

U N C L A S S I F I E D

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AGENCY FOR INTERNATIONAL DEVELOPMENT

Washington, D.C. 20523

PROJECT PAPER

INDIA: Energy Management Consultation
and Training (EMCAT)
386-0517

Dated: April 26, 1991

U N C L A S S I F I E D

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LIST OF ACRONYMS

ADB	Asian Development Bank
AERD	Alternative Energy Resources Development Project
AID	Agency for International Development
ASSOCHAM	Associated Chambers of Commerce and Industry of India
CDSS	Country Development Strategy Statement
CEA	Central Electricity Authority
CEI	Confederation of Engineering Industry
CO	Office of Controller (USAID)
CTD	Centre for Technology Development
DEA	Department of Economic Affairs (Ministry of Finance)
EAS	Energy Audit Scheme
EEC	European Economic Community
EFEC	Equipment Finance for Energy Conservation Scheme
EMC	Energy Management Centre
EMCAT	Energy Management Consultation and Training Project
ESCO	Energy Service Company
FICCI	Federation of Indian Chambers of Commerce and Industry
GDP	Gross Domestic Product
GOI	Government of India
IBRD	International Bank for Reconstruction and Development (World Bank)
ICICI	Industrial Credit and Investment Corporation of India
IDBI	Industrial Development Bank of India
IIEP	Industrial Energy Efficiency Project (World Bank-funded)
IIT	Indian Institute of Technology
LOP	Life of Project
MIS	Management Information System
MOU	Memorandum of Understanding
OFAP	Operational and Financial Action Plan
PACD	Project Assistance Completion Date
PACER	Program for Acceleration of Commercial Energy Research
PACT	Program for Advancement of Commercial Technology
PDPS	Program Development and Project Support Office (USAID)
PFC	Power Finance Corporation
PIL	Project Implementation Letter
PRC	Project Review Committee
RC	Resources Coordinator
RCO	Regional Contracting Officer (USAID)
RFP	Request for Proposal
SEB	State Electricity Board
SOW	Scope of Work
TA	Technical Assistance
TDE	Technology Development and Enterprise Office (USAID)
USAID/India	AID Mission to India

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete A	Amendment Number _____	DOCUMENT CODE 3
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2. COUNTRY/ENTITY	3. PROJECT NUMBER 386-0517
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4. BUREAU/OFFICE APRE/A	2	9	5. PROJECT TITLE (maximum 60 characters) Energy Management Consultation & Training
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6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 03 31 97	7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY <u>91</u> B. Quarter <u>3</u> C. Final FY <u>96</u>
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8. COSTS (\$000 OR EQUIVALENT \$) =						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	2,043	957	3,000	14,898	5,102	20,000
(Grant)	(2,043)	(957)	(3,000)	(14,898)	(5,102)	(20,000)
(Loan)	(--)	(--)	(--)	(--)	(--)	(--)
Other U.S.	1. _____					
	2. _____					
Host Country		1,000	1,000		6,666	6,666
Other Donor(s)	_____					
TOTALS	2,043	1,957	4,000	14,898	11,768	26,666

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) PSEF	B740	870				3,000	--	15,000	--
(2) ARDN	B170	150				--	--	5,000	--
(3)									
(4)									
TOTALS						3,000	--	20,000	--

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) 840 811 878 852 060 110	11. SECONDARY PURPOSE CODE 750
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12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)							
A. Code	DEL	ENV					
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To improve India's technological and management capabilities for the supply of energy and for the efficiency of its end-use by private industry and other sectors, including agriculture and commerce.

14. SCHEDULED EVALUATIONS Interim MM YY MM YY Final MM YY 04 94 11 96	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
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16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment)

Clearance: CO(A) - William C. Graham *WCG*

17. APPROVED BY	Signature: <i>Walter G. Bollinger</i> Title: Walter G. Bollinger Director, USAID/New Delhi	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W AMENDMENTS, DATE OF DISTRIBUTION Date Signed MM DD YY 04 26 91
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UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

NEW DELHI, INDIA

PROJECT AUTHORIZATION

Country: INDIA
Project: Energy Management Consultation
and Training (EMCAT)
Project No.: 386-0517

1. Pursuant to Sections 103 and 106 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Energy Management Consultation and Training Project (EMCAT) ("Project") for India ("Grantee") involving planned obligations of not to exceed Twenty Million United States Dollars (\$20,000,000) in grant funds over a six year period from the date of authorization, subject to the availability of funds in accordance with the annual OYB allotment process, to help in financing the foreign exchange and local currency costs of the Project. The planned life of the Project is six years from the date of initial obligation.

