology transformation and new plants' construction.

This is a good market prospect of making technical and trade cooperation in power plant construction and CCT development. We believe through the active promotion and cooperation between our two governments on the basis of mutual benefits, clean coal technology will find wide application market in China.

4.2.3 South America and Africa

Chapter 4

Clean Coal Technology, Republic of South Africa

Paul Bryant
First Secretary
Embassy of South Africa

EMBASSY OF SOUTH AFRICA
3051 MASSACHUSETTS AVENUE, N. W.
WASHINGTON, D. C. 20008
(202) 232-4400

CLEAN COAL TECHNOLOGY

REPUBLIC OF SOUTH AFRICA

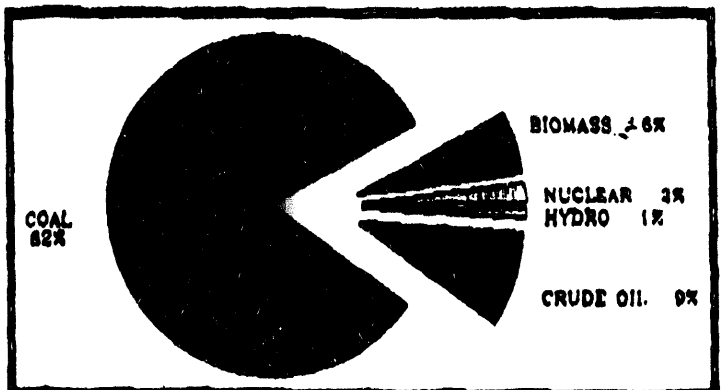
CLEAN COAL TECHNOLOGY
REPUBLIC OF SOUTH AFRICA

1. BACKGROUND

The Republic of South Africa is blessed with large deposits of coal, with known R1 reserves estimated at 100 billion tonnes. Present economically recoverable reserves are estimated at 55 billion tonnes. Consequently, and because of a dearth of other energy resources, the principal source of primary energy in the RSA is coal. This commodity is also exported after undergoing beneficiation. Annual coal sales for 1992 were:

Local Consumption:	126.3 million tonnes
Export:	49.6 million tonnes
TOTAL:	175.9 million tonnes

During 1992, Coal provided 82% of the RSA's primary energy consumption. Crude oil contributed 9% and biomass (eg fuel-wood) contributed 6%. Nuclear and hydro power combined provided only 3% to primary energy consumption.

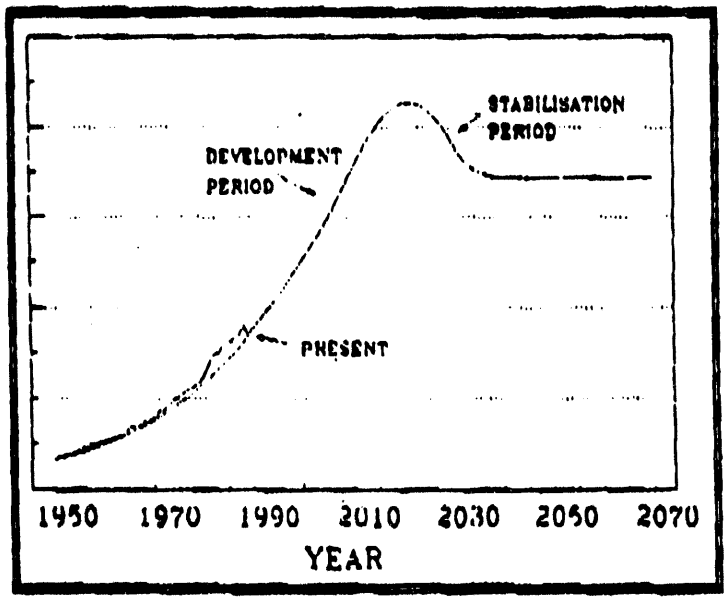


The RSA's Primary Energy Consumption - 1992

The RSA is presently undergoing profound changes. Whilst political changes are receiving highest priority, other obligations are not being neglected. The Department of Environment Affairs (DEA) has recently released a Draft White Paper on Global Climate Change. Moreover, the DEA has recently

commissioned consultants to investigate ways and means of implementing economic tools to manage the environment, and in particular internalising external environmental costs.

The RSA is a developing country, with a large developing community, and the development of this sector should not be sacrificed. Nevertheless, the RSA recognises the need to limit the emission of pollutants, and applies a *no regrets* approach to minimising anthropogenic waste. That is, making the best decision on present information to balance development and environmental protection. Under present trends and technologies, it is expected that after a rapid development period (to uplift the living standards of the developing community) a stabilisation period would ensue during which it is anticipated that the level of emissions can decrease.



2. TECHNOLOGY IN THE RSA

The utilisation of coal in the RSA has generally followed that in the developed world; that is early plants were constructed to maximise output, but with the recent advent of environmental awareness the trend has been to apply policies commensurate with a clean environment and sustainable development. The following sections address some of the technologies in the RSA which utilise coal in an environmentally acceptable manner.

2.1 COAL BENEFICIATION

Most coal consumed in the RSA is used in an unbeneficiated state. However, for some purposes, coal is *washed* to increase its calorific value (CV) for the following consumers:

1) The metallurgical industries, for example where a high purity is required for iron and steel production.
2) Export, for both metallurgical and boiler applications.
3) Some small local industries which require a high grade of coal because they still use old boiler technologies eg chain-grate stokers.

Coal is not beneficiated for use in electric power generation stations in the RSA. On the contrary, some *washing* discards are used in the generation of electricity.

2.2 LIQUEFACTION/GASIFICATION

Coal is used as feedstock for liquefaction and gasification processes. The RSA has three liquid-fuel-from-coal plants (as well as a liquid-fuel-from-gas plant). The liquid fuel is used for transport, and the gas is principally used industrially - a small portion is used domestically. Other chemical products are also produced from coal, eg wax.

2.3 ELECTRIC POWER GENERATION

53.7% of the coal consumed in the RSA during 1992 was used for electric power generation. The principle electric utility in the RSA is Eskom, which generates 97.9% of the electricity, of which 92.1% is coal based. Eskom has a capacity of 36846 MW, and there is a co-generation potential of 1500 MW in other industry. Present usage of Eskom power is only 65% of total capacity which provides some capability to meet increased demand without the need to construct more plant.

Eskom burns low grade coal (approximately 21 GJ/t - Giga Joules per tonne) and also some discards (approximately 16 GJ/t). The coal contains up to 45% ash, but is low in sulphur - approximately 1%. The RSA coals are of lower rank (younger) than the northern-hemisphere coals, and therefore have a lower percentage carbon content. Therefore they emit less carbon dioxide (CO_2 - a *greenhouse* gas) per energy output than the northern-hemisphere coals, and hence are less environmentally unfriendly.

As previously mentioned, these power stations do not apply pre-combustion cleaning, but use electrostatic precipitators (ESP) on the flue gases. (Flue gas desulphurisation is not utilised. The sulphur content of the coal is only 1%, and a tall stack policy is implemented.) Some demonstration experimentation with flue gas pre-conditioning has been done to improve the ESP efficiency.

The Eskom power stations are relatively modern, older stations having recently being moth-balled because of low efficiency, overall low demand and the commissioning of more efficient new units. They use state of-the-art pulverised coal combustion processes. Individual current power stations typically have a capacity of 3960 MW in six generating units and utilise both wet and dry cooling systems. The large size however means that the addition of post-combustion pollution controls decreases the physical efficiency greater than it would with smaller sized units.

2.4 INTEGRATED GASIFICATION COMBINED CYCLE

A small scale integrated gasification combined cycle IGCC plant has been developed in the RSA as a technology demonstration unit. However studies have shown that commercialisation was financially unfeasible.

Present strategy is to investigate overseas technology suitable for the RSA feedstock, and for possible adaption to local conditions.

2.5 LOW-SMOKE COAL

Only 30% of domestic units in the RSA have access to electrical energy. Others must rely on fossil fuels and biomass (eg wood) for their energy needs. The domestic burning of coal results in high air pollution concentrations, and consequently receives highest priority in the air pollution field. Nearly 50% of the population (in the developing communities) rely on D grade coal for cooking and space heating. The coal is burnt in smoky stoves which add to both indoor and outdoor air pollution.

The primary purpose of the electrification programme is to raise the standards of living of the developing communities. However, the use of electrical energy has the added advantage of lowering air pollution in residential areas. Electrification of domestic units is proceeding at an increasing rate, and eventually it is projected that all urban areas will be fully electrified. However, even where areas are electrified, the resident's preference is to use coal for cooking and heating. (Electricity is principally used for lighting and for electronic appliances.) In this case, reasons for preference of coal include:

1) There is a large installed capacity for the domestic use of coal, and to change to an electric base would require a large financial investment on the part of the household which is unavailable.

2) Perceived cost of coal is less than electricity.

3) The unreliability of electrical supply due to: culture of non-payment for services, vandalism to supply lines, etc

The full conversion to electrical energy (and with it a panacea for the air pollution problem) is expected to take a couple of decades. In the meantime a low-smoke coal is being developed as a transitional energy source. The objective is to produce a product which has equivalent cost to the coal presently used. Two projects are currently underway:

1) Discard coal is de-volitilised by heat treatment. Trials have shown a marked decrease in smoke emissions. Suitable under-utilised industrial plant has been identified for possible use in production.

2) Fine coal discard is briquetted with cement as a binder. Trials have shown low smoke and low sulphur emissions. The briquette has the advantage of being labour intensive, thereby alleviating the unemployment problem.

Both low-smoke coals are derived from low cost discards, and are able to be burnt in existing stoves. Tests indicate that both types of low-smoke coal are acceptable by the community. Further work will concentrate on making the coals commercially viable.

3. OPPORTUNITIES FOR CLEAN COAL TECHNOLOGY IN THE RSA

The RSA views the use of environmentally technologies as important. Areas of technological usefulness are:

1) Integrated gasification combined cycle plant.
2) Electric power generation.
3) Small scale appliances.
4) *Green* coal technology.
5) Mining: clean coal beneficiation.
6) Liquifaction and gasification.

Obviously, in context, the RSA would welcome collaboration exercises in this area, based on mutual trust and national interest.

Chapter 4

Coal Resources and Potential Needs for Clean Coal Technology in Mexico

Marcela Serrato
Representative
Ministry of Energy, Mines and State Industry

COAL RESOURCES AND POTENTIAL NEEDS FOR CLEAN COAL TECHNOLOGY IN MEXICO*

Marcela Serrato
Secretaría de Energía, Minas e
Industria Paraestatal, México.

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* Comments presented at the Clean Coal International Technology Transfer Program Public Meeting, Washington D.C., February 10, 1994.

MEXICO

1. Current situation and outlook of the Electricity Sector

* At the end of 1993, generating capacity was 29,204 MW. The generation mix by type of fuel or primary energy was 27.98 percent hydro, 60.66 percent hydrocarbons, 6.51 percent coal, 2.31 percent nuclear and 2.53 percent geothermal. Diversification of energy sources is an important objective of the government.

* The Mexican Constitution and applicable laws provide that the generation, transmission, transformation and distribution of electrical power constituting a public service is reserved solely to the Mexican nation, through the Federal Electricity Commission (CFE), a descentralized agency of the government.

* In December 1992, important changes were made to the law that established the legal framework for the electric industry. The objective of these changes was to broaden the possibilities for the private sector to participate in generation of electricity.

* Today, there are three different ways in which private investors can participate in generating electricity in Mexico: independent power producers, cogenerators and self-suppliers. The projects of the independent power producers should belong to the long term planning programs of the Commission (CFE) and should have a permit that will be granted by the Secretary of Energy, Mines and State Industry (SEMIP). Some permits will be granted to projects that are not included in the Commission's (CFE) long term programs when all of the production is exported.

* Cogeneration of electricity is also allowed by the new law, provided that all of the production that is not used by the cogenerator is sold to the Commission (CFE). Permits will also be granted for the self supply of electricity either for own owner-user, or for several under a condominium regime.

* The generators of electricity will have temporary access to the transmission network of the national electrical system under contracts with the Commission (CFE) when it does not risk the ability of the government to provide the public service. A compensation for the use of the network will be established in the contracts.

* In order to expand the capacity of the Merida Power Plant to supply electricity fot the Yucatan Peninsula by 1996, the Comission (CFE) has decided to internationally bid its first independent power producer project of 320 MW combined cycle power plant and the conversion of the existing 660 MW of oil fire generation to natural gas. The "Merida III Project" also includes a 24 inch natural gas pipeline from Nuevo Pemex to Merida that is 430 miles long.

2. Coal reserves and production

* Two important coal basins have been identified in Mexico: the basin of "Rio Escondido" in the state of Coahuila with proven recoverable reserves of around 640 MT and the basin of "Colombia-San Ignacio" also located in the state of Coahuila with proven recoverable reserves estimated in 91 MT.

* Mexico produced in 1992 around 8.7 MT of coal of which around 62% was used to generate electricity. Coal produced in Mexico has a high percentage of ashes of around 42% as an average, but with mines that can get up to 50%. This poses important difficulties in terms of the production of coal as well as in its selection and handling given that it is necessary to deliver it to the generating facility with a content of 38%.

3. Coal power projects

* The first coal-fired project built in Mexico was the Central Termoelectrica Rio Escondido (CTRE), a 1200 MW facility consisting of four 300 MW units located in Piedras Negras in the Northern state of Coahuila. This plant has been operating since the mid-1980's, generating around 8000 GWh per year (around 7% of the total generation produced in Mexico). It is owned and operated by CFE. The annual consumption of coal of this facility has been around 4 MMT with an ash content of 38% coming from the state company Minera Carbonifera Rio Escondido, created to extract and sell coal.

* CFE is currently constructing four additional units close to the existing plant, the Carbon II plant. Begun in 1986 and expected to be in full commercial operation in 1995-1996, Carbon II will consist of four coal-fired units of 350 MW each. Carbon II will have a total generating capacity of 1400 MW. Combined the two plants will have a 2600 MW capacity, a large source by U.S. standards.

* Construction of the Carbon II project is well advanced. Units 1 and 2 are completed and have been already synchronized. Units 3 and 4 are approximately 40 percent complete. Power generated at Carbon II shall be used for industrial needs in the plant vicinity and the surplus will be delivered to CFE for general distribution.

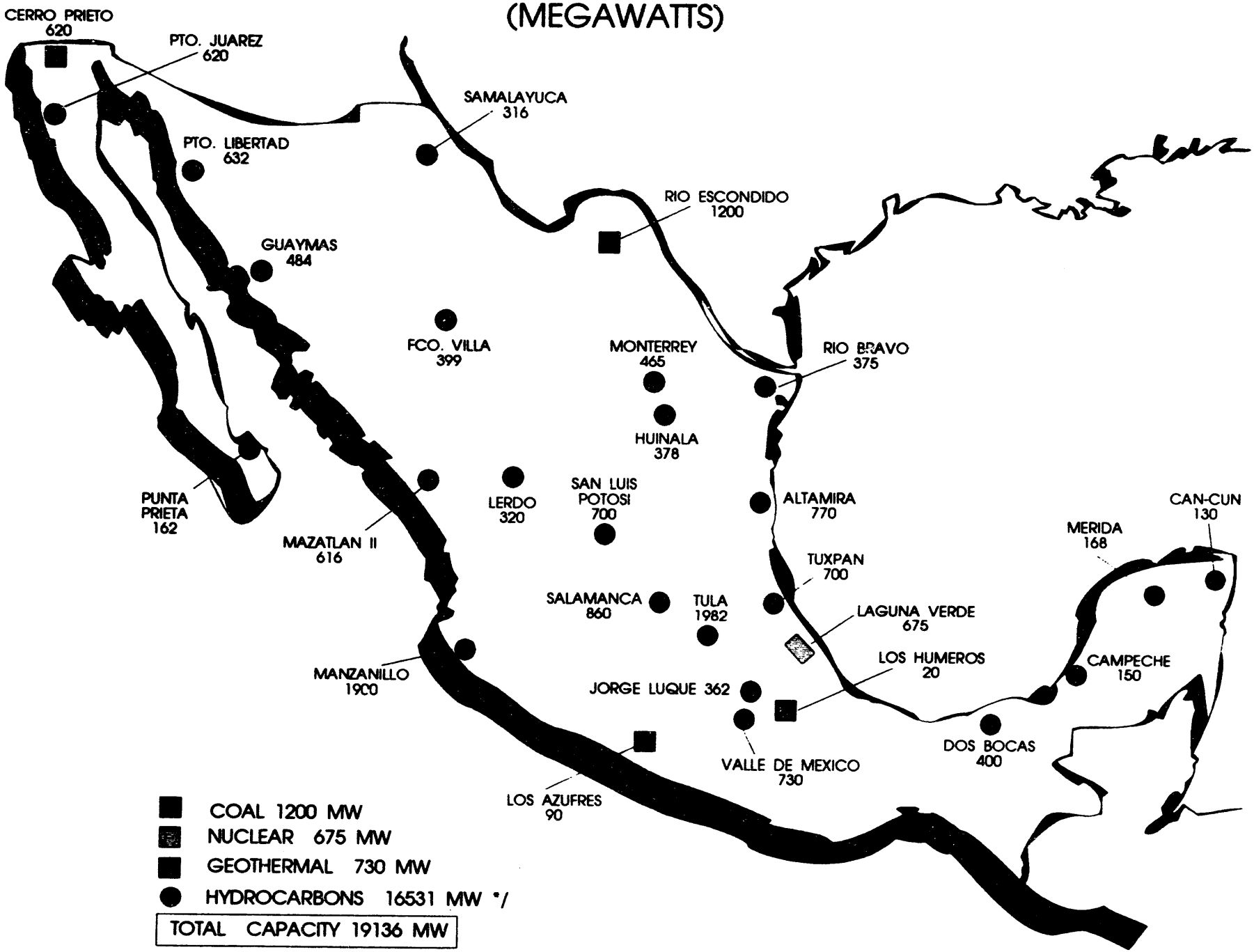
* The two coal-fired projects in Mexico, Rio Escondido and Carbon II, will have a total annual consumption of the order or 9 MMT. Coal for Rio Escondido will come from a variety of sources including coal from the nearby Minera Carbonifera Rio Escondido (MICARE) mines, and other mines in the region. 90% of the coal for Carbon I and II will be from Mexican mines with the remaining 10% being imported.

* Carbon II will have electrostatic precipitators for particulate matter (PM) control. With this technology, the plant should achieve a removal efficiency for particulate matter in excess of 99 percent. In addition, Carbon II Units 3 and 4 will have "Low-NOx" burner technology. As planned, however, Carbon II will not have add-on control for SO2.