2. The Project is designed to assist the Grantee by providing financial and technical support to improve technological and management capabilities related to the supply of energy and the efficient utilization of energy by end-users in the Indian private sector. This will be achieved by financing appropriate procurement of Technical Assistance, Training and Equipment to assist the Power Finance Corporation ("PFC") and the Industrial Development Bank of India ("IDBI"), and through them, the State Electricity Boards and private sector firms.

3. The Project Grant Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

A. **Source and Origin of Commodities:** Goods financed by A.I.D. under the Project shall have their source and origin in the United States or, subject to specific prior written A.I.D. approval, in India. Separate purchases in India not exceeding \$5,000 or separate purchases in India not exceeding \$100,000 of goods that were manufactured in the United States do not require specific written approval.

B. **Nationality of Services:** Services financed by A.I.D. under the Project shall be procured from the United States or, provided that the value of individual contracts does not exceed \$250,000, India. All other purchases are subject to the specific written prior approval of A.I.D..

C. **Conditions Precedent:** The Project Grant Agreement shall contain the following Conditions Precedent to the disbursement of funds:

1. **Initial Disbursement of Funds:**

General: Prior to the initial disbursement of Grant funds, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee shall, except as the parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D.:

- a) a written opinion of counsel acceptable to A.I.D. that the Project Grant Agreement has been fully authorized and/or ratified by, and executed on behalf of, the Grantee, and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms; and
- b) a statement of the names of persons who will be acting on behalf of the Grantee, as specified in Section 8.2 of the Project Grant Agreement, and of any Additional Representatives, together with a specimen signature of each person specified in such statement.

2. **The Power Finance Corporation ("PFC") Component:** Prior to first disbursement of the Grant funds, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made for the Power Finance Corporation ("PFC") component of the Project, the PFC shall furnish directly to A.I.D., in form and substance satisfactory to A.I.D. except as the parties may otherwise agree in writing:

- a) a copy of a duly executed Loan Agreement, certified to be true and correct copy of original, between PFC and either the International Bank for Reconstruction and Development (IBRD) or the Asian Development Bank (ADB) providing assistance to PFC for a project concerning investment in the electric power sector;
- b) evidence that PFC has designated an Officer-in-Charge for managing the Project, at the level of Manager or higher, and such other personnel as the PFC determines are necessary to implement Project activities; and
- c) evidence that PFC has established procedures for contracting, commodity procurement, accounting and payment verification.

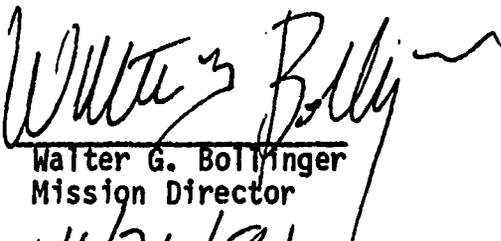
3. **The Industrial Development Bank of India ("IDBI") Component:**
Prior to first disbursement of Grant funds, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for the Industrial Development Bank of India ("IDBI") component of the Project, the IDBI shall furnish directly to A.I.D., in form and substance satisfactory to A.I.D. except as the parties may otherwise agree in writing:
 - a) evidence that IDBI has designated an Officer-in-Charge for managing the Project, at the level of Manager or higher, and such other personnel as the IDBI determines are necessary to implement Project activities.

4. **Subsequent Disbursement to PFC:** Prior to disbursement of project funds to PFC for assistance to any State Electricity Board (SEB), an Operational and Financial Action Plan (OFAP), duly approved by PFC, will be required of that SEB. Exceptions to this are: (1) Project funds may be provided for the preparation of an OFAP or for an environmental analysis related to the preparation of such an OFAP, subject to prior written approval by A.I.D.; (2) Project funds may be provided for short-term technical assistance and training for any SEB as determined necessary by PFC; and (3) other exceptions as the parties may agree in writing.

- D. **Covenants:** The Project Grant Agreement shall contain the following Covenants:
 1. **The PFC** shall maintain in operation for the life of the Project, the procedures established for contracting, commodity procurement, accounting and payment verification.
 2. **The PFC** will create and maintain in operation for the life of the Project, a Project Review Committee (PRC), chaired by PFC, to provide overall guidance to and approve all major Project activities pertaining to the PFC component of the Project. The membership and the operational procedures for the PRC will be developed by the PFC in consultation with A.I.D.
 2. **The PFC** will prepare Annual Plans for implementation of the Project and utilization of the A.I.D. Grant funds pertaining to the PFC component of the Project. Such Annual Plans will be reviewed and approved by the PRC prior to submission by PFC to A.I.D. for concurrence.
 3. **The IDBI** will create and maintain in operation for the life of the Project, a Project Review Committee (PRC), chaired by IDBI, to provide overall guidance to and approve all major Project activities pertaining to the IDBI component of the Project. The membership and the operational procedures for the PRC will be developed by the IDBI in consultation with A.I.D.

4. The IDBI will prepare Annual Plans for implementation of the Project and utilization of the A.I.D. Grant funds pertaining to the IDBI component of the Project. Such Annual Plans will be reviewed and approved by the PRC prior to submission by IDBI to A.I.D. for concurrence.
5. Both the PFC and the IDBI:
 - a) will make all training, and receipt of all technical assistance, under the Project available to their personnel without regard to gender; and
 - b) will exercise every reasonable effort to require that each of their personnel or other government personnel trained under the Project shall work in activities related to the Project or in activities approved for financing under the Project Grant Agreement, in India, for not less than three times the length of his or her training program.
6. A.I.D., the IDBI and the PFC will jointly establish an Evaluation Program as part of implementation of the Project. Except as the parties may otherwise agree in writing, the program will include, at one mutually agreed point during the implementation of the Project, a mid-term evaluation, and a final evaluation before the end of the Project.

Signature:


Walter G. Bollinger
Mission Director

Date:

04/26/91

1. SUMMARY AND RECOMMENDATION

1.1. Project Objectives and Description

1.1.1. The Energy Management Consultation and Training (EMCAT) Project set forth in this Project Paper is a U.S. \$20 million grant to the Government of India (GOI) over six years. The purpose of the Project is to improve India's technological and management capabilities for the efficient supply of energy and for the efficiency of its end-use of energy by private industry and other sectors. EMCAT will use three avenues to improve both the supply side and the demand side of the energy equation.

1.1.2. First, in order to provide a more assured and reliable supply of electric power, EMCAT will assist the GOI Power Finance Corporation (PFC) to effectively lead the electric utilities, in particular the State Electricity Boards (SEBs), to operate according to sound technical standards and economic principles, such as in pricing of power both purchased and sold, so that they can supply power on a more efficient, reliable and sustainable basis to Indian industry, other sectors, such as agriculture and commerce, and household users. The Project will also help utilities to obtain equipment and access such energy services as engineering and audit consultancies from private Indian and U.S. sources to improve their management, planning and productivity.

1.1.3. Second, working on the policy side, EMCAT will promote open markets in the supply and purchase of power so that Indian industrial, agricultural and commercial enterprises meet their needs. Aid to private enterprises will enable them to obtain energy services and equipment from private U.S. and Indian suppliers for the creation of cogeneration capacity.

1.1.4. Third, working through the Industrial Development Bank of India, (IDBI), EMCAT will help private industrial, agribusiness, and commercial enterprises to improve management and to install new systems to decrease energy consumption through services and equipment purchased from private U.S. and Indian sources.

1.1.5. By contributing to more efficient supply and use of energy, the EMCAT Project will help reduce pollution, particularly in India's cities, which are among the most polluted in the world.

1.1.6. Project inputs, to be provided to the PFC, SEBs (through the PFC), IDBI, and private sector enterprises and business associations (through the IDBI) include: technical assistance, training, commodities, and studies. These inputs will be provided from both U.S. and Indian private suppliers, primarily through two comprehensive direct AID contracts, one for the energy end-use component under IDBI, and the other for the energy supply component under PFC. A summary budget for the Project follows.

<u>Project Inputs</u>	<u>USAID</u> <u>(\$000)</u>	<u>GOI</u> <u>(\$000 equivalent)</u>
<u>1. Power Supply Component (PFC)</u>		
Technical Assistance & Studies	6,443	1,222
Training	4,961	2,159
Commodities	825	63
Project Admn. (evaln., etc.)	191	507
Inflation & Contingencies	1,580	715
 Total	 14,000	 4,666
<u>2. Energy End-use Component (IDBI)</u>		
Technical Assistance & Studies	2,833	1,104
Training	573	133
Commodities	1,846	471
Project Admn.(evaln., etc.)	150	18
Inflation & Contingencies	598	274
 Total	 6,000	 2,000
 Grand Total	 20,000	 6,666

1.2. Grantee and Executing Agencies

1.2.1. The grantee will be the Government of India. The Project Agreement will be jointly signed by the Department of Economic Affairs of the Ministry of Finance, the PFC and the IDBI. Project Review Committees will be established for both sides of the project to obtain views from other key participants in the energy sector, including representatives from the GOI Department of Power, the private sector, and USAID/India.