* On October 11, 1993, Southern California Edison Corp announced that its wholly owned subsidiary Mission Energy Company, its joint venture partner, Grupo Acerero del Norte and CFE, had mutually agreed to terminate negotiations for the ownership and operation of the Carbon II power project by Operadora de Piedras Negras (OPINSA), a joint venture subsidiary of GAN and Rio Escondido Energy Company, a subsidiary of Mission Energy. Rio was to acquire a 49% interest in the Carbon II project through OPINSA. Power sales and asset transfer agreements with CFE pertaining to the proposed porject were signed effective December 1992. Since that time, Mission Energy had been working with the other parties to complete the financing and other elements of the project. CFE will now own and operate the project.

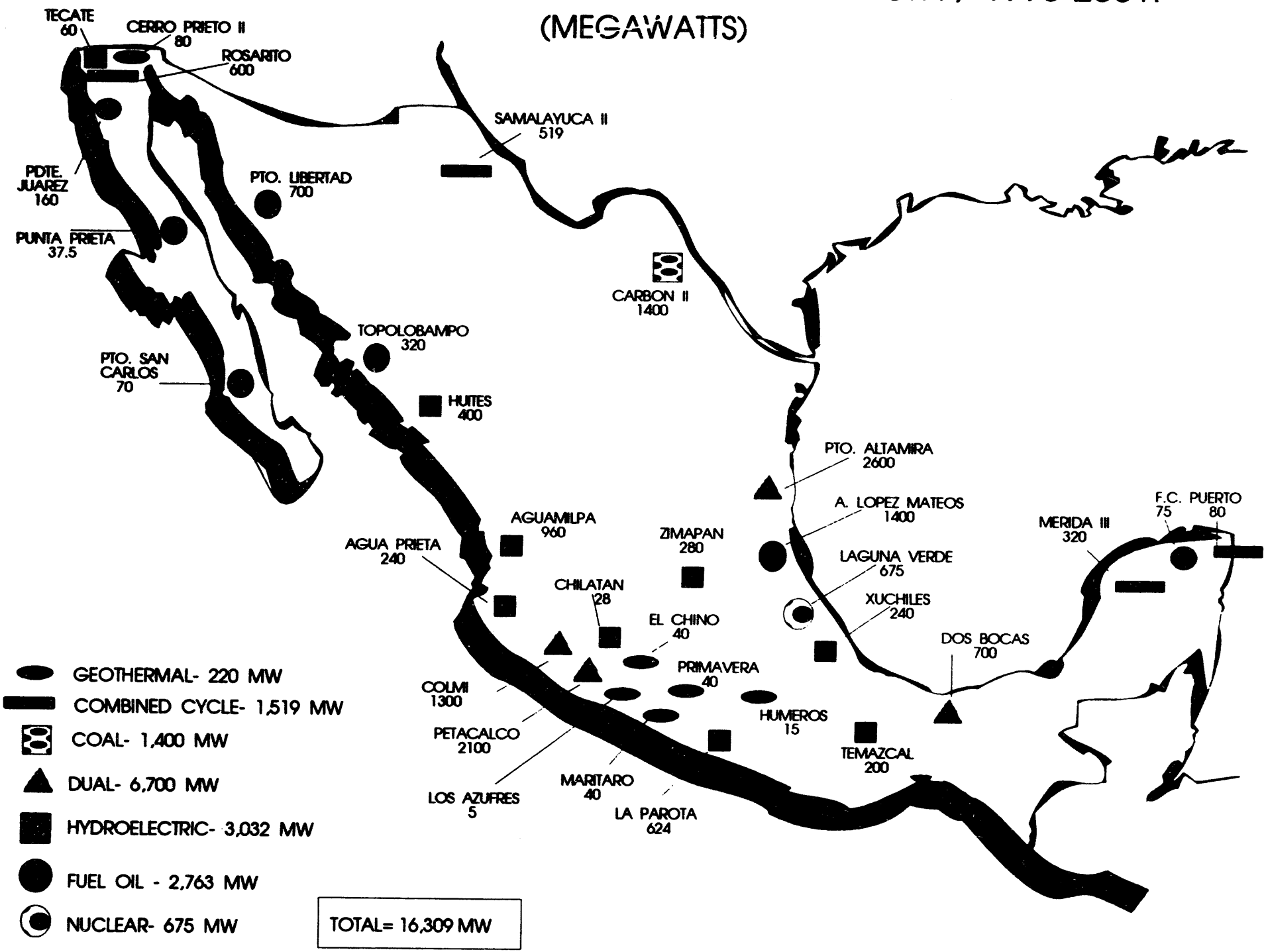
* CFE's most recent estimate of generation expansion requirements include 12,217 MW of new capacity to be added by the year 2001. These requirements include 700 MW from coal (Carbon II project) and the same amount from the dual-fired power project of Petacalco in Lazaro Cardenas, Michoacan, of which Unit 5 (350 MW) is scheduled for completion in July 1994 and Unit 6 (350 MW) in January 1995. The intention is that the new projects will be built under the independent power production scheme.

MEXICO: THERMAL CAPACITY, 1992.
(MEGAWATTS)



*/ THIS TOTAL INCLUDES OTHER PLANTS.

MEXICO: PLANNED GENERATION CAPACITY, 1993-2001.
(MEGAWATTS)



Chapter 4

Brazilian Use of Coal for Electrical Energy Generation Technological and Environmental Concerns and Projects

Manuel Montenegro
Head, Science and Technology Section
Embassy of Brazil

BRAZILIAN USE OF COAL FOR ELECTRICAL ENERGY GENERATION TECHNOLOGICAL AND ENVIRONMENTAL CONCERNS AND PROSPECTS*

Brazilian Embassy
Science & Technology Sector
Washington, D.C., February, 1994

Executive Summary

The review of the National Energy Sector directed by Presidential Decree 99503 on 2 September, 1990, which was submitted and subsequently approved on 19 November, 1991, establishes a significant increase in the consumption of mineral coal for the years 2000 and 2010, which were used as milestones in the simulation exercises conducted by the Commission that was put in charge of the review. That Review Commission's considerations and conclusions concerning coal are presented as Annex I to this paper, which incorporates in summary form the document prepared under the direction of the Review Commission by an inter-agency working group. A list of the agencies involved is included here as Annex II. Tables including Brazil's overall 1971-1992 energy supply, demand, and foreign dependency, broken down by source, as well as tables on oil and coal consumption are included in Anex III.

THE REVIEW OF THE ROLE OF COAL IN THE NATIONAL ENERGY SECTOR

After consulting with major actors in the coal sector, the Review Commission reported that the electricity sector expects coal consumption in the context of its Electrical Energy Expansion Plan for 2010 (hereinafter Plan 2010) to rise from the current three-million-ton consumption (1990) to twenty-five million tons (2010), as a result of an increase in coal-based electrical power generation total from 1,050 MW to 7,150 MW, while other energy sources would only show sluggish growth.

Such an increase was considered to be an issue of concern by representatives of the environment and science & technology areas in the Review Commission. As a result of those concerns, a "Coal Protocol" was signed on 12 November, 1991 between the MINFRA (at that time Ministry for Infrastructure, presently the Ministry for Mines and Energy, MME),

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* This paper was presented at the Clean Coal International Technology Transfer Program Public Meeting, organized by the U.S. Department of Energy on February 10, 1994. It is based on studies and recommendations made under the aegis of the Brazilian Ministry for Mines and Energy in 1993 by the Coal Commission, and by the Commission for the Review of the National Energy Matrix (Annex I).

the then Secretariat (currently Ministry) for Science and Technology, ELETROBRAS, SNIEC (the coal producers association), and FINEP (Brazil's S&T sector public financing agency), with a view to assessing the feasibility and adequacy of "clean" coal technologies in Brazil, as well as the prospects for the use of such technologies. A "Mineral Coal Commission" was put in charge of that study.

This summary of the Coal Commission's report includes surveys and assessments undertaken on the subject of Brazil's environmental legislation concerning coal, on the use of mineral coal for electrical energy generation and on clean coal technologies to be used in order to comply with environmental legal requirements. Furthermore, the report includes economic, political, and social considerations concerning Brazil's coal sector, as well as the conclusions and recommendations of the Commission to ensure the achievement of the goals related to coal-based thermal energy generation included in the final report of the Review of the National Energy Sector.

TECHNOLOGICAL AND ENVIRONMENTAL CONSIDERATIONS

1. The Coal Thermal Electricity Program

In the context of the Plan 2010, coal was included as a prospective energy source for the following reasons:

- proposals advanced by the Ministry for Mines and Energy recommend an increase in the use of coal for electricity generation;
- studies conducted by ELETROBRAS identify coal as the most competitive option for electricity generation once the hydro-electric low-cost potential is exhausted;
- there is a plentiful supply of coal in Brazil, estimated at 0.3GW in Paraná, 3.4GW in Santa Catarina, and 46.6GW in Rio Grande do Sul.

Therefore, a "minimum program for coal-powered generation plants" was called for.

2. The "Coal Protocol"

Mineral coal is the single most available fossil fuel source in Brazil, although its use amounts to only 2% of total energy consumption. This is expected to rise to 4% by around the year 2010.

As with all other fossil fuels, environmental control of coal use is of the essence. In this context, the Ministry for Infrastructure (MINFRA, presently the Ministry for Mines and Energy, MME), the then Secretariat (presently Ministry) for Science and Technology (MCT), SNIEC, ELETROBRAS, and FINEP (Brazil's agency for technology development financing) signed the "Coal Protocol", with a view to developing clean coal technologies and to adapt coal-powered energy plants emissions to the guidelines set under the National Environmental Council's Decision No. 8 (Resolução CONAMA No. 8, 12/6/90).

3. Coal in Brazil

Mineral coal sources in Brazil are concentrated mainly in the southernmost region of the country; proven reserves amount to 32 billion tons. Coal accounts for 60% of the non-renewable energy potential of Brazil. The technical characteristics of Brazilian coal, which range from 3100 to 6000 kcal/kg, from 1.3 to 4.2 sulphur content, and from 22% to 55% ash content, indicate that it best be used for electricity generation. As for environmental concerns, the gradual nature of the increase in coal use should allow for an adaptation process with a view to controlling environmental impacts through the use of adequate technologies.

4. Coal and the Environment

In the case of Brazil, fully 50% of coal consumption occurs at the Jorge Lacerda (Santa Catarina) and Candiota (Rio Grande do Sul) Complexes. Studies by ELETROSUL indicate air quality in those regions to be "good" according to SO2 and particle EPA standards which have been adopted by the São Paulo environmental authority, CETESB. This is apparently due to the low concentration of coal plants in the area.

5. Economic, Political, and Social Considerations

The predominant technologies developed over the last two hundred years for the high-energy, low-sulphur content, low-ash residue coals found in developed countries affected prospects for the use of Brazilian coal, which has low energy potential, as well as higher sulphur content and ash residues. Therefore, the rate of use of Brazilian coal by the nation's metallurgy sector did not correspond to this fuel's swift overall growth. Moreover, after the recent introduction of price deregulation and free commercialization, production of local coal for metallurgy was discontinued, in the face of more competitive imported coal.

Nevertheless, the major market for Brazilian coal, which is thermal electrical energy and industrial heat generation, developed after the first oil shock, and led to a significant role of coal energy generation plants for Brazil's future power grid.

Furthermore, coal mining and production play a role in the development of the country's southernmost region. At its peak 1986/97 level of 7 million tons per year, the coal industry generated 14,000 jobs directly, and over 100,000 jobs indirectly. Coal also had a positive impact on the region's education and science infrastructure, as reflected in the creation of the University of the South (in Santa Catarina, SC) and of several research centers throughout the region, such as CIENTEC in Rio Grande do Sul (RS), and SATC, in Santa Catarina and Paraná (PR) states.

Moreover, there were the indirect benefits of port and transportation infrastructure, especially in the municipalities of Rio Grande (RS), Imbituba (SC), and Antonina (PR).

Clean coal technologies for Brazilian-type coal have been developed relatively recently in industrialized countries which may be highly relevant for the future use of Brazilian coal in energy generation. In fact, the harnessing of coal residues achieved by some of those technologies may be of great assistance for the environmental reclaiming of presently degraded areas, such as Criciúma.

6. Conclusions and Recommendations

Brazil has traditionally used conventional pulverized coal burning technology for electrical energy generation, and has consequently developed an engineering capability for the specification, contracting, construction, operation, and maintainance of thermal electrical energy generation units. However, Decision No. 8 of CONAMA on SO2 and particle emissions created serious problems for present technology, particularly for units over 70MW.

Such obstacles can be overcome by the use of clean coal technologies, which, however, entail various types of costs in their installation and operation. The most appropriate available technology that complies with environmental CONAMA regulations is that of fluidized bed at atmospheric pressure. Brazil has not yet developed this technology.

Therefore, two priorities have to be considered.

First, current environmental policies should be reassessed in light of environmental concerns and the availability of clean coal technology, by means of a gradual increase in legal requirements to encourage the incorporation of new technologies by Brazilian operators; at the same time, air quality levels should be kept up to the standards set out by the World Health Organization (WHO).

In addition, it is of the essence to stimulate technology development of coal mining, processing, and other relevant techniques. In the financial and economic areas, the Commission emphasizes the following:

- the present scarcity of resources in the energy sector as a whole, which is especially felt in the electrical energy sector;
- the potential represented by southern Brazil's coal-rich regions and their importance for the development of that region;
- the southern region's good prospects for integrating its energy resources into the MERCOSUL (the southern Common Market being established by Brazil, Argentina, Paraguay, and Uruguay);
- interest and resource availability on the part of the private sector to finance the expansion of the coal-powered energy complex.

The Commission set up to undertake the studies proposed under the Coal Protocol thus concludes that it is feasible to increase the coal contribution to electricity generation, as called for by the final report of the Review of the National Energy Sector, and by the Electrical Sector Expansion Plans formulated by ELETROBRAS. The Commission therefore recommends the following measures, to be associated

with sustainable growth and which in no way imply the granting of subsidies or other budgetary dislocations:

- that the signatories of the Coal Protocol, coordinated by the Ministry for Mines and Energy, and by the Ministry for the Environment, immediatly conduct a joint review of CONAMA decisions 5/89 and 8/90;

- that a Plan for the Development of Thermal Power Generation be drawn up coordinated by TELEBRAS, adopting the criteria set out by TELEBRAS's "Guidelines concerning the Environment and the Electrical Sector".

- that the Ministry for Science and Technology draw up a Development and Technological Capacity Plan for the Coal Sector, emphasizing thermal power generation, particularly clean coal technologies, with imput from the other signatories of the Coal Protocol, and other interested parties;

- that opportunities and rules be spelled out for the participation of private enterprise in order to expand the generation of mineral coal-based electrical power generation;

- that Brazilian mineral coal be more seriously considered as an energy resource in the context of MERCOSUL;

- that appropriate legislative measures be taken to facilitate the achievement of these proposed goals for the electrical energy sector.

ANNEX I
A REVIEW OF THE BRAZILIAN ENERGY SECTOR
Strategies and Trends for the Development of Energy Sources
(Unofficial abstract and translation)

The following forward-looking analysis uses a model of energy consumption projections based on sector-specific estimates concerning growth of GNP, the energy consumption-per-product-unit demands for each consumption sector, and estimates concerning the participation of each energy source in each consumption sector.

Projections take into account two macro-economic scenarios - one for high growth levels, one for low growth levels. Estimated yearly growth rates are as follows:

	Economic Growth Rates (%) Scenarios	
Year	Low Growth	High Growth
1990	-3.0	-3.0
1991	0.0	1.0
1992	1.0	3.0
1993	3.0	5.0
1994	5.0	5.5

1995 to 2000	5.0	6.0

Source: Ministry for Economics & Planning

These projections assume the continuation of current factors affecting energy-related decision-making, including pricing policies. In that case, final consumption would tend to grow over the next 20 years at a rate somewhat inferior to GIP growth, with increasing levels of consumption for electricity and oil. On the supply side, renewable sources (hydroelectricity and biomass) would tend to decrease, while consumptio levels for fossil fuels and nuclear energy would rise as follows:

Domestic Gross Energy Supply - High Growth Scenario

	%			(millions OET)*		
	1990	2000	2010	1990	2000	2010
Oil	30.0	31.7	33.1	55.1	91.4	156.7
Natural Gas	2.0	4.1	4.6	3.7	11.7	22.0
Mineral Coal	5.0	5.8	6.2	9.1	16.6	29.5
Nuclear	0.3	1.1	1.9	0.6	3.2	9.5
Other	0.0	0.3	0.2	0.0	0.9	0.9
Total, Non-renewable	37.3	43.0	46.0	68.5	123.8	218.6
Hydraulic pwr	36.9	35.8	36.0	67.8	103.3	170.4
Sugarcane prod.	9.9	8.2	7.7	18.1	23.6	36.4
Firewood	14.9	11.6	9.0	27.4	33.4	42.5
Other renewable	1.0	1.4	1.3	1.8	4.0	6.0
Total, renewable	62.7	57.0	54.0	115.1	164.3	255.3
TOTAL	100.0	100.0	100.0	183.6	288.1	473.9

* OET = Oil/Petroleum Equivalent Tons

The above scenario incorporates present trends, including distortions that affect the energy sector. A more realistic pricing policy, plus a modernization drive incorporating incentives for cost reduction would induce increasing energy-saving efforts, as well as stimulate changes in the above ranking of energy sources.

The aim of this review is to present policy options that would check the growth in demand while allowing for an increase in funding to finance investment. Realistic pricing policies alone are not sufficient, however. New investments will have to be covered in part by supplamentary risk capital outlays and by financing from outside the energy sector.

The projected results of such a policy would be as follows:

- A drop in overall energy consumption, relative to the above trends, of 9% in the year 2000 and 18% in 2010; a decrease in oil consumption of 13% in 2000 and 25% in 2010; and a decrease in hydraulic-based energy of 16% by 2000 and 26% in 2010.
- Lessened dependency on oil imports through an increase of domestic oil production to 1 million barrels per day by 1995 and 1.5 million barrels per day by 2000.
- Expanded electricity supply, retaining the present predominance of hydro-electric sources while allowing for a gradual increase in the role of thermal generation.

- Increased use of natural gas from 2% of overall consumption in 1990 to at least 4.5% in 1990 and 6% in 2010.
- Increased use of coal-based energy from around 6 million tons in 1989 to 25 million tons in 2010, particularly to satisfy the need for installed coal-based thermal energy generation units, which is expected to grow from 2,650 MW in 2000 to 7,150 MW in 2010.
- Increased use of renewable sources, especially from the biomass.
- Increase to a level of at least 4% of electricity derived from sugarcane byproducts and refuse generated by alcohol and sugar production units.
- Increase to at least 80% of total firewood supply from forestry projects; the other 20% are to be harnessed from the sustainable management of natural-growth native forests.