1.3. Project Review

1.3.1. The PID for this Project was conditionally approved by AID/W in State Cable 168598, dated May 24, 1990, a copy of which is included in Annex B. In an exchange of cables the Mission responded to the issues raised by AID/W, and it was given delegation to authorize the Project in State Cable 278357, dated August 20, 1990 (see cables in Annex B). A Congressional Notification for the Project expired without objection on March 19, 1991 per State Cable 088720 dated March 20, 1991.

1.3.2. Major issues raised during AID/W and USAID/India review included: a) criteria for selecting SEBs to receive project assistance; b) criteria for approval of SEB Operational and Financial Action Plans, which are expected to serve as the PFC's major tool in providing finance to SEBs; c) role of the private sector in electric power generation; and d) contracting methods for the Project and GOI procurement. As discussed in the cables in Annex B, these issues have been resolved and incorporated into the project design.

1.4. Findings and Recommendation

1.4.1. The design team has examined the technical, administrative, financial, economic, and social implications of the project's activities. The findings from these analyses have been incorporated into the project design, and all project activities are considered feasible and beneficial.

1.4.2. A grant in the amount of \$20.0 million over a six-year period commencing April 1991 should be authorized to the Government of India for execution of the EMCAT Project subject to the Conditions and Covenants set forth in Section 7.

2. PROJECT RATIONALE AND DESCRIPTION

2.1. Overview

2.1.1. India enjoyed substantial growth in both industrial output and GDP during the 1980s due primarily to a liberalization of GOI policies toward private enterprise. However, the Indian economy overall and the industrial sector in particular, would have performed even better if it were not for an inadequate and unreliable supply of electric power. According to industrialists, the major problem in improving performance is the inadequacy of the power supply. Although India's power systems have an installed capacity of over 64,000 MW and provided 250,000 GWh of energy in 1989, shortages equivalent to about 17% of peak demand and 8% of overall energy demand have persisted. In the past few years these power shortages have been coupled with the poor quality of delivered power in both frequency and voltage and untimely nature of much of the load shedding. These problems have seriously eroded the profitability and operational productivity of the industrial sector and have had a generalized adverse effect on the commercial sector. The Federation of Indian Chambers of Commerce and Industry (FICCI), a key association representing private sector interests, has estimated that total production losses in 1983-84 were equivalent to approximately \$2.7 billion in 1987 prices or about 1.5% of GDP. An indicator of the severity of the supply constraint is that, to safeguard against power cuts, Indian industrial and commercial establishments frequently resort to the installation of inefficient, high-cost diesel generators and captive power plants. Private captive generation is estimated at about 12% of the public supply of electrical energy.

2.1.2. Electricity consumption has been growing at a rate of approximately 9% per annum and is projected to continue expanding at that rate through the year 2000. The GOI plans to install an additional 80,000 MW of capacity by the year 2000 in an effort to meet the greater demand to improve supply quality, and to continue rural electrification. If this augmentation is actually effected, it would cost about \$150 billion and claim between 25% and 30% of total allocations under the Eighth and Ninth Plans (compared to about 20% under the Seventh Plan).

2.1.3. While lack of capital is an acknowledged constraint in building new power production capacity, more fundamental problems in India's production of electric power exist:

- Thermal plant availability is 10-15% lower than norms elsewhere in Asia;
- Power transmission and distribution losses average a high 19% (versus 10% in Thailand, 6% in South Korea).

2.1.4. About 93% of all electric power in India (not including captive generation) is produced by public utilities -- 19 SEBs and a few other national, regional and state utilities. In 1988-89, excluding subsidies, all but one SEB incurred financial losses.

2.1.5. The poor performance of SEBs is largely due to inefficient management and poor planning practices as well as old and obsolete machinery and equipment. An additional problem is the politically motivated fixing of consumer prices for power at often subsidized levels by state officials. The SEBs' ability to avoid financial losses and invest in new technology is consequently reduced. The organizational morale of the SEBs is low because increased sales do not bring higher profits but rather greater losses.

2.1.6. A major constraint to obtaining the maximum effective supply from India's electric power sector has been and will continue to be the imbalance in sector development: between an expansion of (primarily Government-owned) generation capacity but limited attention to improvement of operations; rehabilitation of existing generation, transmission and distribution facilities; and management of load demand. This traditional Indian approach to power planning has long been in need of reform; consideration must be given to the system as an integrated whole.

2.1.7. Only recently the GOI and, to a far lesser degree, the SEBs have begun to realize that the power deficit problem could be addressed at a fraction of the cost of government-financed supply expansion by taking a systems approach. The GOI and SEBs are beginning to realize that a revised strategy, particularly on the part of the SEBs, should include: a) reducing the need for expand generation capacity through improved management, modernization and rehabilitation of power systems; and b) revising pricing policies to make both private power generation/cogeneration and consumer energy conservation measures financially attractive.

2.1.8. PFC Power Supply Component: In recognition of this supply-side problem, the GOI has created the Power Finance Corporation, which it expects to be a major source of both financing and, through EMCAT, technical assistance/training/studies, for the rehabilitation of existing facilities and the construction of new facilities for power generation, transmission, and distribution. PFC is expected to assist cooperating SEBs in their preparation of Operational and Financial Action Plans and to lend only to those SEBs with approved OFAPs. For the first time, the GOI will be injecting an important element of conditionality into its financing for the electric power sector. In reviewing and approving OFAPs, the PFC will examine financial, operational, environmental, and private sector factors.

2.1.9. The role of the OFAP is crucial in rationalizing operation of the SEBs and, indeed, in the entire evolution of the generation, transmission and distribution system, since the previous lack of reasonable economic and solid technical bases for operation of the SEBs has made viable and self-sustaining power sector impossible to achieve.

2.1.10. The World Bank, Asian Development Bank (ADB), and policy planners at the national level intend to utilize PFC to influence the electric power policies of the SEBs by channelling all of their future power sector lending through it.

2.1.11. To accomplish its work, PFC will need assistance, both in developing its own organization and in providing assistance either from its own staff or through consultant recruitment, to the SEBs in their preparation of OFAPs. PFC anticipates relying on consultants to assist in examining existing generation plants and completing hydroelectric surveys. In response to a request from the PFC, World Bank, and ADB, AID will finance most of PFC's technical assistance, training and studies and a portion of the SEBs' related needs through the PFC.

2.1.12. Policy reforms will be promoted by dialogue at the national and state levels. Such issues as pricing of power, both purchased and sold, the role of the private sector, etc., will be examined by policy studies, workshops and seminars. This dialogue will be held not only among AID, the World Bank, ADB and GOI but, equally important, between the Indian private sector and the GOI. EMCAT will directly support the latter dialogue by assisting Indian business and industrial associations.

2.1.13. IDBI Energy End-use Component: The power availability problem on the supply side is matched by a major problem on the demand side: high levels of energy consumption by the Indian economy, which is one of the least energy efficient of the world's major economies. When compared with international best-practice, the scope for energy savings, particularly in Indian industry, is approximately 20%, a considerable portion of which could consist of the implementation of relatively simple, low cost, and rapid payback measures.

2.1.14. Among the constraints that inhibit the adoption of technologies and practices to improve energy conservation/efficiency are: lack of energy audit, engineering and other consultancy services; outdated process and product technologies; and inadequate domestic manufacture and supply of energy-efficiency devices and systems.

2.1.15. Although some energy conservation/efficiency services have been offered by both parastatal organizations and industry associations, these services suffer from certain common drawbacks:

- Generally only preliminary energy audits are completed;
- The energy audits suffer from inadequate engineering design and tend to focus on traditional areas (boilers and furnaces) over process-related energy efficiency opportunities;
- The reports are frequently dismissed because they lack a demonstrative on-the-ground effect due to the non-availability of turn-key or implementation services.
- Financial analysis is inadequate;
- Reliable commercial information on equipment suppliers, job contractors, system architectural firms, etc. is not available; and
- No contractual guarantees are included to cover the risks associated with the introduction of energy efficiency systems.

2.1.16. Additional constraints are found in such policy areas as high tariffs on imports of energy conservation/efficiency technologies, although these are slated to be reduced under the 8th 5-Year Plan. Moreover, most SEBs do not have satisfactory policies on the price of power purchased by them. Utilization of the cogeneration approach to energy efficiency is discouraged, and substantial captive generation capacity which could sell energy at a fair price is idle.