Such a policy is expected to cut US$ 26 billion cut in investment needs for energy production by the year 2000 (which is equivalent to 25% of the total period), as well as to cut US$ 59 billion in such needs for the 2001-2010 period (28% of total) vis-à-vis present trends.

Sector-specific Guidelines: Mineral Coal

It is recommended that

- Commercialization and operational rules should be clarified for thermal electricity generation in the south of Brazil, so as to allow for long-range planning to increase coal production. These rules shall be applied both to present units and to those yet to be built, so as to establish mimimum annual levels of production and sale of coal that lead to stable conditions for mining operations.

- Industrial use of coal and other alternative fuels should be conducted under competitive market conditions, which entails that the state-sector energy production be prevented from generating price distortions that hinder policies aimed at developing domestic sources of energy.

- Industry should be supported in its initiatives to develop more efficient technologies consistent with Brazilian environmental legislation for the use of coal, especially fluidized bed gasification and combustion technology.

- Financing should be extended to the coal sector under the national Program for Industrial Quality and Productivity.

ANNEX II

COAL COMMISSION MEMBERS

MINISTRY FOR MINES AND ENERGY

Deraldo Marins Cortez
Luiz Celso Parisi Negrão

MINISTRY FOR SCIENCE AND TECHNOLOGY

Felix Andrade da Silva

CENTRAIS ELETRICAS BRASILEIRAS S.A. - ELETROBRAS

Carlos Almir Morissy
Frederico Birchal Magalhães Gomes
Milton Martins Carneiro

STUDIES AND PROJECTS FINANCING AGENCY - FINEP

Laêrcio de Siqueira

NATIONAL COAL INDUSTRIALISTS UNION - SNIEC

César Weinschenk Faria
Firmino Moraes Sant'anna
Ignácio Resende

ANNEX III

TABLE I

DOMESTIC ENERGY SUPPLY
OFERTA INTERNA DE ENERGIA (10*6 tEP)

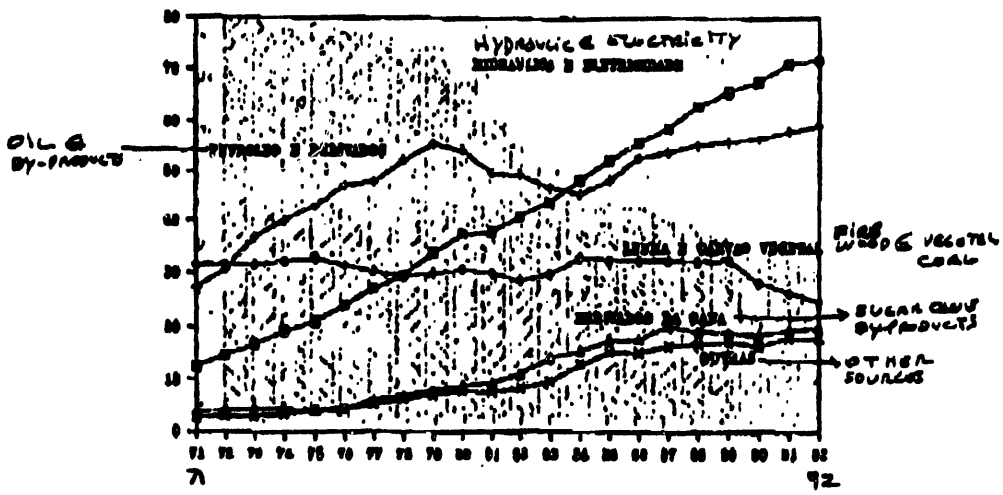


TABLE II

FINAL CONSUMPTION, BY SOURCE
CONSUMO FINAL POR FONTE (10*6 tEP)

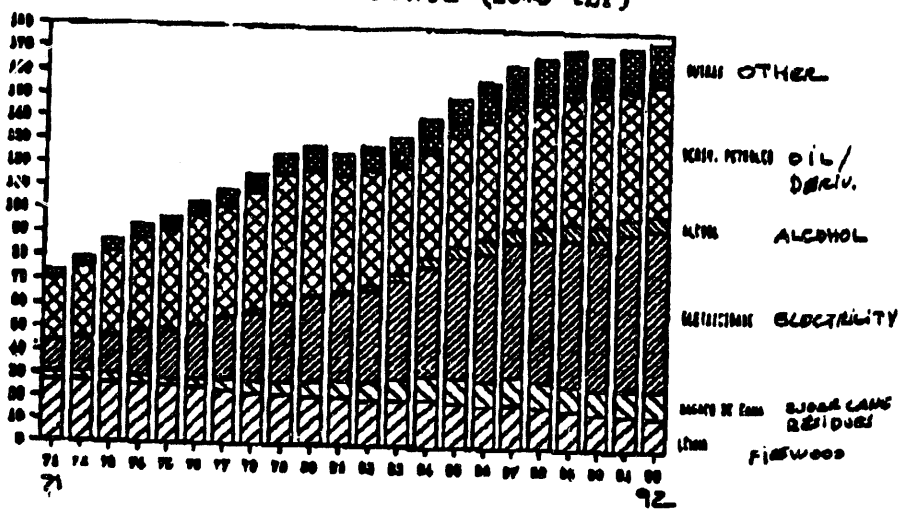


TABLE III

FINAL CONSUMPTION BY SOURCE

CONSUMO FINAL POR FONTE (%)

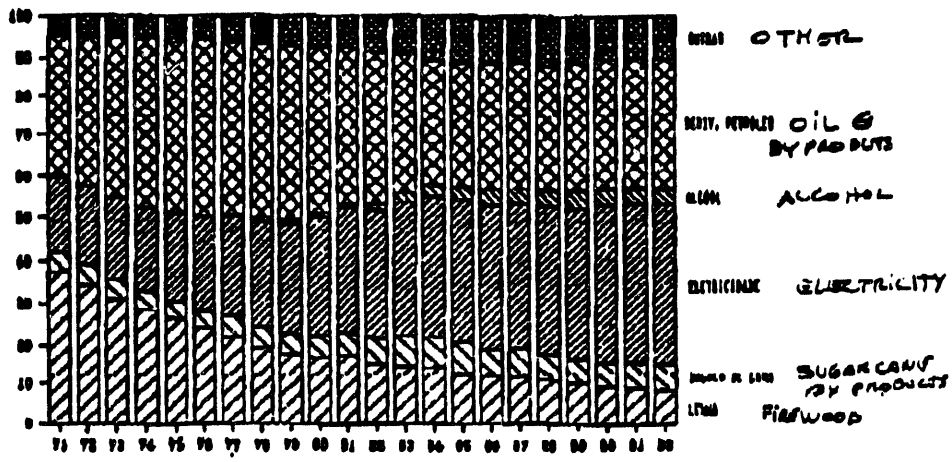


TABLE IV

FOREIGN ENERGY DEPENDENCY

DEPENDENCIA EXTERNA DE ENERGIA (%)

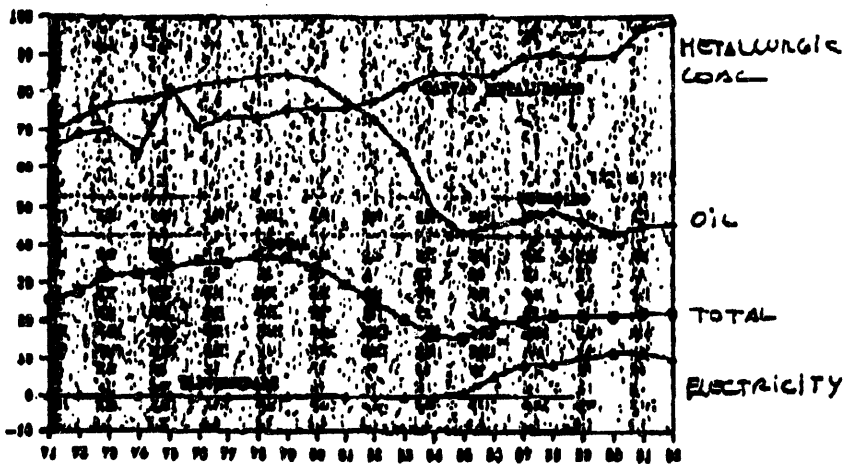


TABLE V

TOTAL CONSUMPTION - OIL

CONSUMO TOTAL DE DERIV. DE PETROLEO (%)

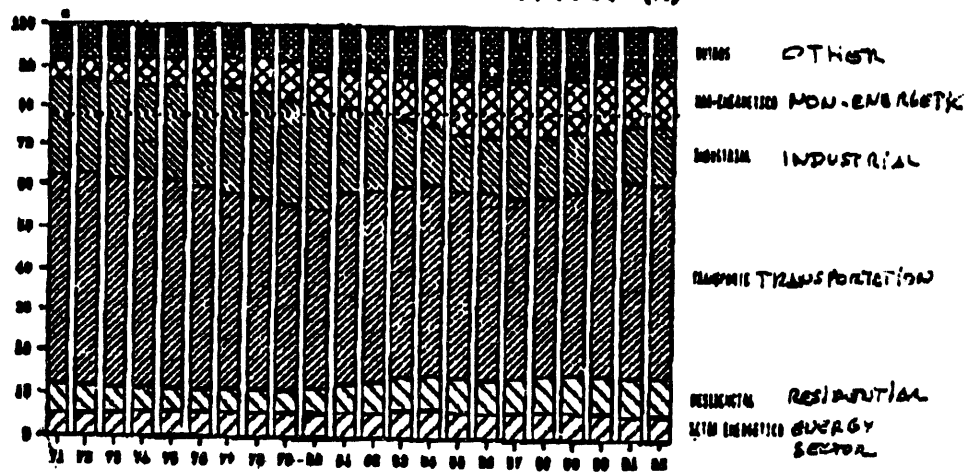
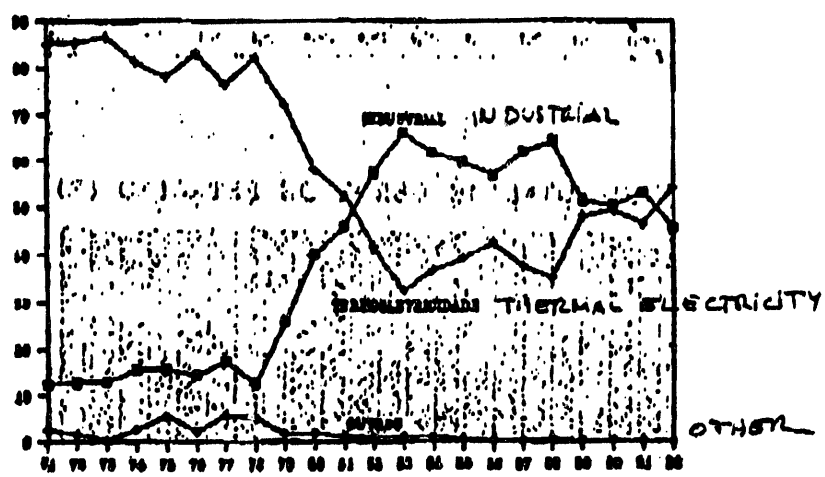


TABLE VI

TOTAL COAL CONSUMPTION FOR ENERGY

CONSUMO TOTAL DE CARVAO VAPOR (%)



Chapter 4

Southern African Development Community

John W. Hindman
International Affairs Coordinator
Science Applications International Corporation

Wendall F. Holland
Partner
LeBoeuf, Lamb, Greene and MacRae

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

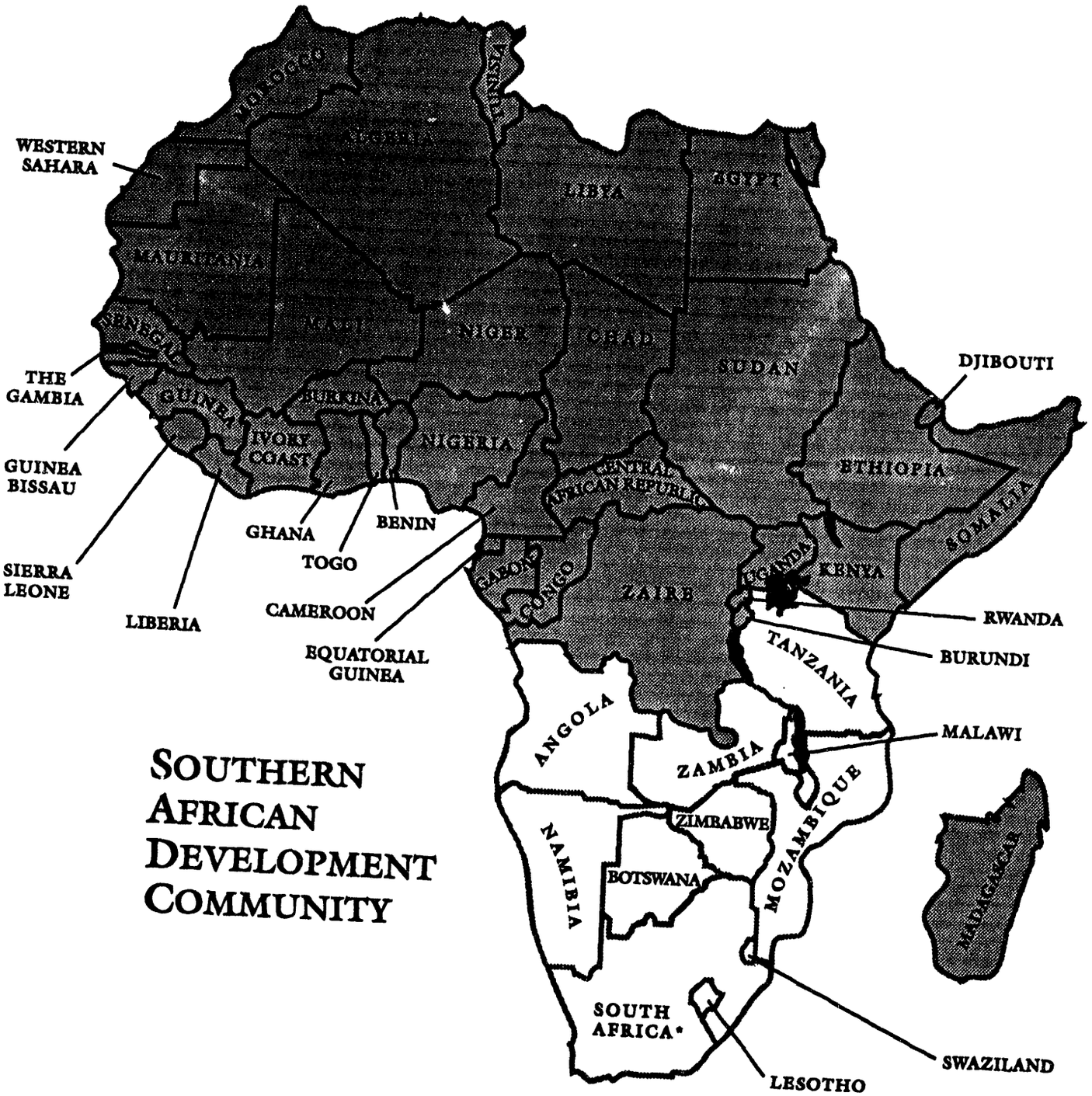
SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

- **SADC established April 1, 1980, to promote regional cooperation by synchronizing development plans and reducing economic dependence upon South Africa**

- **Member Nations**

Angola	**Botswana**	**Lesotho**	**Malawi**	**Mozambique**
Namibia	**Swaziland**	**Tanzania**	**Zambia**	**Zimbabwe**

- **Recognized by World Bank as one of most effective regional groupings of African nations**



SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

*South Africa to be included in the SADC post-apartheid.

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

- Initial focus on rehabilitation and expansion of transport corridors to facilitate movement of goods from interior of region without use of routes through South Africa

- Current focus on further industrialization of largely agricultural regional economies

- SADC and member countries adjusting policy to promote and attract trade and investment

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

- **SADC has initiated comprehensive global drive to strengthen ties, trade, and investment with SADC region**

- **Region has abundant energy resources, large reserves of coal and oil, enormous hydro-electric power resources, and significant mineral deposits --- iron ore, copper, nickel, cobalt, chromium, lead, zinc, gold, and diamonds**

- **'Post apartheid' South Africa may ultimately become a SADC member, and increase already large resource base and potential of SADC**

TOTAL INSTALLED ELECTRIC CAPACITY

	Capacity	Produced	Per Capita
SADC:			
(excluding South Africa)	8.04 MkW	19,685 MkWh	230 kWh
(including South Africa)	48.00 MkW	177,685 MkWh	1,400 kWh

TOTAL COAL, OIL & GAS RESERVES

	Coal	Oil	Gas
SADC:			
(excluding South Africa)	7,268 M short tons	2.9 billion barrels	100 billion cubic feet
(including South Africa)	68,245 M short tons	2.9 billion barrels	300 billion cubic feet

Both SADC and its member nations have undertaken a significant reexamination of all known and potential reserves and deposits of any economically exploitable mineral resources

TOTAL POPULATION (as of July 1992)

	Real Growth Rate	Population
SADC:		
(excluding South Africa)	**2.0%**	**87,175,850**
(including South Africa)	**2.0%**	**128,864,210**