2.1.17. The Industrial Development Bank of India and the Industrial Credit and Investment Corporation of India (ICICI), both national-level development finance institutions, are currently planning to strengthen their support for energy efficiency/conservation in industry and commerce. The World Bank is expected to make a major loan under its proposed Industrial Energy Efficiency Project (IEEP) to enable these institutions to expand lending in this area. The World Bank and GOI have also asked various bilateral donors, including USAID/India, to provide technical assistance, training and studies for both the IDBI and the private sector in support of this effort. With EMCAT, USAID is contributing to the technical assistance program of IEEP.

2.1.18. Consideration had been given to extending this AID assistance to ICICI as well, particularly in view of the ongoing AID/ICICI relationship developed in the PACT, PACER, and CTD Projects, but this was ruled out because of the added complexity of dealing with a third institution. In addition, ICICI and IDBI jointly finance most energy-related investments, so EMCAT assistance will indirectly support ICICI lending as well.

2.2. Rationale

2.2.1. Through the EMCAT Project, AID, with a relatively small investment of \$20 million in technical assistance, training, studies and commodities, will not only be able to contribute to improved policy, but will also enhance the effectiveness of much larger investments from the GOI, World Bank, and ADB in the PFC and IDBI. AID is thus presented with a unique opportunity to make, with relatively modest funding, a substantial impact on the modernization and rehabilitation of India's power sector and on the improvement of private industry's energy end-use efficiency and conservation. At the same time EMCAT will promote trade and investment opportunities for U.S. business in India. A further major benefit will be improvements in environmental quality as current inefficient production and wasteful use of energy decline.

2.2.2. Direct beneficiaries of EMCAT, on the demand side, will be the owners, managers and employees of private enterprises which reduce energy consumption and improve energy efficiency. Such enterprises will increase their productivity as a result of having received assistance through the IDBI, private consulting firms and ESCOs to better design, finance, and manage their energy efficiency/conservation investments. Although, these private enterprises will be primarily in the industrial sector, including agribusiness, commerce and other sectors will also be included. The consultancy firms will also benefit directly from training and other assistance provided by EMCAT through IDBI. On the supply side, the direct beneficiaries will be the management and employees of the PFC and SEBs assisted under the Project. Private consulting firms will also benefit as they are called upon, with EMCAT support, to prepare studies for investments in electric power supply.

2.2.3. Indirect beneficiaries will include a wide spectrum of primarily private sector electric power consumers: industrial, commercial, agricultural and residential, who will receive a more reliable supply of electric power. Many of these consumers will be in rural areas. The agricultural sector has become a major consumer of electric power, primarily for irrigation purposes (accounting for 21% of all electric power consumption in 1987); however rural residential consumption is also increasing as 95% of all villages in India now receive some electric power.

2.2.4. The populace as a whole will benefit from goods and services supplied at lower cost, to the extent that the Project helps reduce the cost of energy inputs for production of those goods and services and free market competition causes those reduced costs to be passed on to consumers.

2.2.5. Environmental benefits: Urban populations, in particular, will benefit from less environmental pollution as the Project contributes to lower consumption of coal by promoting more efficient production of power by SEBs and less wasteful consumption by end-users.

2.2.5.1 An unfortunate consequence of India's industrial growth has been environmental degradation and concerns about its possible contribution to global warming. Of 50 major cities around the world monitored by the U.N. Global Environment Monitoring System, New Delhi ranks first in the level of air pollution as measured by quantity of particulate matter (averaging 294 days per year when suspended particulate matter exceeds 23.0 micrograms per cubic meter). Calcutta and Bombay rank fourth and tenth of the fifty.

2.2.5.2 A major cause of air pollution in India is electric power generation; the thermal power sector is India's largest carbon emitter. A study commissioned by USAID/India estimates that under different scenarios, improved energy efficiency by thermal power plants and major industrial energy consumers would result in 15-23% less carbon-emissions by the year 2005 than the base case scenario (see Annex J). EMCAT will contribute to such energy efficiency improvements.

2.3. Relationship of Project to GOI Development Strategy

2.3.1. Since independence, a cornerstone of India's industrial development effort has been massive investment in infrastructure. Infrastructure bottlenecks, however, are a major constraint to economic growth and industrial development. Because energy supply, in particular, has fallen far short of meeting demand, crippling power shortages occur. In an attempt to remedy this chronic shortfall, the GOI has continued to increase sector budgetary allocations; in the FY90/91 budget, for example, expenditures for energy alone account for 31 percent of all government outlays.