4.3 FINANCIAL

4.3.1 Clean Coal Technology Export Finance Programs

Peter J. Cover
Office of Planning and Environment
U.S. Department of Energy

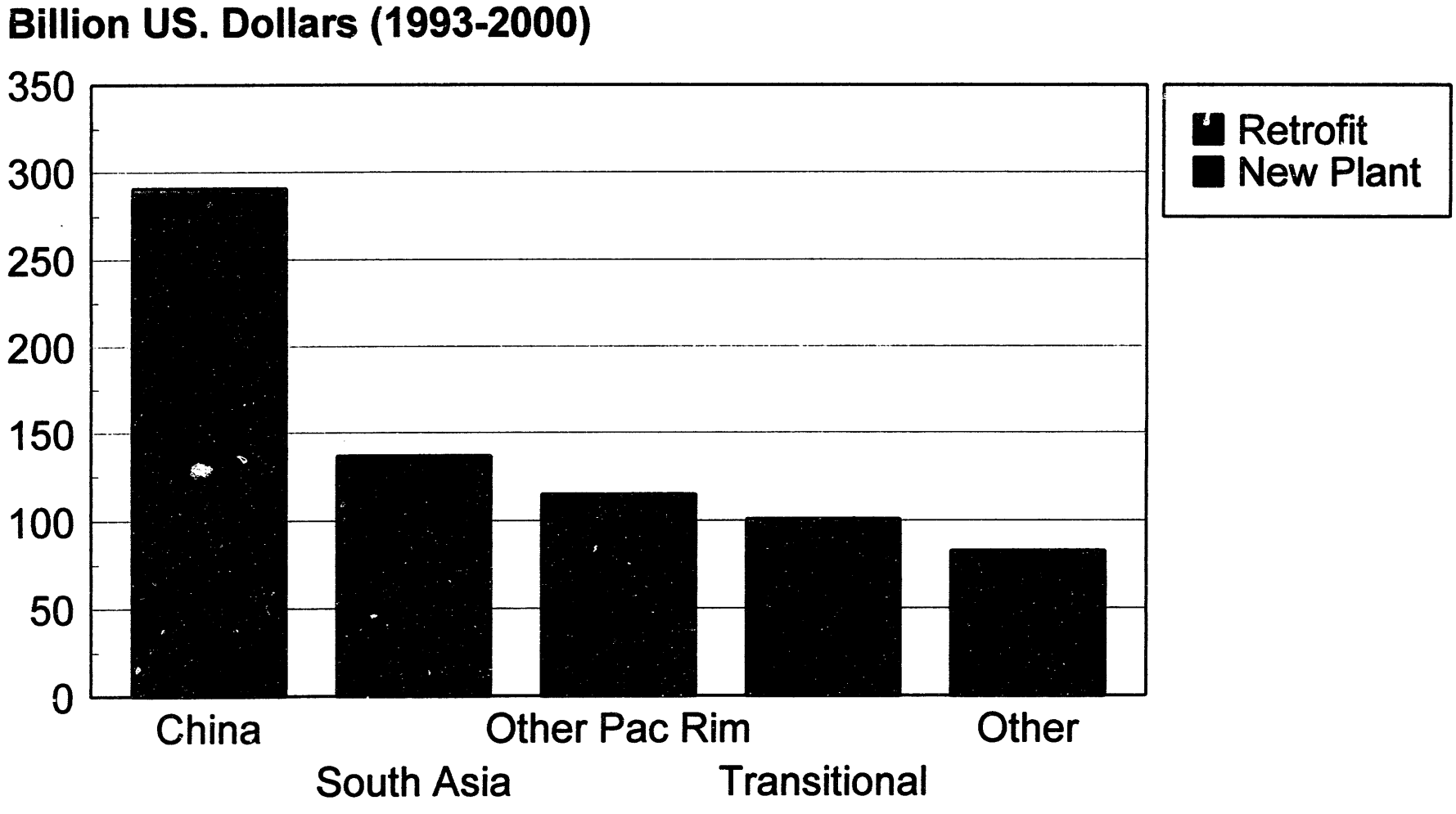
CLEAN COAL TECHNOLOGY EXPORT FINANCE PROGRAMS

Peter Cover
U.S. Department of Energy
Office of Fossil Energy

FINANCING IS CRUCIAL TO INTERNATIONAL CCT PROJECTS.

- Large investments required.
  (Up to hundreds of million dollars)
- Development takes many years.
- Risks are high.
- Complex transactions - many parties.
- CCTs are new and complex.
- Unique project finance requirements.

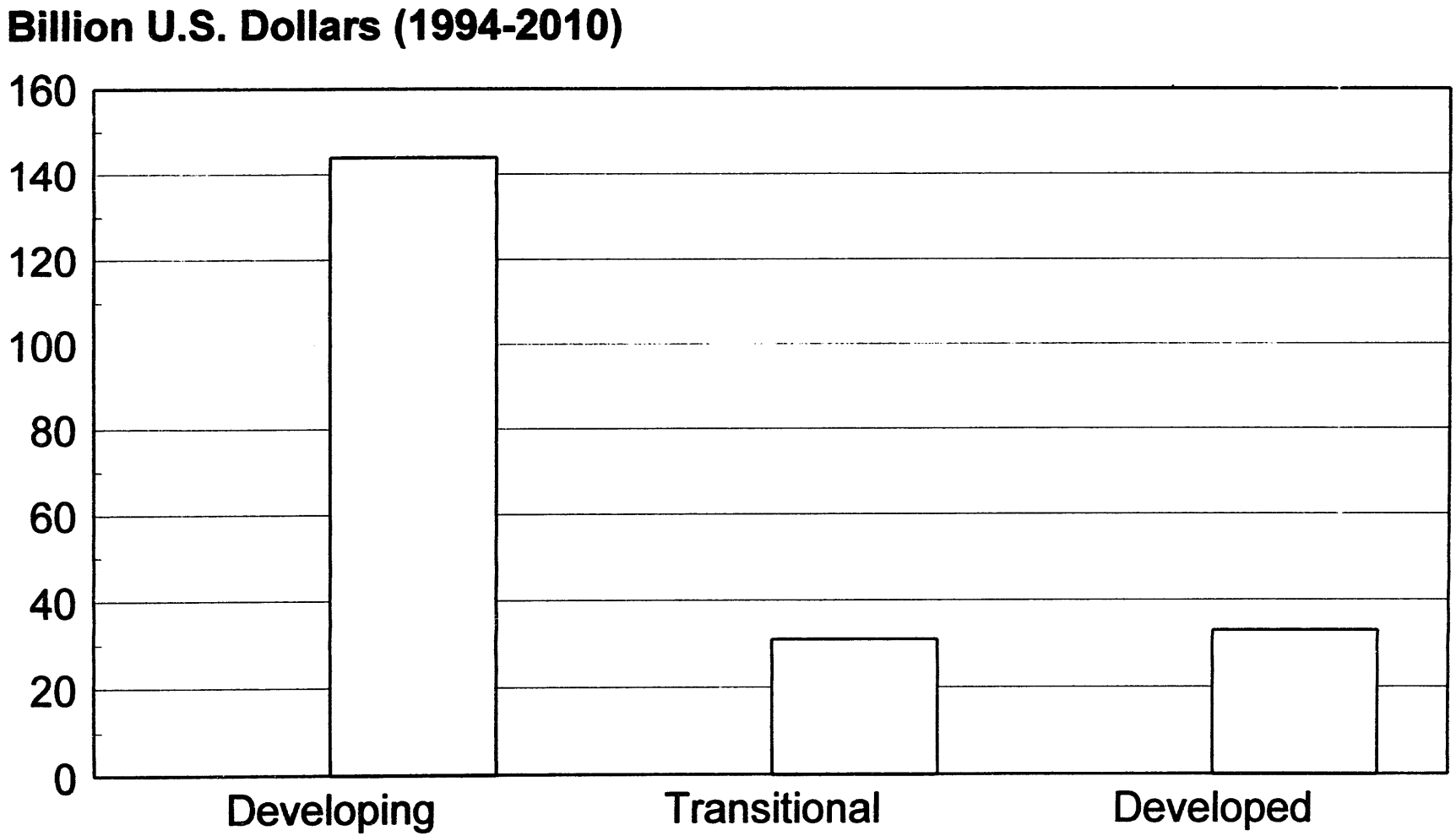
POTENTIAL CCT CAPITAL REQUIREMENTS OUTSIDE THE US ARE LARGE.



BENEFITS OF CCT INVESTMENTS:

- Energy/electric supply
- Cost-effective energy
- Increased efficiency
- Reduced environmental impacts
- Economic development
- Energy self reliance

DEVELOPING AND TRANSITIONAL COUNTRIES HAVE MOST POTENTIAL FOR CCT IMPORTS.



BUSINESS OPPORTUNITIES ARE LARGE FOR:

- Project developers
- Architect engineer/constructors
- Equipment vendors
- Service suppliers
- Financial institutions
- Fuel suppliers

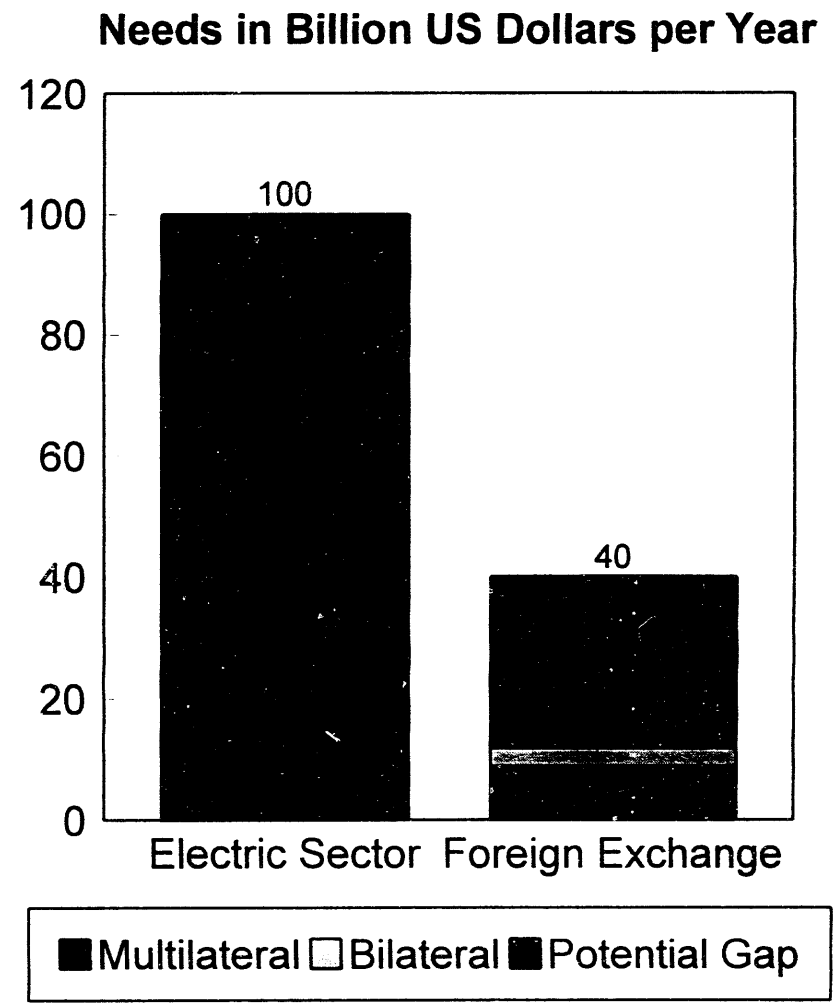
PROJECT FINANCING PRESENTS DIFFICULT PROBLEMS.

- Many financing requirements compete.
  - Growth in all economic sectors
  - Domestic capital lacking
- High risk profile
  - Lack of currency convertibility
  - Credit ratings may be absent
  - Transparent regulatory framework lacking
  - Electricity pricing not based on economics
  - Uncertain or low environmental standard

Many governments working to overcome problems.

A LARGE FINANCING GAP MAY RESULT FOR POWER PROJECTS IN DEVELOPING AND TRANSITIONAL COUNTRIES.

- Rapid growth means high power needs.
- Needs far outstrip traditional capital resources.
  - Domestic
  - Multilateral
  - Bilateral
- Only private finance can fill gap.
- Only best projects will get financing.
- Some anticipated needs may be unmet.



THE US. GOVERNMENT IS COMMITTED TO HELP SOLVE THESE PROBLEMS.

- Helping countries adapt to private power requirements.
- Working with U.S. industry to close financing gap.
  - Helping developers focus on key markets
  - Encouraging private funding
  - Making U.S. programs more effective

HELPING COUNTRIES ADAPT TO PRIVATE POWER REQUIREMENTS:

- Training and information on private power
- Developing legal/regulatory infrastructure
- Creating viable capital markets
- Training to evaluate options for
  - Power generation
  - Environmental control

HELPING PROJECT DEVELOPERS FOCUS ON KEY MARKETS WHERE:

- Power projects are a key priority.
- CCTs are economically feasible.
- Business environment is positive.
- Playing field is level.

The host government is key.

ENCOURAGING PRIVATE FUNDING:

- Establish basis for long-term banking sector participation
- Sustain dialogue with investment and commercial bankers
- Coordinate with mulilateral development banks

MAKING U.S. GOVERNMENT ASSISTANCE MORE EFFECTIVE:

- Establish one-stop shopping for U.S. financial assistance
- Increase international project finance expertise at Eximbank and OPIC
- Increase current OPIC $50 million loan guarantee limit
- Maintain U.S. competitiveness within OECD tied-aid arrangement
- Ensure repatriation of debt and equity

US. GOVERNMENT HAS PROGRAMS TO HELP.

Financing of Projects

Agency	Major Programs
Overseas Private Investment Corporation	Investment Finance
	Investment Insurance
Export-Import Bank of the US.	Long-Term Loans and Guarantees
Agency for International Development	Energy Project Development Fund
Small Business Administration	Business Loans
	Export Revolving Credit
	International Trade Loans

FEDERAL FINANCING ASSISTANCE IS ONLY ONE PART OF THE PUZZLE.

- Private investment is the key.
- Fundamental Issue: How does the government stimulate it?

INDUSTRY INPUT IS NEEDED.

- How can we help secure financing for projects?
- Are current programs adequate?
- What are the problems you face?
- How can we do better?
- What can stimulate private financing?

4.3.2 Project Finance

John Wisniewski
Vice President, Engineering
Export-Import Bank of the U.S.

CLEAN COAL INTERNATIONAL TECHNOLOGY TRANSFER PROGRAM
Hyatt Regency Washington on Capitol Hill
Washington, D.C.
February 11, 1994

"PROJECT FINANCE"

Remarks of John W. Wisniewski
Vice President, Engineering
Export-Import Bank of the United States

Eximbank Programs

Eximbank is an independent U.S. Government agency that facilitates the financing and sale of U.S. goods and services to foreign buyers by neutralizing the effect of export credit subsidies from other governments by absorbing reasonable credit risks that are beyond the current reach of the commercial banking sector. During its 60-year history, Eximbank has helped finance more than $280 billion in sales of American goods and services around the world. Last year Eximbank supported $17 billion of U.S. exports.

To qualify for Eximbank support, the product or service must have at least 50% U.S. content, and cannot be military-related. There is a statutory requirement that the loans, guarantees, and insurance provided by Eximbank offer a reasonable assurance of repayment.

Over the years, Eximbank has enabled U.S. companies to market new products and technologies which commercial lenders could not finance on their own. Eximbank has helped new U.S. exporters enter foreign markets, and it has helped established exporters sustain their overseas markets, despite international financial uncertainties and intense foreign government-supported competition.

Open for business in more than 150 countries, Eximbank provides most of its financing support to developing countries.

Eximbank does not give preferential treatment to any U.S. product, company or industry, nor does it allocate specific sums of money to countries or geographic regions. We're a demand-driven agency, responding to specific requests for financing from foreign buyers and American exporters, and we welcome your requests.

National Export Strategy

In September 1993, the President announced our national export strategy, a set of 65 specific recommendations, including:

- We will provide U.S. Government advocacy at the highest levels on behalf of American companies pursuing foreign government procurement opportunities. Our competitors have done this for decades. Now it is our turn.

- We will now vigorously combat the tied aid practices of our competitors. Our new tied aid facility will allow us to selectively counter other countries' long-term low-interest rate loans.

- The Administration's goal is to reduce foreign tied aid use, especially in critical sectors such as power, telecommunications, transportation and the environment. Our objective--reduce worldwide subsidy, and as a means to that end, create a level playing field for U.S. bidders on selected projects.

On November 22, 1993, Secretary Brown, Environmental Protection Agency (EPA) Administrator Carol Browner and Energy Secretary Hazel O'Leary announced the nation's first-ever national export strategy for environmental technologies. The strategy, called for by the President in his Earth Day speech in April 1993, reflects the Administration's commitment to close interagency cooperation in the pursuit of this large and rapidly growing market. The TPCC has targeted environmental exports as an especially attractive growth opportunity, one that can create high-paying U.S. jobs while protecting the global environment.

U.S. Government export strategies encompass Clean Coal Technology and should greatly assist in accessing the international markets and providing a more level playing field in power and environmental technology exports.

Role of Eximbank

Now let me discuss how Eximbank fits into this strategy. Our mission--financing and facilitating U.S. export sales by meeting but not beating foreign government financing competition, or filling the gap when private sector financing is not available--has not changed. With the increased flexibility in our programs, as well as an improved economic environment, U.S. exports have surged and the demand on Eximbank is at record levels.

As the overall economic environment has changed, so must Eximbank. To respond to U.S. exporters' needs for support in the newly emerging democracies and other rapidly growing markets, Eximbank must become more creative, progressive and flexible. We are evaluating all our programs from case processing through personnel compensation. Some results have already been achieved. We have already reduced the time it takes to respond to U.S. exporters' needs from over three months to only one week for a majority of our applications with our Letter of Interest. This faster response helps our customers clinch deals.

We are also preparing for the wave of private sector deals that will be coming our way in the developing world. Two years ago, virtually all of our loans were to governments. The shift to private sector transactions is underway.

This shift is illustrated in the Asia power market which, as you all are aware, is experiencing enormous growth in demand. Our support used to be all sovereign risk, now it is shifting to private financing and investment. In Fiscal 1992, all Eximbank Asia power financing was sovereign risk, but in Fiscal Year 1993, it shifted with $293.7 million in sovereign risk transactions and $609 million in private sector transactions. The $609 million was for the Black Point Power Plant in Hong Kong (corporate risk) and $200 million for the Hopewell/Pagbilao project finance transaction in the Philippines.

Project Financing for Power Projects

Eximbank support for power generation projects rose dramatically in 1993. This trend is expected to continue due to the rapidly growing international market for power projects in Asia, as mentioned above.

New business in our pipeline includes:

- 9 sovereign risk applications in Indonesia, and 1 large project finance application worth hundreds of millions of dollars;
- 6 private financing applications in India;
- 1 private financing application in Hong Kong;
- 6 sovereign risk applications and 4 project finance applications in the Philippines.

The shift to private power has had an impact on how Eximbank intends to meet its budget and human resource requirements for the demand in this rapidly growing sector. The Bank is exploring ways to expand its project financing capability to meet the growing need for limited recourse project financing and has developed criteria and information requirements to facilitate financing of such projects. The Bank, with input from the independent power industry and other private sector companies and banks, is reviewing its existing criteria and organizational structure for processing these transactions and will announce the results of its review shortly. Our Chairman has made this a top priority.

The Bank has not yet reached a conclusion and is now listening to everyone inside and outside the Bank in a series of meetings with industry, commercial and multilateral financing groups. We need the input of all of you. A schedule of these meetings is included in the material provided for this meeting.

Among the project finance issues now being evaluated are: 1) should the Bank form a Project Finance Group in order to be more responsive to the customers' needs; 2) should the Bank offer both pre- and post-completion comprehensive risk; and 3) should the minimum transaction value be less than $50 million? Other issues involve:

- <u>25% Equity Requirement</u>. We are told that on larger projects, this is a real issue as the base equity requirement affects the economics of a project.
- <u>Risk Sharing</u>. You've told us projects so large need partnerships. Sharing of risk needs to be examined.

- Environment. Taking environmental issues much more seriously. Eximbank is interested in supporting environmentally sound projects and is in the process of developing regulations that could reference World Bank standards or similar standards which consider factors such as resettlement, species endangerment, and emissions and effluent limits.

An Eximbank limited-recourse project finance case is defined as any transaction in which all of the following criteria apply:

(1) A full debt repayment guarantee from one or more third-party guarantors, offering reasonable assurance of repayment, does not appear to be available. Eximbank will probably not be able to rely on full recourse to a sovereign government; nor to one or more commercial banks; nor to investors, including parents and joint-venture sponsors.

(2) Debt repayment depends primarily on the completion of new physical facilities, rather than on the character and capital of an established organization.

(3) Assessment of post-completion commercial risks, of likelihood of debt repayment, and of potential returns to equity investors, depends substantially on the evaluation of cash flows associated with the completed facilities.

(4) The applicant has requested Eximbank to provide some degree of risk cover, ranging from defined political risks to comprehensive cover.

(5) The case meets minimum Eximbank project finance case acceptance criteria, especially: the case involves U.S. content greater than $50 million; the proposed financing involves a debt-to-equity ratio no greater than 3 to 1; and the Bank has received a feasibility study with detailed engineering, cash flow, and sensitivity analysis.

Eximbank will consider project financing in any country where Eximbank is not legislatively prohibited from doing business. General criteria for acceptance of project financing applications are attached. Special criteria may apply in certain markets, depending on Eximbank's assessment of country risk.

A critical element in the initial evaluation of project risk cases is the ability of Eximbank to differentiate between substantially viable proposals and those which are premature. The application criteria must be strict enough to discourage sponsors

from relying on Eximbank to take a lead role in putting a project together, but Eximbank does not want to reject potentially good projects before they can be fully developed. Also, the Bank would like to participate early enough so that it could influence the finance and security structure and not be presented late in the process with an inflexible proposal.

Eximbank currently charges an exposure fee on all loans and guarantees based on term, country risk and category of borrower or guarantor, and may charge a surcharge on this fee for project financing transactions containing additional identifiable risks.

Eximbank's processing procedures include a review of an internal general project review list that provides examples of the following broad identifiable risks:

- PRE AND POST-COMMISSIONING FINANCE RISKS
- TECHNICAL RISKS - PRE AND POST-COMMISSIONING
- ECONOMIC RISKS
- POLITICAL RISKS
- LEGAL/CONTRACTUAL RISKS
- PORTFOLIO RISKS

CONCLUSION

We want to aggressively meet your investment needs in the power sector. We will continue to be innovative and creative in developing programs that meet our mutual interests. U.S. exporters need competitive financing and we are committed to providing it. There is a steep learning curve for all of us and we need to work together to realize this great opportunity.

Thank you for the chance to share with you our thoughts for improving U.S. competitiveness in this huge and growing international market.

4.3.3 Barriers to Closing Private Power Projects in Eastern Europe

William A. Franks
Business Development Manager
Southern Electric International

Barriers to Closing Private Power Projects in Eastern Europe

International Clean Coal Technology Transfer Program

February 10-11, 1994

Hyatt Regency
Washington D.C.

William A. Franks
Director, European Projects

John R. Campbell
International Business Analyst

Southern Electric
International

I. Introduction

Despite Eastern Europe's increasing need to modernize and rehabilitate the majority of its power sector, very little capital investment has been made there in the four years since the fall of the Berlin Wall. Of over 25 major projects in the region, only two in Eastern Germany have closed.[1] Investors have found it difficult to surmount the obstacles to financial closing in the region. These obstacles include: the lack of, or untried commercial and legal structures; currency risk, low electricity prices and other economic factors; a political climate in which extended debate over priorities and policies delays implementation of reforms; and, cultural barriers, such as lack of experience with western business practice, which slow the investment process.

This paper describes barriers to developing projects in Central Europe. From the discussion it can be seen that the issues are ones which can and will be dealt with given time for reforms to be implemented and individuals to learn. This discussion of barriers is not intended to imply that projects cannot be successfully financed (some are so close that they may occur as we speak), just, that experience shows it is difficult and some of the difficulties are different than in other parts of the world.

II. Active Projects

There are over 25 active projects involving private sector hard currency capital investment in the region. Table A lists projects and their sponsors and gives a status

[1] The region consists of the post-communist countries where large scale private investment in the power sector is likely in the near future: The Czech Republic, Eastern Germany, Hungary, Poland, and Slovakia.

summary. Since there is generally an excess of installed capacity in Eastern Europe, most of these projects call for modernization and rehabilitation to improve economic and environmental performance rather than new greenfield investments.

III. Legal and Commercial Obstacles

The post-communist countries of Central Europe are working to bring their legal and commercial systems up to the level the West has developed over the past 50 years. This reform process is not yet complete. Gaps in the legal and commercial systems present obstacles to investors. Some examples are: the existing laws concerning ownership which in some cases require government approval for foreign controlled corporations to own real estate; accounting regulations inconsistent with international norms which lead to cumbersome and inefficient legal structures to treat foreign denominated loans and create trapped cash; and a lack of understanding of the level of detailed commercial/economic analysis required by equity partners and banks.

Greater sophistication than presently exists in commercial and legal documentation, analysis, and financial structuring is required to justify and to determine risk allocation and credit enhancement for project financing. The local partners are not familiar with the time, expense, and documentation required; detailed analysis and documentation is required at each step. Requirements include: the history and experience of the sponsors; analysis of the role and impact of the project on the electric system; detailed organizational and management plans; fuel supply plans and strategies to meet contingencies; financing plans; currency risk

assessments; and a detailed economic models which incorporate this information. It is not enough to say we have determined that this project is needed to meet a particular requirement. Formerly, a risk/return analysis was not used. Decisions were made on the basis of the production needed and there is little experience with financially based decision making.

Another legal/commercial obstacle is the lack of institutional reform in the electric sector and the time required to develop the programs and put them in place. Integrated resource plans must be prepared to justify specific investments. A tariff structure must be developed within which investors can reasonably expect to be paid. A regulatory structure must be put in place. These reforms take time and it is difficult to move forward without them.

The lack of a relevant historical track record in the statistical information published on the economies of the region also makes economic forecasting difficult. This increases the risk in projecting future labor costs, for instance. Consequently, investors have difficulty determining likely returns

IV. Economic Obstacles

Some of the economic obstacles to private investment in the power sector include price and currency issues. The low price of electricity that prevails in the post-communist countries of Central Europe is a significant impediment to private investment in the power sector. Low income levels make governments hold electricity prices below world market prices through subsidies to generators and fuel suppliers as well as cross subsidization of residential customers by industrial users. Until

prices paid in all segments of the industry rise to market levels it is difficult to predict if an adequate return will be realized.

To the extent revenues are in local currency while loan and equity return payments must be made in hard currency, the weak currencies of the post communist countries of Central Europe present obstacles to investment. These include inflation, devaluation, and convertibility risks. Inflation risk, by itself, may be mitigated through careful indexation. However, high inflation forces countries to devalue to maintain competitiveness with trading partners. Devaluation risk is more difficult to mitigate -- dollarization is one solution. Another alternative is to base revenues on export contracts with payments in hard currency. There is a limit to the number of these available. Convertibility risk can be addressed to a significant extent by the purchase of insurance, from OPIC, for instance. Although, the currencies of Hungary and Poland have only internal convertibility, this is not considered an obstacle.

V. Political Obstacles

The political instability that is the nature of emerging democracies is also an impediment to Western investors. The fact that the official you deal with today may not be there next month means that you may have to start the education process all over again. Necessary structural changes may be delayed due to lack of conviction on the part of leaders, as politicians seek to prevent the short term pain and political cost of layoffs and higher prices. Without clear direction at the top, government agencies lack coordination; authorities are sometimes confused over who has the authority to negotiate contracts; privatizations are delayed as officials are indecisive over the

details of implementation. Bureaucrats refuse responsibility for new concepts. This leadership vacuum slows the pace of decision making.

Many of these countries have very tight budget requirements and there is sensitivity to the price at which state assets are sold. This can result in differences about the valuation of existing assets and sometimes decisions are made which enhance short term revenues at the expense of lower long term costs.

There are also a variety of local stakeholders in the projects. These include existing management; the state treasury; the enterprise's work force; and various politicians. A key role of the western developer is to sell a complex concept to all of these groups whose interests often are not the same and some of whom may suffer in order to create a successful project.

VI. Cultural Obstacles

The isolation of the post communist countries of Central Europe from the discipline of a market economy over the past 50 years produced differences in business-culture that impede the private investment process. Eastern managers were not exposed to the western free market concepts of marketing, finance, and human resources.[2] This lack of exposure to market economies means that there must be a continuing educational process conducted by the developer.

Unfamiliarity with western free market practice makes many managers apprehensive about privatization. The lack of understanding of the financing process,

[2] For example: In former times, analysis was not done to determine the revenues from the sale of outputs from project investments. Investment decisions were not revenue-based and the repayment of capital was not a concern.

as noted earlier leads to unrealistic expectations about the speed and timing of financing. It also leads managers to focus on the things they know how to do, e.g., engineering design, when the emphasis should be on the more difficult issues of the legal and financial structure and documentation necessary to obtain financing.

Another cultural impediment is national and personal pride. Such pride says "we can do it on our own and not pay the fees of Western professionals". Or, we are unwilling to give up the control and authority we are use to having. However contracts cannot be developed and executed, projects structured, and risks allocated without the advice of investment bankers and legal counsel for both sides of the transaction. Likewise, in a non-recourse project finance, significant control, especially under adverse circumstances, is given to your partners and bankers.

VII. Summary

There are significant legal and commercial, economic, political, and cultural obstacles to successful private investment in the power sector of the post communist countries of Central Europe. All of these countries are in the process of developing the legal and regulatory framework necessary to enter financable power sales contracts: some have made greater progress than others.

The struggling economies of the region include weak currencies and low electricity prices that may prevent investors from structuring projects with adequate returns. The region's emerging democracies are often engaged in intense internal debates about their reforms. This is good, because that is what is supposed to happen in democracies. It is bad, because it delays necessary

reform. The region's inexperience with the market economy presents business-culture obstacles, slowing the investment process.

Active development in the region is based on the conviction that free markets work and that these countries are committed to implementing them. It is our firm conviction that in the long term the opportunities and results will be very good. Patience and staying power are, however key requirements.

TABLE A

HUNGARY

Company	Project Name	Partners	Electric Capacity	Comments
Dynalytics	Gyoer	Developer Western Energy Co and three local partners	165 MW	Cogeneration with the city heating district as the thermal host.
	Nyiregyhaza	the city government developer and the electric utility	100 MW	Cogeneration with the city heating district as the thermal host.
	Szekszard	the city government developer and the electric utility	40 MW	Cogeneration with the city heating district as the thermal host.
Citizens Power & Light	Debrecen	Hungarian National Oil	60 MW	Valued at $35 million. World bank or OPIC may participate.

SLOVAKIA

Company	Project Name	Partners	Electric Capacity	Comments
Dynalytics	Nitra	city government, city electric utility, and the natural gas distribution company.	50 -60 MW	60% stake. Cogeneration with the city heating district as the thermal host.
	Rimavska Sobota	city government, city electric utility, an industrial firm, and the natural gas distribution company.	35 MW	60% stake. Retrofit.
	Povazska Bystrica	city government, city electric utility, an industrial firm, a boiler contractor, and the natural gas distribution company	40 MW	Conversion of coal to gas.
	Bratislava	national electric company and the national insurance company.	200 MW	Gas fired.
SEI	Vojany	Slovak Electric Enterprise (SEP).	1320 MW	Repowering.

CZECH REPUBLIC

Company	Project Name	Partners	Electric Capacity	Comments
Mission	Latonov	Texaco, GE, Air Products & Chemicals	600 MW	Consortium is seeking sovereign guarantees.
Atlantic Partners	Straz Pod Arsklem	Science Application International Co.	50 MW	Cogeneration plant at a uranium mine.
ABB	Ostrava	Prvni Brneska Strojrna	60 MW	CFB combined-cycle, financed by Swedish Export Credit Corp.

EASTERN GERMANY

Company	Project Name	Partners	Electric Capacity	Comments
Enron Power	Bitterfeld/Wolfen	MEAG	230 MW	Repowering to 300 MW. Estimated cost is $330 million.
PreussenElektra	Stade replacement	none	700 MW	Gas fired. Replaces Germany's oldest nuclear plant
Morrison-Knudsen/NRG/PowerGen	MIBRAG	---	1097 MW	closed.
RWE, Bayernwerk, PreussenElektra	--	none	12,000 MW	purchased 70% of VEAG,.
Westinghouse Electric	Cottbus	none	425 MW	gas fired with transition to lignite gasification by 2000.

POLAND

Company	Project Name	Partners	Electric Capacity	Comments
AES	Chorzów	Plant owner.	Existing plant - 100 MW. New plant unknown.	New fluidized bed plant to be erected at existing site.
Ahlstrom -Pyropower	Turów	ABB, Elektrim, and the current plant owner.	Existing plant 2000 MW. With modifications 1980 MW.	
Coastal Corp.	Gorzów	The current plant owner.	< 100 MW	Gas fired cogeneration based on local gas field.
Infrastructure Services, Inc.	Lublin Cogeneration Facility	Polish and Western investors		
International Energy Corp.	Plock refinery	The refinery and city of Plock.	350 MW	This is a cogeneration project based on solving an environmental problem at the refinery by gasifying refinery waste.
Imatran Voima Oy	Krakow-Leg	Vattenfall, United Energy Partners, and the plant owner.	460 MW	Project was put out for bid.

POLAND

Company	Project Name	Partners	Electric Capacity	Comments
Western Investors	Warsaw/Bialylstok transmission line.	PPGC	400 kV - 172 transmission line	This project is close to financial closing if exemptions from the VAT can be obtained from Ministry of Finance.
J. Makowski Associates				Makowski has a coal bed methane project and also a natural gas storage project.
Tractebel	Mloty	EDF, PPGC	750 MW pumped storage station.	On hold pending completion of PPGC's Integrated Resource Plan to determine need.
Transpower	Walbrzch	Plant owner.	< 300 MW combined heat and power	Proposing to construct replacement plant for existing facility.
Vattenfall	Patnów	unknown.	Current plant 1600 MW.	This is a project is a potential export facility to Sweden. A power sales contract has been under negotiation with PPGC for over a year. Vattenfall is involved in two undersea cable projects. One under construction between Sweden and Germany and the other, proposed between Sweden and Poland.
Westinghouse	Model-Pol	Various	Nine Polish power plants with 200 MW units	A joint venture company was established between Westinghouse and the nine Polish generators to implement upgrades.
Many interested Western partners. No commitment.	Dolna Odra	Elektrim and current plant owner.	Current plant 1600 MW.	Large coal fired plant in Western Poland with export potential. A joint venture under discussion for several years.

TABLE B

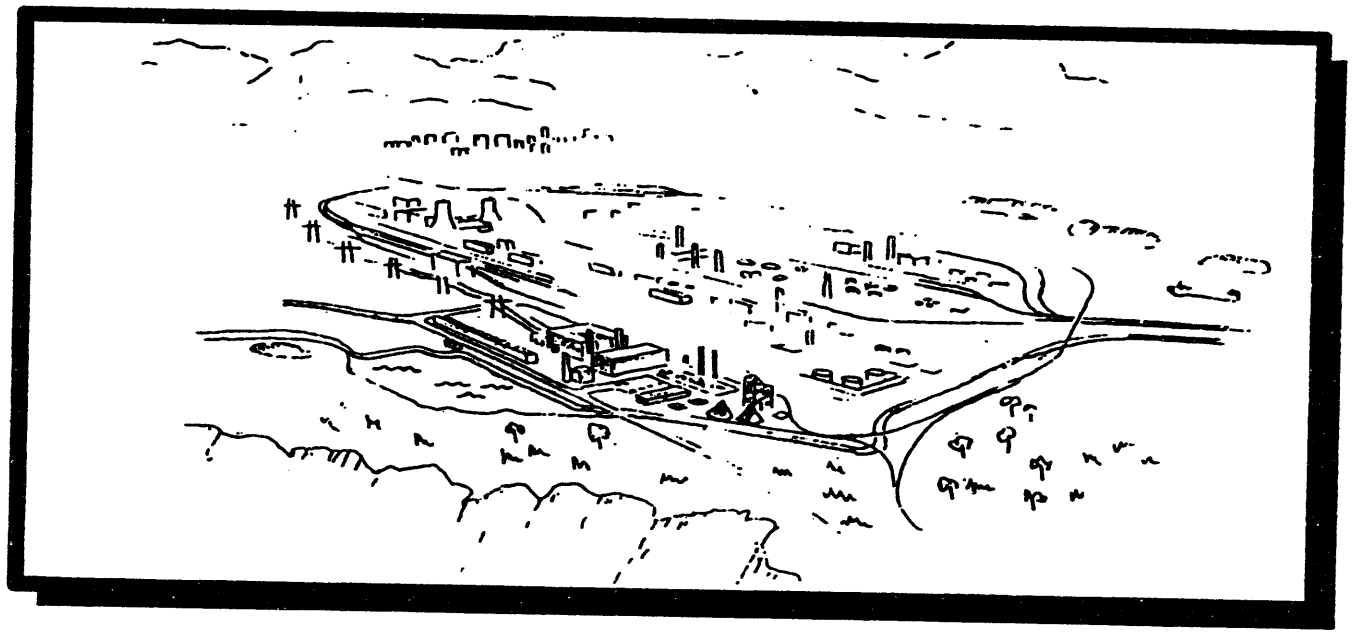
Representative Retail Rate Structures

	Average Household (cents/kWh)	Average Industrial (cents/kWh)
Czech Republic	2.7	5.3
Germany (Eastern)	13.8	15.0
Hungary	4.1	6.0
Poland	5.5	4.0
Slovakia	2.7	5.3

4.3.4 Synchem Project, Litvinov, Czech Republic

Earl R. Osterstock
Manager, Commercial Development
Air Products and Chemicals, Inc.

SYNCHEM PROJECT



Litvinov, Czech Republic


Litvinov
Prague

Synchem Project
LITVINOV SITE

- Large local coal supplies
- Availability of residual oil supplies
- Large Chemopetrol steam demand
- Public support for environmental investment

Synchem Project
WHY IS IT UNIQUE?