2.3.2. In its attempts to reduce the power supply constraint, the GOI has traditionally focussed on increased generation capacity. Recently however, conservation and system efficiency in both generation and end use have taken on greater importance and were accorded "highest priority" in the GOI's newly formulated 8th Five-Year Plan.

2.3.3. In the last decade, the GOI has also begun to appreciate that restrictive policies with regard to the overall role of the private sector in the economy have been a major constraint, not only on private sector industrial development but also on overall economic growth. During that period there has been significant liberalization in the country's industrial policy regime including:

- Granting greater discretionary authority to private enterprises, such as switching product lines or expanding production capacity;
- Lowering entry barriers in a number of industries, thus increasing the intensity of, or creating the opportunity for, competition; and

- Improving the private sector's access to foreign technologies and capital goods for sectors in need of production capacity modernization, thus enhancing productivity and profitability.

2.3.4. In June 1990, the government instituted a new policy designed to encourage investment by private sector firms (domestic and foreign) in the electric power sector. The key aspects of the new policy are: a) private sector firms may own and operate generating stations and sell the output to existing public utilities; b) private sector firms may, in association with existing utilities, own and operate electric distribution companies; c) a rate of return on equity of five percent above the Reserve Bank of India's "specified rate" (comparable to the Federal Reserve's discount rate) will be allowed (the current specified rate is ten percent); d) each license granted will be valid for 30 years; e) companies investing in electric power will be exempt from the Monopolies and Restrictive Trade Practices Act; f) the debt/equity ratio allowed will be four to one, with a stipulation that (i) the promotor's investment must be at least 11 percent and (ii) no more than 40 percent of total investment can be raised from government-owned financial institutions; g) electricity sales to SEBs will be based on a two-part tariff; and h) a single clearance point will be established for processing applications. Both of the major Indian chambers of commerce have endorsed and supported the reforms.

2.3.5. While policy reforms to date have been notable, particularly the opening up of the electric power sector, much more remains to be done. As explained in later sections of this PP, by supporting policy studies and dialogue and by leveraging major funding from the World Bank and ADB, EMCAT will assist India in undertaking further reforms in the energy sector. Ultimately, EMCAT-assisted reforms will make GOI, donor, and private sector investments in power supply modernization and end-use efficiency more attractive.

2.4. Relationship of Project to AID Strategy

2.4.1. The EMCAT project design is in conformity with USAID/India's current CDSS. Increasing the efficiency of energy generation and use in the Indian economy is the Strategy's sector goal. EMCAT will be central to implementing the Mission's recently-submitted Program Performance Budgeting Plan objective in the energy sector: increased commercialization of key energy-efficient technologies and adoption of market-oriented energy policies.

2.4.2. EMCAT supports AID's commitment to open markets. The Project, along with other projects in USAID/India's energy portfolio, will encourage a technologically dynamic open market economy by fostering: a more rapid pace of technology development and adoption; dialogue on energy policy issues of national concern; increased industrial output and competitiveness; professional and institutional linkages between U.S. and Indian energy groups; and U.S. trade and investment. The U.S. trade and investment potential arising from increased investments in energy efficiency promoted by EMCAT are discussed in Annex M.

2.5. AID Energy Projects in India

2.5.1. In the early 1960s USAID/India began its support for energy projects by financing the design and construction of 15 major thermal power projects (at an average cost of about \$40 million each) and several hydro power projects. Later, the \$58 million Rural Electrification Project financed the transmission and distribution of electric power to rural areas. In the 1980s, AID's focus changed to an emphasis on science and technology in the energy development cooperation between the two countries: Technologies for the Rural Poor (386-0465), Alternative Energy Resources Development (386-0474), and Program for Acceleration of Commercial Energy Research (386-0494).

2.5.2. The Technologies for the Rural Poor Project was designed to foster scientific cooperation between U.S. and Indian researchers in non-conventional energy sources, primarily solar energy. A 1984 project evaluation determined that the project enjoyed appreciable success in meeting its science and technology goals.

2.5.3. The Alternative Energy Resources Development Project (AERD) was designed to expand India's technical capacity to develop selected energy technologies to a stage of application. It has addressed the areas of coal technology development, biomass production and energy efficiency. A mid-term evaluation of the project in January 1987 commended the project's progress in the development of energy technologies.