- First demo of modern slagging gasifier on Central European brown coals
- Direct, long-term investment of ~$200 MM U.S. private equity capital-largest U.S. project financed venture
- Participation by U.S. firms permits deployment of best available control technology
  - 75-99% reduction of major emissions vs. existing plants
  - Sulfur emissions 10-15 times lower than alternative control technologies

Synchem Project
DEVELOPMENT SCHEDULE

Early 1992:	**Exploratory discussions by Texaco and Nykomb Synergetics with prospective Czech customers/ partners**
Dec. 1992:	**Joint Development Agreement executed initiating Feasibility Phase**
Nov. 1993:	**Feasibility Phase completed**
Jan./Feb. 1994:	**- Initiate Development Phase** **- Submit Loan/Contractual Guarantee Application to Czech Government** **- Initiate environmental permitting**
July 1995:	**- Financial closing** **- Initiate construction**
Jan. 1998:	**Commercial Operation**

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Synchem Project
FEASIBILITY PHASE
ACCOMPLISHMENTS

- Completed preliminary design/cost estimates for two configurations
- Successfully demonstrated gasification of oil/brown coal mixture at Texaco Research Facility
- Developed financial model and preliminary financing plan. Established economic feasibility.
- Developed pricing/contract frameworks for product off-takes and feedstock supplies
- Prepared Loan/Contractual Guarantees Proposal to be submitted to Czech Government (Feb '94)

Synchem Project
SUMMARY

- **Fuel:** 3700 tonnes/day brown coal
  +
  1100 tonnes/day residual oils
- **Products:** 400 MW electricity
  +
  255 tonnes/hr steam
- **Capital Costs:** ~$900 MM Total Capitalization
- **Ownership:** 67% U.S.
  33% Czech
- **Start-Up:** 1998

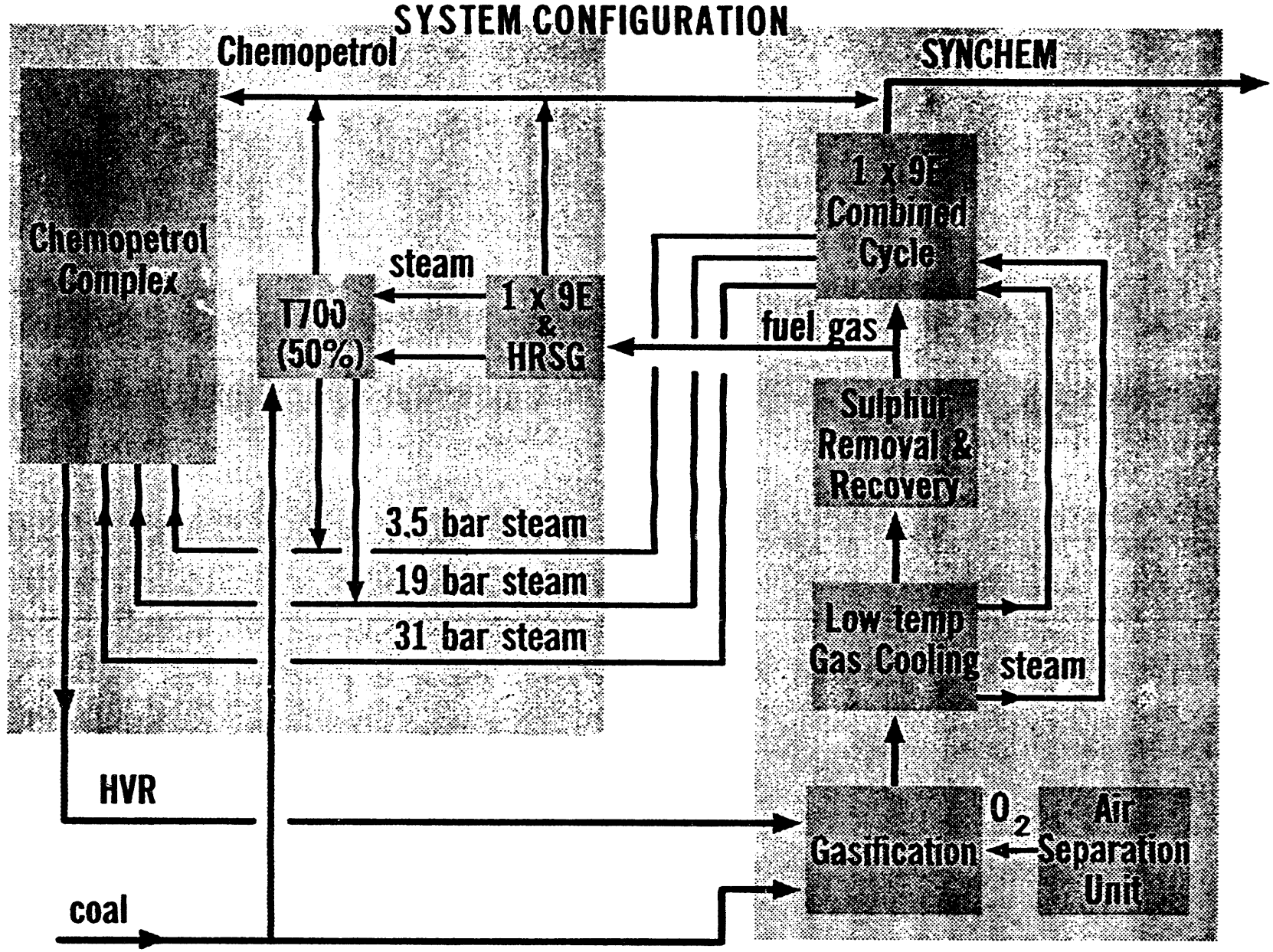
Synchem Project
SIGNIFICANT ENVIRONMENTAL ENHANCEMENT!

Air Quality

Pollutant	Annual Reduction MT/YR	% Reduction
SO_2	186,500	98.5%
NO_X	23,500	83
CO_2	3,730,000	37
Particulates	98,700	99.7

Solid Waste:
- Safe, nonleachable slag
- No sludge or unstable waste

Refinery Waste:
- Safe, beneficial use of waste oils


SYSTEM CONFIGURATION
Chemopetrol
SYNCHEM
Chemopetrol Complex
1 x 9E Combined Cycle
steam
T700 (50%)
1 x 9E & HRSG
fuel gas
Sulphur Removal & Recovery
3.5 bar steam
19 bar steam
31 bar steam
Low temp Gas Cooling
steam
HVR
Gasification
O2
Air Separation Unit
coal
11465.003

Synchem Project
BENEFITS TO CZECH REPUBLIC

- Environmentally acceptable use of indigenous energy resources
- Transfer of state-of-the-art environmental technology/expertise
- U.S. Partners absorb major risk burdens:
  - Construction
  - Schedule
  - Performance
- Major air quality enhancement
- Up to 2000 construction jobs

Synchem Project
BENEFITS TO U.S.

- Opens international market for GCC technology via commercial initiative
- Further demonstrates/widens private power approach in international markets
- ~$300 MM of U.S. equipment/engineering/ technology fees

Synchem Project
MAJOR CHALLENGES

- Project finance concept new to Czech companies
- Establishing long-term commercial contracts in midst of transitioning economy
- Major partners/customers are in middle of privatization programs
- 1997 environmental compliance mandates impose tight schedule
- Czech government faces multitude of requests for support/guarantees for commercial ventures

Synchem Project
PROJECT FINANCING

- **Debt/equity mix**
- **Project terms must match financing**
  - **Cash flows → Debt service**
  - **Project assets → Collateral**
- **Augmented by limited sovereign guarantees**
  - **Contract performance**
  - **Certain loan repayment risks**

Czech government position on contract/ loan guarantees will shape debt structure

Synchem Project
POSSIBLE SOURCES OF DEBT FINANCING

Source	Current Maximum Term	Require Sovereign Guarantees?
International Finance Corporation (IFC)	12 Years	No
European Bank for Reconstruction and Development (EBRD)		
Private	12 Years	No
Public	15 Years	No
European Investment Bank		
Industrial	12 Years	Yes
Infrastructure	15 Years	Yes
Export Credit Agencies (ECAs)	8 1/2 Years	Yes
Commercial Banks	7-8 Years	Yes

Best Possible Financing Terms Are Key to Favorable Project Economic Performance

11465PPW1

Synchem Project
FINANCING CHALLENGES

- Czech government guarantees
- Developing secure contracts
  - Fuel
  - Power/steam
  - Grid sales
- Mitigating lending institutions' concerns
  - Exchange rates
  - Privatization issues
  - "Emerging Technology" issues
  - Long-term viability of customers/suppliers

Synchem Project
HOW CAN U.S. GOVERNMENT ASSIST?

- Express interest in/support for environmental technology transfer initiatives
- Express confidence in U.S. Clean Coal Technologies
- Urge host governments to facilitate:
  - Necessary commercial contracts
  - Guarantee packages
- Assist in structuring appropriate, longer-term financing, consistent with:
  - Terms of the specific deal
  - Needs of the host country

APPENDIX 1

WRITTEN PUBLIC COMMENTS

China

Integrated Gasification Combined Cycle (IGCC) affords China the opportunity to utilize coal for the generation of power in an environmentally acceptable manner. This technology, which has been demonstrated in the United States but has not reached a point of commercial replication, offers the opportunity to "showcase" advanced U.S. technology. A team approach involving a U.S. boiler supplier, a U.S. gasifier supplier, and a U.S. gas turbine supplier offers the potential for significant future business in China.

The design, fabrication, and supply of a Pressurized Fluidized Bed Combustor (PFBC) similar to the Clean Coal I project at the American Electric Power Tidd Plant would also afford the opportunity to "showcase" a clean and efficient technology. Such a plant could form a solid foundation for the acceptance of future U.S. technologies by the Chinese market, and could generate significant goodwill within that market.

Eastern Europe (Including Russia and Newly Independent States (Also applicable in China)

While economies are down, there is an adequate supply of generation capacity in many parts of this region; however, environmental cleanup technologies along with those that improve efficiency would be appropriate. We recommend any of the following in one of the numerous central heating plants that exist. Whatever is demonstrated, would be repeatable many times because of the number of these plants.

- Fluidized Bed Technology

  The retrofit of commercially available U.S. fluid bed technology to an existing powerplant in Eastern Europe offers the opportunity to demonstrate our ability to reduce SO_x, NO_x, and carbon dioxide emissions while working within the existing boiler footprint. Once demonstrated, there are a large number of existing plants to which this approach could be applied. This coupled with a condensing heat exchanger (below), would be a good combination of environmental and efficiency improvements.

- CHX (Condensing Heat Exchanger [with Integrated Flue Gas Treatment])

  CHX is a Teflon-covered heat exchanger that significantly increases boiler efficiency recovering both latent heat and sensible heat from the flue gas. The technology can incorporate flue gas treatment for emission control purposes. Commercial condensing heat exchanger units have demonstrated satisfactory performance in over 100 industrial applications over the past 10 years. The use of Teflon coverings on all portions of the heat exchanger exposed to the flue gas from which condensation occurs ensures adequate material lifetime in the corrosive environment encountered when the flue gas temperature drops below the acid dew point. Most of the commercial applications for condensing heat exchangers to date have been for heat sources firing natural gas or oil. These clean fuel applications are economically justified solely on the basis of the heat recovered.

  A recent improvement in the commercial condensing heat exchanger design, called the Integrated Flue Gas Treatment (IFGT) concept, offers the potential of removing pollutants from the flue gas while waste heat is recovered. It has been demonstrated at pilot scale as a device to remove SO_2, HCl, particulate matter, and certain other acid gases and air toxics. The IFGT is particularly attractive for applications where dirtier fuels, such as high sulfur oil or coal, are fired. The justification, in this case, would be increased output of the plant and meeting environmental regulations in the most cost effective way.

  Of the many applications for an IFGT unit, district heating and processes that require a high amount of make-up water are ideal. For these cases, the IFGT will heat the make-up water prior to a de-aerator. This results in a direct fuel savings and efficiency improvement.

  Additionally, the CHX with any of the following technologies would also serve the stated goals:

- LIMB (Limestone Injection Multistage Burner)

  A low capital cost, furnace sorbent injection technology for moderate SO_2 emission control that was demonstrated in conjunction with the use of low-NO_x burners. During the CCT project, the ranges of SO_2 removal achievable with both limes and limestone were demonstrated in a 105 MWe unit at Ohio Edison's Edgewater Plant.

- Coolside

  A low capital cost, duct sorbent injection technology also intended for moderate levels of SO_2 emission control. The process was demonstrated at the same 105 MWe unit as LIMB. Related tests were also performed at the DOE's 12 MWe Duct Injection Test Facility at Ohio Power's Muskingum River Station where pilot studies were conducted with both dry and aqueous slurries of lime.

- Limestone Injection with Dry Scrubbing

  A furnace sorbent injection technology in which the resultant excess calcined lime, slurried in water, is used to achieve a higher degree of SO_2 removal in a (spray) dry scrubber. This technology takes advantage of combining low cost, dry, pulverized limestone injection with the higher removal efficiency of a commercial dry scrubbing technology.

- SNRB or SO_x-NO_x-Rox Box

  An advanced emission control technology that incorporates lime- or sodium-based sorbent injection to capture SO_2, selective catalytic reduction of NO_x by ammonia, and particulate (Rox) removal in a high-temperature, pulse-jet baghouse. A 5 MWe module, using full-scale bags, was used for the CCT demonstration at the Ohio Edison R.E. Burger Plant.

- **Indonesia and Thailand**

  The installation of remote site Circulating Fluid Bed power generating units, burning biomass and other waste fuels, in the 10-15 MWe size range offers

quickly installed, easy-to-operate units to unelectrified areas. Maximum modularization of equipment will provide short lead times of a concept that could be repeated in numerous locations.

- **Latin America**

  We see the best opportunities to be low NO_x burners or LIMB, Coolside, Limestone Injection with Dry Scrubbing, and SNRB as listed above.

APPENDIX 2

MEETING ATTENDANCE

REGISTRATION

Name	Company	Mailing Address	Telephone
Y. K. Ahn Manager, Advanced Engineering, International	Gilbert/Commonwealth International, Inc.	P.O. Box 1498 Reading, Pennsylvania 19603	(610) 775–2600
Mary–Jane Albanese International Affairs Consultant	Edlow International Company	1666 Connecticut Avenue, N.W., #500 Washington, DC 20009	(202) 483–4959
Vincent M. Albanese Vice President, External Affairs	Nalco Fuel Tech	1001 Frontenac Road Naperville, Illinois 60565	(708) 983–3254
David Alcorn CEO	Donlee Technologies	693 North Hills Road York, Pennsylvania 17402	(717) 755–1081
Zachariah Allen Managing Director	The Intersea Group	ul. Filtrowa 67 m 5 02–055 Warszawa (Poland)	(48 22) 25 29 14
Deborah A. Alto Research Assistant	Japan Electric Power Information Center, Inc. (JEPIC)	1120 Connecticut Avenue, N.W. Suite 1070 Washington, DC 20036	(202) 955–5610
Matti Amadhila Counsellor	Embassy of the Republic of Namibia	1605 New Hampshire Avenue, N.W. Washington, DC 20009	(202) 986–0540
Charles E. Anderson Manager, Government Systems	Air Products and Chemicals, Inc.	7201 Hamilton Boulevard Allentown, Pennsylvania 18195	(610) 481–8635

REGISTRATION

Name	Company	Mailing Address	Telephone
Herbert E. Andrus Manager, IGCC Product Development	ABB Combustion Engineering	1000 Prospect Hill Road P.O. Box 500 Windor, Connecticut 06095-0500	(203) 285-4770
Helmut Attlfellner Director, Marketing	Lotepro Corporation	115 Stevens Avenue Valhalla, New York 11709	(914) 747-3500
Theodore Atwood Program Manager, FE-221	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(301) 903-9445
Akhtar A. Awan Economist, PO-51	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586-6427
James Aylsworth Coal Advisor	Government of Canada	c/o Coal Division 580 Booth Street Ottawa, Ontario, Canada K1A OE4	(613) 992-5086
Richard A. Bajura Associate Provost for Research	West Virginia University	302 Stewart Hall Morgantown, West Virginia 26506-6216	(304) 293-3449
Arthur Baldwin Program Coordinator, NOx Contol Technology	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 920 Pittsburgh, Pennsylvania 15236-0940	(412) 892-6011
Pan Baozheng Minister - Counsellor for Science and Technology	Embassy of the People's Republic of China	2300 Connecticut Avenue, N.W. Washington, DC 20008	(202) 328-2530

REGISTRATION

Name	Company	Mailing Address	Telephone
William Bartok Consultant	William Bartok, Inc.	956 Wyandotte Trail Westfield, New Jersey 07090	(908) 789-7351
Frederick E. Becker Director, Energy Technology	Thermo Power Corporation/Tecogen	45 First Avenue Waltham, Massachusetts 02254-8995	(617) 622-1059
Carl Bell President	International Business Development Corporation	606 Massachusetts Avenue, N.E. Washington, DC 20002	(202) 546-2627
Karen Benedek	Arthur D. Little, Inc.	Acorn Park Cambridge, Massachusetts 02140-2390	(617) 498-6061
Caitlin D. Bergin Staff Assistant	United States Senate Committee on Energy and Natural Resources	312 Hart Building Washington, DC 20510	(202) 224-7569
Alan S. Berson President	Pulse Point, Inc.	7259 Spring Side Way McLean, Virginia 22101	(703) 734-0902
Frank P. Bevc Manager, Emerging Technologies	Westinghouse Electric Corporation	4400 Alafaya Trail, MC381 Orlando, Florida 32826-2399	(407) 281-3393
Richard Bichel Director, Technical Services	Pioneer Energy, Inc.	7N770 Phar Lap St. Charles, Illinois 60125	(708) 513-7269
David C. Blee	Franklin, Blee & Burling	919 Eighteenth Street, N.W. Suite 450 Washington, DC 20006	(202) 466-6535

REGISTRATION

Name	Company	Mailing Address	Telephone
Arthur Brearley Associate and Manager	Sargent & Lundy	1825 I Street, N.W., Suite 400 Washington, DC 20006	(202) 429-2065
Gardner Brown Chairman/CEO	RusSon, Inc.	1101 S. Arlington Ridge Road, #1112 Arlington, Virginia 22202	(703) 521-0004
Michael W. Broyles	Broyles Enterprises, Inc.	386 Willanco Drive Eddyville, Kentucky 42038	(502) 522-4644
Paul Bryant First Secretary	South African Embassy	3051 Massachusetts Avenue, N.W. Washington, DC 20008	(202) 232-4400
Aye Hla Bu Third Secretary	Embassy of Myanmar	Economics & Information Department 2300 S Street, N.W. Washington, DC 20008	(202) 332-9044
David P. Burford Project Manager, Yates CT-121 Clean Coal Project	Southern Company Services, Inc.	Georgia Power's Plant Yates 708 Dyer Road Newnan, Georgia 30263	(404) 253-6253
John Byam International/Domestic Business Development	U.S. Department of Energy	Morgantown Energy Technology Center 3610 Collins Ferry Road P.O. Box 880, AO5 Morgantown, West Virginia 26507-0880	(304) 291-4064
John W. Cebrowski President	Sales Builders, Inc.	10625 Jones Street Fairfax, Virginia 22030	(703) 591-3232

REGISTRATION

Name	Company	Mailing Address	Telephone
Filomeno Ceita Commercial Attache	Angola Embassy	1899 L Street, N.W., Suite 500 Washington, DC 20036	(202) 785–1156
Norman M. Chakanetsa Counsellor (Commercial)	Embassy of Zimbabwe	1608 New Hampshire Avenue, N.W. Washington, DC 20009	(202) 332–7100
Jean–Pierre Charpentier Senior Energy Specialist	The World Bank	Room G–5135 1818 H Street, N.W. Washington, DC 20433	(202) 473–8504
Steven Chi Chairman, East Asia Group	Morrison Knudsen Corporation	720 Park Boulevard Boise, Idaho 83729	(208) 386–5757
James Childress Director of Research	The Council on Alternate Fuels	1110 North Glebe Road Suite 610 Arlington, Virginia 22201	(703) 276–6655
Sun W. Chun Director	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 922 Pittsburgh, Pennsylvania 15236–0940	(412) 892–6122
Paul N. Cicio Manager, Government Relations Hydrocarbons & Energy	The Dow Chemical Company	1776 Eye Street, N.W. Suite 575 Washington, DC 20006	(202) 429–3411
Anthony J. Cirrito Director	Cirrito Associates	89 Spring Hill Road East Sandwich, Massachusetts 02537	(508) 888–4643

REGISTRATION

Name	Company	Mailing Address	Telephone
Mark Clark Assignment Manager, Fossil Fuels Issues	U.S. General Accounting Office	Union Labor Life Building 111 Massachusetts Avenue, N.W., #201 Washington, DC 20001	(202) 512-6881
Stewart Clayton Program Manager, FE-222	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(301) 903-9429
George J. Clessuras Vice President	Babcock & Wilcox	20 S. Van Buren Avenue P.O. Box 351 Barberton, Ohio 44203-0351	(216) 860-1382
Owen Cylke	U.S. Agency for International Development (AID)	Department of State 320 21st Street, N.W. Room 3319 Washington, DC 20523	(202) 736-4662
Peter Cover Program Manager, FE-4 Coal & Technology Exports Program	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586-7297
William D. Craig	Bechtel Group Inc.	1015 15th Street, N.W. Suite 700 Washington, DC 20007	(202) 828-7364
G. A. Cremer Commercial Development Manager	Shell Synthetic Fuels, Inc.	P.O. Box 2099 Houston, Texas 77252	(713) 241-2914

REGISTRATION

Name	Company	Mailing Address	Telephone
Tom Cutler Foreign Affairs Officer, PO–71	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–6156
Peter Danforth Project Director, Central & East European Energy Efficiency Study	Bechtel Corporation	1015 15th Street, N.W., Suite 700 Washington, DC 20005	(202) 828–5202
Charles H. Davis Senior Business Development Manager	J.A. Jones Construction Company	J.A. Jones Drive Charlotte, North Carolina 28287	(704) 553–3451
Carolyn Dawson	Coal & Sunfuels Technology	1616 N. Fort Myer Drive, #1000 Arlington, Virginia 22030	(703) 816–8642
Douglas A. Dedrick Project Adminstration Manager	PSI Energy	1000 E. Main Street Plainfield, Indiana 46168	(317) 838–6856
Randall J. Dellefield PFBC Product Manager	U.S. Department of Energy	Morgantown Energy Technology Center P.O. Box 880 Morgantown, West Virginia 26507	(304) 291–4725
Christian P. Demeter Principal	Antares Group, Inc.	8240 Professional Place, Suite 207 Landover, Maryland 20785	(301) 731–1900
Robert D. Dixon General Manager, Business Development	Air Products & Chemicals, Inc.	7540 Windsor Drive Allentown, Pennsylvania 18195	(610) 481–5068

REGISTRATION

Name	Company	Mailing Address	Telephone
Christopher J. Donatelli Manager, Business Development	K&M Engineering and Consulting Corporation	2001 L Street, N.W., Suite 500 Washington, DC 20036	(202) 728-0390
Gilbert Dubois Counselor	Delegation of the European Commission	2100 M Street, N.W., 7th Floor Washington, DC 20037	(202) 862-9570
Terry Dudley Director, Project Development	Morrison Knudson Corporation	720 Park Boulevard Boise, Idaho 83729	(208) 386-5757
Robert H. Eggleston President	EFH Coal Company	Box 1600 Wilkes-Barre, Pennsylvania 18705	(717) 823-7664
Scott Eisele Associate	Koleda Childress, Inc.	1110 North Glebe Road, Suite 610 Arlington, Virginia 22201	(703) 276-0600
Bernard Ennis President	EGT Enterprises, Inc.	20 High Point Cedar Grove, New Jersey 07009	(201) 239-0404
David Eskinazi Manager, Government & International Projects	Electric Power Research Institute	2000 L Street, N.W. Washington, DC 20036	(202) 293-7515
Samuel H. Esleeck Consultant	Babcock & Wilcox	Esleeck Consulting, Inc. 124 Linden Avenue Lynchburg, Virginia 24503	(804) 384-2392

REGISTRATION

Name	Company	Mailing Address	Telephone
Charles D. Estes President	Estes & Zahradnik & Associates	1331 Pennsylvania Avenue, N.W. Suite 730N Washington, DC 20004	(202) 662-8979
Bob Evans Director, Washington Operations	Parsons Main, Inc.	1133 15th Street, N.W., Suite 800 Washington, DC 20005	(202) 775-3455
John C. Evans Assistant Treasurer	Air Products and Chemicals, Inc.	7201 Hamilton Boulevard Allentown, Pennsylvania 18195-1501	(610) 481-8692
Peter C. Evans		2633 Garfield Street, N.W. Washington, DC 20008	(202) 234-9757
Philip C. Evison Regional Vice President	Westinghouse Electric SA	Aleje Jerozolimskie 56c/3 Warsaw, Poland 00-893	48-2-630-2444
Antonio E. Evora Commercial Attache	Embassy of Cape Verde	3415 Massachusetts Avenue Washington, DC 20007	(202) 965-6820
Laurence M. Feder Assistant Director, Program Development	Institute of Gas Technology	1825 K Street, N.W., Suite 503 Washington, DC 20853	(202) 785-3511
Thomas J. Feeley, III Project Manager	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 922 Pittsburgh, Pennsylvania 15236-0940	(412) 892-6134

REGISTRATION

Name	Company	Mailing Address	Telephone
Howard Feibus Director, FE-221, Clean Coal Technolgy	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(301) 903-4348
John L. Ferrell Manager Technology	BOC Process Plants	575 Mountain Avenue Murray Hill, New Jersey 07974	(908) 771-1821
Frederico Fische	The Delta Group	606 Massachusetts Avenue, N.E. Washington, DC 20002	(202) 546-2627
Gregg Fisher Assistant Director, Energy Policy / Fossil Fuels Issues	U.S. General Accounting Office	Union Labor Life Building 111 Massachusetts Avenue, N.W., #201 Washington, DC 20001	(202) 512-6873
Blair A. Folsom Senior Vice President	Energy and Environmental Research Corporation 9EER)	18 Mason Irvine, California 92718	(714) 859-8851
William A. Franks Business Development Manager	Southern Electric International	100 Ashford Center North Atlanta, Georgia 30338	(404) 392-7645
Robert Gentile	KFx, Atlantic Partners	901 N. Stuart, Suite 750 Arlington, Virginia 22203	(703) 524-0500
Chris Gidez Assistant to Vice President	Texaco, Inc.	2000 Westchester Avenue White Plains, New York 10650	(914) 253-6170

REGISTRATION

Name	Company	Mailing Address	Telephone
Robin L. Godfrey Executive Vice President	Custom Coals	100 First Avenue, Suite 500 Pittsburgh, Pennsylvania 15222	(412) 642-2625
Thomas C. Gray Cleanest Coal Geographer/ Attorney	Attorney-at-Law	803 Main Street P.O. Box 585 Petersburg, Indiana 47567	(812) 354-9260
Laura Green	Technology & Management Services, Inc. (TMS)	18757 N. Frederick Road Gaithersburg, Maryland 20879	(301) 670-6390
Stephen H. Greenleigh President	Euro-American Business Development Corporation	4602 N. Park Avenue Chevy Chase, Maryland 20815	(301) 986-5200
Lawrence C. Grundmann, Jr. Director, Business Development	Ahlstrom Development Corporation	7806 Sudley Road, Suite 210 Manassas, Virginia 22110-2804	(703) 361-8454
Richard Grundy Senior Professional Staff	Committee on Energy & Natural Resources	U.S. Senate Washington, DC 20510	(202) 224-7847
John A. Gruver Executive Consultant	Westinghouse Electric Corporation	1801 K Street, N.W. Washington, DC 20006	(202) 835-2350
John A. Hardgrove Manager - Propulsion & Environment Business Areas	TRW Space & Energy Group	One Space Park (M/S 01/2010) Redondo Beach, California 90278	(310) 814-5240

REGISTRATION

Name	Company	Mailing Address	Telephone
Jun Hashimoto Deputy Director	Ministry of International Trade & Industry (MITI)	1-3-1, Kasumigaseki, Chiyoda-ku Tokyo, Japan 100	(03)3501-2503
Eric W. Haskins Manager, Utility Partnership Program	U.S. Energy Association	1620 I Street, N.W., Suite 1000 Washington, DC 20006	(202) 331-0415
Robert L. Hershey Executive Engineer	AEA O'Donnell, Inc.	1255 New Hampshire Avenue, N.W. Suite 1033 Washington, DC 20036	(202) 659-9529
George L. Hiller Export Education Manager	Virginia Department of Economic Department	P.O. Box 798 Richmond, Virginia 23206-0798	(804) 371-0629
John W. Hindman International Affairs Coordinator	Science Applications International Corporation	P.O. Box 18288 Pittsburgh, Pennsylvania 15236	(412) 892-4755
Wendell F. Holland Partner	LeBoeuf, Lamb, Greene & MacRae	125 West 55th Street New York City, New York 10019	(212) 424-8350
Elmer C. Holt, Jr. PO-60	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20858	(202) 586-0714
John W. Holt Manager, Fuel & Transportation	NRECA	1800 Massachusetts Avenue, N.W. Washington, DC 20036	(202) 857-9569

REGISTRATION

Name	Company	Mailing Address	Telephone
John Hoppe Principal Engineer / Project Coordinator	Burns & Roe	2812 Old Two Hundred Highway Fairfax, Virginia 22031	(703) 207-0800
Lawford C. M. Howells Vice President	Foster Wheeler International Corporation	Perryville Corporate Park Clinton, New Jersey 08809-4000	(908) 730-5295
Edward Hoyt Secretary	North American Environmental Technologies	1101 30th Street, N.W., 4th Floor Washington, DC 20007	(202) 965-6048
Don Huber Manager of Project Engineering	Burns & Roe Enterprises	2812 Old Lee Highway, Suite 135 Fairfax, Virginia 22031	(703) 207-0800
Japhet Isaack Minister Counsellor	Embassy of the Republic of Namibia	1605 New Hampshire Avenue, N.W. Washington, DC 20009	(202) 986-0540
Robert Jackson Program Manager	Roberts & Schaefer Company	2790 Mosside Boulevard Monroeville, Pennsylvania 15146	(412) 373-8020
L. Wally Jacobson Director	POWER INTERNATIONAL	250 Northwest Boulevard Suite 206 Coeur d'Alene, Idaho 83814	(208) 664-6400
Michael L. Jones Associate Director	UND / Energy & Environmental Research Center	P.O. Box 9018 Grand Forks, North Dakota 58202-9018	(701) 777-5000

REGISTRATION

Name	Company	Mailing Address	Telephone
Ronald H. Jones Director, International Systems Sales	ABB Combustion Engineering Systems	1000 Prospect Hill Road Windsor, Connecticut 06095	(203) 285–9252
Len M. Jornlin Manager, Trade and Investment Programs	U.S.–ASEAN Council	1400 L Street, N.W. Suite 375 Washington, DC 20005–3509	(202) 289–1911
Larry Joseph Program Manager, FE–222	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20858	(301) 903–9450
Wojciech Jozewicz Program Area Manager	Acurex Environmental Corporation	P.O. Box 13109 Research Triangle Park, North Carolina 27709	(919) 541–3662
Roddie R. Judkins Fossil Energy Program Manager	U.S. Department of Energy	Oak Ridge National Laboratory 1 Bethel Valley Road P.O. Box 2008 Oak Ridge, Tennessee 37831–6084	(615) 574–4572
Bob Kane Program Manager, FE–4	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–4753
Christopher Kane Principal	ER3, Inc.	1710 Rhode Island Avenue, N.W. Washington, DC 20036	(202) 659–0593

REGISTRATION

Name	Company	Mailing Address	Telephone
Dan Kaplan	King Publishing	627 National Press Building Washington, DC 20045	(202) 662-9743
Michael H. Kappaz Chairman & CEO	K&M Engineering & Consulting Corporation	2001 L Street, N.W. Washington, DC 20036	(202) 728-0390
Olga Karasinska Director, Eastern European Desk	STRONSKA	1 San Fernando Way San Francisco, California 94127	(415) 681-8882
Susan Keightley	Technology & Management Services, Inc. (TMS)	18757 N. Frederick Road Gaithersburg, MD 20879	(301) 670-6390
Frank A. Kelleher Director, Government Affairs	Foster Wheeler USA Corporation	1701 Pennsylvania Avenue, N.W. Washington, DC 20006	(202) 298-7750
James M. Kelly Managing Partner	Rosebud SynCoal Partnership	P.O. Box 7137 Billings, Montana 59103	(406) 252-2277
Dolores M. Kern Director, Research & Development	National Coal Association	1130 17th Street, N.W. Washington, DC 20036	(202) 463-2625
Everett Kidder Manager, Technology Transfer	Tennessee Valley Authority	1101 Market Street (CST17A) Chattanooga, Tennessee 37402	(615) 751-2827

REGISTRATION

Name	Company	Mailing Address	Telephone
Fred L. Kinsinger Manager, PFBC Projects	Babcock & Wilcox	20 S. Van Buren Avenue P.O. Box 351 Barberton, Ohio 44203-0351	(216) 860-6240
David E. Kluttz Engineering Manager	Duke Engineering & Services, Inc.	230 South Tryon Street P.O. Box 1004 Charlotte, North Carolina 28201-1004	(704) 382-2798
Jonathan Kohn	KFx, Atlantic Partners	901 N. Stuart, Suite 750 Arlington, Virginia 22203	(703) 524-0500
Lester Koransky International Economist	U.S. Department of Labor	200 Constitution Avenue, N.W. Room S-5317 Washington, DC 20210	(202) 219-6201
Jacob Korenberg Vice President	Donlee Energy Systems	693 North Hills Road York, Pennsylvania 17402	(717) 755-0020
Wafik A. Kouchouk Vice President	Stone & Webster International Corporation	245 Summer Street Boston, Massachusetts 02210	(617) 589-7541
Elena Kouznetsova	Viking Systems International	2070 William Pitt Way Pittsburgh, Pennsylvania 15238	(412) 826-3355
Harold A. Kulberg Manager of Technology	Black & Veatch/Pritchard Corp.	10950 Grandview Drive Overland Park, Kansas 66210	(913) 661-6017

REGISTRATION

Name	Company	Mailing Address	Telephone
Thomas A. Laboon Senior Program Manager	RADIAN Corporation	2455 Horsepen Road, Suite 250 Herndon, Virginia 22071	(703) 713–1512
Susan D. Laczko International Program Coordinator	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 922–Mezz Pittsburgh, Pennsylvania 15236–0940	(412) 892–6145
Kenneth Langer Manager, Energy & Environmental Infrastructure	U.S.–Asia Environmental Partnership	1133 20th Street Washington, DC 20036	(202) 835–0333
Francis S. Lau Assistant Vice President, Process Development	Institute of Gas Technology	3424 S. State Street Chicago, Illinois 60616	(312) 949–3692
T.K. Lau Program Officer, PO–70	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–9249
Dennis Leaf Chief, Evaluation & International Section, Acid Rain Division	U.S. Environmental Protection Agency	401 M Street, S.W. (6204 J) Washington, DC 20460	(202) 233–9129
Jean Lerch Office of Fossil Energy	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–7320

REGISTRATION

Name	Company	Mailing Address	Telephone
Anthony Liccardi Vice President, Environmental Programs	Viking Systems International	101 Chestnut Street Gaithersburg, Maryland 20877	(301) 975–0035
Tom Lillestolen Senior Technology Manager	ABB Environmental Systems	1400 Centerpoint Boulevard Knoxville, Tennessee 37932–1966	(615) 694–5374
M. Linda Lin Marketing Manager, Asia	Nalco Fuel Tech	One Nalco Center Naperville, Illinois 60563	(708) 305–2038
George Litman, III Project Manager for Export Assistance, PO–8	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–4344
Hua Liu Minister–Councilor	Chinese Embassy	2300 Connecticut Avenue, N.W. Washington, DC 20008	(202) 328–2531
Reinier Lock Of Counsel	LeBoeuf, Lamb, Greene & MacRae	1875 Connecticut Avenue, N.W. Washington, DC 20009–5728	(202) 986–8024
Ronke Luke–Boone Engineer	Resource Dynamics Corporation	8605 Westwood Center Drive McLean, Virginia 22102	(703) 356–1300
James MacArthur Vice President	Hydrocarbon Research, Inc.	100 Overlook Center Suite 400 Princeton, New Jersey 08540	(609) 987–3012

REGISTRATION

Name	Company	Mailing Address	Telephone
Bonn Macy Senior Energy Economist	Halliburton NUS Environmental Corporation	910 Clopper Road Gaithersburg, Maryland 20878	(202) 328–3047
Harvey Major Program Manager, EE–542	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–2238
Ann Marie Maloney	Overseas Private Investment Corp.	1100 New York Avenue, N.W. Washington, DC 20527	(202) 336–8606
Sharon K. Marchant Business/Financial Advisor	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 920 Pittsburgh, Pennsylvania 15236–0940	(412) 892–6008
James Marchetti Senior Vice President	H. Zinder & Associates	1828 L Street, N.W. Washington, DC 20036	(202) 862–3411
Patrick McClear Development Associate	W.R. Grace & Company – Conn.	7379 Route 32 Columbia, Maryland 21046	(410) 531–4176
John L. McCormick President	Energy Policy Center	P.O. Box 1893 Shepherdstown, West Virginia 25443	(304) 876–1536
Jay McCrensky Executive Director	International Private Energy Association (IPEA)	2 Wisconsin Circle, Suite 1030 Chevy Chase/Washington, DC 20815	(301) 656–2222
Robert D. McFarren Manager–International Programs	Stone & Webster Engineering Corp.	1201 Connecticut Avenue, N.W. Suite 850 Washington, DC 20036–2605	(202) 466–7415

REGISTRATION

Name	Company	Mailing Address	Telephone
Barbara N. McKee Special Assistant , Office of Deputy Assistant Secretary for Coal Technology, FE-20	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(301) 903-4497
Mike McKelvy Project Engineer	CQ Inc.	One Quality Center P.O. Box 280 Homer City, Pennsylvania 15748-0280	(412) 479-6030
Charles A. McMenamy Program Manager, Solid Fuel Combustion	Donlee Energy Systems	693 North Hills Road York, Pennsylvania 17402	(717) 755-1081, ext. 209
Stephen A. Meleski Policy Analyst	Argonne National Laboratory	955 L'Enfant Plaza, S.W. Suite 6000 Washington, DC 20024-2168	(202) 488-2434
Lawrence E. Mercando Director of Technology	Kennecott Corporation	10 East South Temple Salt Lake City, Utah 84147	(801) 322-7021
E. Stephen Miliaras Managing Director	Energotechnology Corporation	497 Massachusetts Avenue Cambridge, Massachusetts 02139	(617) 492-3700
C. Lowell Miller Associate Deputy Assistant Secretary for Clean Coal, FE-22	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(301) 903-9451

REGISTRATION

Name	Company	Mailing Address	Telephone
George L. Miller	Virginia Department of Economic Development	P.O. Box 798 Richmond, Virginia 23206-0798	(804) 371-0629
Jonathan J. Milley Associate	K&M Engineering and Consulting Corporation	2001 L Street, N.W., Suite 500 Washington, DC 20036	(202) 728-0390
Jack Mingus	Clean Coal Technology Coalition	1050 Thomas Jefferson Street, N.W. Washington, DC 20007	(202) 298-1897
James Moll Senior Consultant	Resource Dynamics Corporation	450 San Antonio Road Suite 19 Palo Alto, California 94306	(415) 494-2850
Steve Montafia President	Applied Energy Consultants Corporation	4237 Berry Road Gainesville, Virginia 22065	(703) 754-7849
Manuel C. Montenegro Second Secretary	Brazilian Embassy	3006 Massachusetts Avenue, N.W. Washington, DC 20008	(202) 745-2750
Harry T. Morehead New Program & Development Manager	Westinghouse Electric Corporation	4400 Alafaya Trail MC381 Orlando, Florida 32826-2399	(407) 281-3322
Susan Moya Manager, Domestic Government Affairs	Asea Brown Boveri, Inc.	1101 15th Street, N.W., Suite 500 Washington, DC 20005	(202) 429-6872

REGISTRATION

Name	Company	Mailing Address	Telephone
Dona T. Mularkey AAAS Diplomacy Fellow	U.S. Agency for International Development (AID)	515 22nd Street Washington, DC 20523	(202) 674-3690
Sumie Nakayama Visiting Researcher	Massachusetts Institute of Technology	1 Amherst Street, E40-472 Cambridge, Massachusetts 02139	(617) 253-7828
David P. Nance Geologist/Technical Services Coordinator	Midwest Environmental Industries, Inc.	P.O. Box 8, State Road 64 East Winslow, Indiana 47598	(812) 789-2230
Bradley J. Nelson Director, Engineering	NRG Energy, Inc.	1221 Nicollet Mall Suite 731 Minneapolis, Minnesota 55403-2445	(612) 373-5406
Sen Nieh Professor and Director, Combustion Laboratory	Catholic University of America	620 Michigan Avenue, N.E. Washington, DC 20064	(301) 989-2337
Paul S. Nolan Senior Technical Consultant	Babcock & Wilcox	20 S. Van Buren Avenue P.O. Box 351 Barberton, Ohio 44203	(216) 860-1074
Gurgen G. Olkhovsky Director	All-Russia Thermal Engineering Institute	14/23, Avtozavodskaya Street 109280 Moscow, Russia	275-34-83
Showa Omabegho President	Joint Venture Services, Inc.	14 Cornwall Drive Newark, Delaware 19711	(302) 456-9704

REGISTRATION

Name	Company	Mailing Address	Telephone
Earl R. Osterstock Manager, Commercial Development	Air Products & Chemicals, Inc.	7201 Hamilton Boulevard Allenton, Pennsylvania 18195	(215) 481–5574
Kirit G. Parikh Senior Vice President	K&M Engineering and Consulting Corporation	2001 L Street, N.W. Suite 500 Washington, DC 20036	(202) 728–0390
John Patten Program Manager	Vortec Corporation	3770 Ridge Pike Collegeville, Pennsylvania 19426	(610) 489–2255
Anton D. Paul Senior Engineer	Science Applications International Corporation	7600–A Leesburg Pike Falls Church, Virginia 22043	(703) 734–4346
William C. Peters Program Manager	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940, M/S 922 Pittsburgh, Pennsylvania 15236–0940	(412) 892–4802
Gary Philo Energy & Natural Resources Specialist	Illinois Department of Energy & National Resources	325 W. Adams, Room 300 Springfield, Illinois 62704	(217) 782–6091
J. L. (Bud) Piland Manager, Government Programs	Babcock & Wilcox	1850 K Street, N.W. Suite 950 Washington, DC 20006	(202) 833–7029

REGISTRATION

Name	Company	Mailing Address	Telephone
John E. Plunkett Manager, Scientific and Engineering Services	EG&G Technical Services of West Virginia	990 Elmer Prince Drive Morgantown, West Virginia 26505–3276	(304) 599–5941
Ravi Prakash Counsellor (Science)	Embassy of India	2536 Massachusetts Avenue, N.W. Washington, DC 20008	(202) 939–9803
Jeffrey P. Price President	Resource Dynamics Corporation	8605 Westwood Center Drive Vienna, Virginia 22182	(703) 356–1300
Andrzej Rabczenko Counsellor of Scientific Technological Office	Polish Embassy	2640 16th Street, N.W. Washington, DC 20009	(202) 234–3800
Rajagopalan Ramesh	Science Applications International Corporation (SAIC)	7600–A Leesburg Pike Falls Church, Virginia 22043	(703) 821–4653
Nagaraja Rao Assistant Technical Manager	Burns & Roe Services Corporation	P.O. Box 18288 Pittsburgh, Pennsylvania 15236	(412) 892–6488
John Rezaiyan Program Manager	K&M Engineering & Consulting Corporation	2001 L Street, N.W. Washington, DC 20036	(202) 728–0390
Kristin D. Robl Legislative Professional	Clean Coal Technology Coalition	c/o Van Ness & Feldman 1050 Thomas Jefferson Street, N.W. 6th Floor Washington, DC 20007	(202) 298–1813

REGISTRATION

Name	Company	Mailing Address	Telephone
Leonard J. Rogers Senior Energy Manager	U.S. Agency for International Development	320 21st Street, N.W., #4440, NS Washington, DC 20523–0053	(202) 647–8274
Peter L. Rozelle Vice President	EFH Coal Company	P.O. Box 669 Mars, Pennsylvania 16045	(412) 452–8850
Lynn N. Rubow Project Manager	Gilbert/Commonwealth, Inc.	P.O. Box 1498 Reading, Pennsylvania 19603	(215) 775–2600
Milan Ruzicka	Journal of Commerce	7901 Sycamore Drive Falls Church, Virginia 22042	(202) 838–6122
Guy Saint–Jacques Counsellor (Energy)	Canadian Embassy	501 Pennsylvania Avenue, N.W. Washington, DC 20001	(202) 682–7741
Jack Saluja President	Viking Systems International	2070 William Pitt Way Pittsburgh, Pennsylvania 15238	(412) 826–3355
Dale K. Schmidt IGCC Product Manager	U.S. Department of Energy	Morgantown Energy Technology Center 3610 Collins Ferry Road Morgantown, West Virginia 26507	(304) 291–4359
William Schoofs	Resource Dynamics Corporation	8605 Westwood Center Drive Vienna, Virginia 22182	(703) 356–1300
H.C.E. Schreurs M.Sc.	NOVEM BV	P.O. Box 17 6130 AA Sittard, The Netherlands	(31) 46–595 314

REGISTRATION

Name	Company	Mailing Address	Telephone
Bohdan M. Senyk Vice President, Business Development	ABB SUSA, Inc.	1100 Cornwall Road Monmouth Junction, New Jersey 08852	(908) 422-2127
Marcela Serrato de Trevino Representative	Embassy of Mexico	1911 Pennsylvania Avenue, N.W. Washington, DC 20006	(202) 728-1614
Grant Shields Program Manager Emission Control	Bechtel Power Corporation	801 Washingtonian Boulevard Gaithersburg, Maryland 20878-5356	(301) 417-4765
Jack S. Siegel Acting Assistant Secretary for Fossil Energy	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586-1650
Robert Simon	Committee on Energy & Natural Resources	U.S. Senate Washington, DC 20510	(202) 224-9201
Jana Simonova Second Secretary	Czech Embassy	3900 Spring of Freedom Street, N.W. Washington, DC 20008	(202) 363-6315
John F. M. Sims Vice President Marketing	Usibelli Coal Mine, Inc.	122 First Avenue, Suite 302 Fairbanks, Alaska 99701	(907) 452-2625
Michael T. Skinker Attorney, GC-14	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586-6667

REGISTRATION

Name	Company	Mailing Address	Telephone
Adam Smiarowski Professor	Catholic University of America	Michigan Avenue Washington, DC 20064	(202) 319–5879
John Smigelski Principal Engineer	New York State Electric & Gas Corporation	Corporate Drive Kirkwood Industrial Park P.O. Box 5227 Binghamton, New York 13902–5227	(607) 762–8688
Charles Smith	Electrotek	2111 Wilson Boulevard Suite 323 Arlington, Virginia 22201	(703) 351–4492
Thomas R. Smith Senior Vice President	J. Makowski Associates	One Bowdoin Square Boston, Massachusetts 02114	(617) 720–7639
Gerry C. Snow Project Development Manager	POWER International	250 Northwest Boulevard, Suite 206 Coeur d'Alene, Idaho 83814	(208) 664–6400
James C. Sorensen Director, Marketing & Development	Air Products & Chemicals	7201 Hamilton Boulevard Allentown, Pennsylvania 18195–1501	(215) 481–7172
Dwain F. Spencer Principal	SIMTECHE	24 Fairway Place Half Moom Bay, California 94019	(415) 726–3617
G. D. Stamoulis Consultant		10613 South Dunmoor Drive Silver Spring, Maryland 20901	(301) 681–4719

REGISTRATION

Name	Company	Mailing Address	Telephone
Greg Starheim Manager, Market Development	General Electric	1 River Road, 273–400 Schenectady, New York 12345	(518) 385–9807
Henry D. Steingass Energy Consultant, Asia Bureau	U.S. Agency for International Development (AID)	Asia/DR/TR/TD/, Room 3214 Washington, DC 20523–0021	(202) 647–3805
Richard Stern Senior Technical Advisor, International Technology Liaison	U.S. Environmental Protection Agency	MD–60 Research Triangle Park, North Carolina 27711	(919) 541–2973
Larry Stevens Regional Manager	Pyropower Corporation	3712 16th Avenue, West Bradenton, Florida 34205	(813) 746–1914
James B. Stewart Vice Provost for Education Equity and Professor of Labor Studies and Industrial Relations	Penn State University	314 Old Main University Park, Pennsylvania 16802	(814) 865–5906
Joseph Strakey Associate Director	U.S. Department of Energy	Pittsburgh Energy Technology Center P.O. Box 10940 Pittsburgh, PA 15236	(412) 892–6124
George Stosur FE–33	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20858	(301) 903–2749

REGISTRATION

Name	Company	Mailing Address	Telephone
Nick Sundt Editor	Energy, Economics & Climate Change	1347 Massachusetts Avenue, S.E. Washington, DC 20003	(202) 547–0850
Steven W. Sussman Director	ABB Lummus Crest Inc.	1515 Broad Street Bloomfield, New Jersey 07003–3096	(201) 893–2231
Masaki Takahashi Project Manager	Electric Power Development Co., Ltd.	15–1, Ginza, 6–chome, Chuo–ku Tokyo 104, Japan	03–3546–9373
Michael Tanca	ABB Combustion Engineering Systems	1000 Prospect Hill Road Windsor, Connecticut 06095–0500	(203) 285–
E. Stratos Tavoulareas	EnTEC	7722 Desdemona Court McLean, Virginia 22102	(703) 506–0422
Mark W. Thompson Director, Government Relations	Morrison Knudsen Corporation	555 13th Street, N.W. Suite 410 West Tower Washington, DC 20004–1109	(202) 638–6355
Anne Troy Attorney–Advisor, GC–34	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20585	(202) 586–1900
Michael A. Trykoski Program Manager Power Plant Systems	Edison Electric Institute	701 Pennsylvania Avenue, N.W. Washington, DC 20004–2696	(202) 508–5168

REGISTRATION

Name	Company	Mailing Address	Telephone
B. Chris Tye Vice President – Sales	Duke/Fluor Daniel	P.O. Box 1011 Charlotte, North Carolina 28201–1011	(704) 329–2713
Thomas J. Tyson President and CEO	Energy and Environmental Research Corporation (EER)	18 Mason Irvine, California 92718	(714) 859–8851
Alfredo J. Valencia Minister Counselor (Economic)	Embassy of Peru	1700 Massachusetts Avenue, N.W. Washington, DC 20036	(202) 833–9860
Robert Vander Molen Manager, Business Development	Combustion Power Company	1020 Marsh Road Menlo Park, California 94025	(415) 324–4744
Sarah Veale Senior Evaluator	U.S. General Accounting Office	111 Massachusetts Avenue, N.W. Suite 201 Washington, DC 20009	(202) 512)–6890
David C. Vogt Manager, Quality Control	Brown & Root, Inc.	P.O. Box 3 (03–662) Houston, Texas 77001–0003	(713) 676–4068
Marian Voicu First Secretary (Economic)	Embassy of Romania	1607 23rd Street, N.W. Washington, DC 20008	(202) 332–4848
John D. Vujevich Controller	Babcock & Wilcox	20 S. Van Buren Avenue Barberton, Ohio 44203	(216) 860–1677

REGISTRATION

Name	Company	Mailing Address	Telephone
Don C. Vymazal Manager, Contract and Government Administration	Pure Air	7540 Windsor Drive Allentown, Pennsylvania 18195	(215) 481-3687
Kathleen Walton Analyst	Merrill Lynch	World Financial Center North Tower, 20th Floor New York, New York 10281-1320	(212) 449-3146
Jon H. Ward Engineer	Science Applications International Corporation (SAIC)	7600-A Leesburg Pike Falls Church, Virginia 22043	(703) 821-4832
Lew Waters PO-63	U.S. Department of Energy	1000 Independence Avenue, S.W. Washington, DC 20858	(202) 586-3900
H. Weisenfeld		7804 Orchard Gate Court Bethesda, Maryland 20817	(301) 469-8817
Wayne Weiss	Black & Veatch	18310 Montgomery Village Avenue Suite 500 Gaithersburg, Maryland 20879	(301) 921-2869
Richard Weissman Staff Economic Analyst	Texaco, Inc.	2000 Westchester Avenue White Plains, New York 10650	(914) 253-4034
Richard A. Wenglarz Senior Staff Research Scientist	Allison Engine Company	P.O. Box 420, Speed Code T14 Indianapolis, Indiana 46206	(317) 230-2185

REGISTRATION

Name	Company	Mailing Address	Telephone
Richard F. Wesner President	Eavenson Auchmuty & Greenwald	Airport Office Park IV 333 Rouser Road Coraopolis, Pennsylvania 15108	(412) 262-5300
Stan Whitney Manager, PFBC Marketing	Babcock & Wilcox	20 S. Van Buren Avenue P.O. Box 351 Barberton, Ohio 44203-0351	(216) 860-1142
Hattie A. Wicks Policy Editor	Coal Tech International/ McGraw-Hill	1200 G Street, N.W., Suite 1100 Washington, DC 20005-3802	(202) 383-2191
John G. Williams EPA, Client Sector Manager	Radian Corporation	2455 Horsepen Road Herndon, Virginia 22071	(703) 713-1500
Jack Williamson Director, Marketing	CORE International, Inc.	1400 K Street, N.W., Suite 910 Washington, DC 20005	(202) 789-4252
John Wills Director, Business Development IPG	Rolls-Royce, Inc.	11911 Freedom Drive Reston, Virginia 22090	(703) 318-9008
Robert P. Wilson Vice President and Director of Combustion and Fuels Technology	Arthur D. Little, Inc.	20 Acorn Park Cambridge, Massachusetts 02140	(617) 498-5806

REGISTRATION

Name	Company	Mailing Address	Telephone
Lawrence I. Wisdom Vice President	Hydrocarbon Research, Inc.	100 Overlook Center, Suite 400 Princton, New Jersey 08540	(609) 987-3017
Richard Wolfe President	Coal Technology Corporation	103 Thomas Road Bristol, Virginia 24201	(703) 669-6515
Marilyn Wolfe	Coal Technology Corporation	103 Thomas Road Bristol, Virginia 24201	(703) 669-6515
Sheldon M. Wool Chairman & CEO	Custom Coals	100 First Avenue, Suite 500 Pittsburgh, Pennsylvania 15222	(412) 642-2625
Barry Worthington Executive Director	U.S. Energy Association	1620 I Street, N.W., Suite 1000 Washington, DC 20006	(202) 331-0415, ext. 3008
Ben Yamagata Executive Director	Van Ness, Feldman & Curtis/ Clean Coal Technology Coalition	1050 Thomas Jefferson Street, N.W. Seventh Floor Washington, DC 20007	(202) 298-1857
Ernest R. Zabolotny Manager, Advanced Technology Projects	Stone & Webster Engineering	245 Summer Street Boston, Massachusetts 02210	(617) 589-2818
Bert Zauderer President	Coal Tech Corporation	P.O. Box 154 Merion Station, Pennsylvania 19066-0154	(215) 667-0442
Sherri Zedd Legislative Consultant Riley Consolidated, Inc.	Neece, Cator, Barnicle & Associates	1050 - 17th Street, N.W., Suite 810 Washington, DC 20036	(202) 887-5599

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