2.5.4. Of particular relevance to EMCAT are the findings of the AERD-sponsored study of the possibilities for cogeneration. The results of the study, which were widely publicized in India, concluded that a significant potential for cogeneration exists: some 4000 MW in the surveyed state of Maharashtra and Gujarat. Progress in implementing cogeneration has been hindered, however, by two barriers, the removal of which will be a key objective of EMCAT: a) absence of a realistic, avoided cost formula in almost all states; and b) inadequate contractual precedents on the wheeling of power by the state utilities.

2.5.5. The Program for Acceleration of Commercial Energy Research (PACER) was approved in August 1987 for \$20 million to promote market-driven energy technology development. The project has had an excellent start and several energy technologies are at various stages of commercial development.

2.5.6. These projects have provided AID the opportunity to work closely with the GOI and the private sector on the problems of technology development and commercialization in the energy sector. Important lessons derived from this experience include:

- Financial intermediaries, such as the IDBI and ICICI, can be effective means for channeling funds to India's private sector for energy-related investment;
- The U.S. has a comparative advantage in energy-related technologies that is highly appreciated in India;
- Given the paucity of AID financial resources relative to the massive costs associated with the construction of power infrastructure, AID projects alone cannot have major impact on India's massive energy sector; but
- There is enormous potential for U.S. trade and investment in India's power sector, in both generation and end-use efficiency; by leveraging other resources, AID project assistance can effectively catalyze that potential.

2.5.7. Activities under PACER will be coordinated with the implementation of EMCAT, to the benefit of both projects, through the membership of ICICI on the IDBI Project Review Committee (PRC), as discussed in Section 4.2.3 below.

2.6. Project Objectives

2.6.1. The goal of EMCAT is to improve the efficiency of energy supply and use in the industrial and other sectors.

2.6.2. The purpose of the Project is to improve India's technological and management capabilities for the supply of energy and for the efficiency of its end use by private industry and other sectors, including agriculture and commerce. EMCAT will do this by working on both the supply side (PFC Component) and demand side (IDBI Component) of the energy equation.

2.6.3. End of Project Status: By the Project Assistance Completion Date (PACD) of March 31, 1997 the EMCAT Power Supply (PFC) Component will have helped to bring about the following:

- A program to modernize and rehabilitate the national power system through the PFC and SEBs;
- GOI and SEB policy reforms that encourage a more reliable supply of power;

- Increased power generation capacity in India through SEB acceptance of power resulting from industrial and commercial cogeneration;
- An improved program supporting substantial volumes of GOI and MDB lending for power supply improvements; and
- Strengthened ties with US technological and management expertise and equipment manufacturing to improve the PFC's and SEBs' capabilities to address electric power supply issues.

2.6.4. By the PACD, the EMCAT Energy End-Use (IDBI) Component will have helped to bring about the following:

- Improvement in the efficiency of energy utilization resulting from motivation of Indian industry to design, manufacture and implement energy-efficient technologies, devices and techniques;
- Strengthened ties with U.S. technological and management expertise to improve the ability of private Indian industry and other sectors to address energy end-use issues;
- Policy reforms that promote adoption of energy-efficient technologies and installation of cogeneration systems by industry and commerce;
- An improved program supporting substantial volumes of GOI and donor lending for installing energy-efficient equipment by industry and other sectors; and
- Increased involvement of business associations in promoting energy conservation and policy reforms.

2.6.5. Project Outputs

2.6.5.1. Power Supply Component

- Operational and Financial Action Plans (OFAPs) prepared and used in all major SEBs;
- 100 key officers of PFC and SEBs trained in analytical and planning techniques (e.g. least cost investment planning);
- 250 PFC and SEB operating personnel trained in such areas as plant modernization, T&D loss reduction techniques, life extension techniques, system improvement, environmental issues, financial analysis, cost accounting and management;
- 20-30 pre-investment and feasibility studies conducted for investment by utilities;

- 10 policy-oriented studies addressing critical issues on power generation completed and disseminated; and
- Plant life extension techniques demonstrated to SEBs.

2.6.5.2. Energy End-Use Component

- Key personnel of 70 private sector engineering consultancy firms trained in energy audits;
- Provision to 50 such firms of diagnostic instruments for conduct of energy audits;
- A minimum of one Energy Service Company (ESCO) formed and operating;
- 3 demonstration units on cogeneration waste heat recovery and utilization established and visited by other industrial and commercial firms;
- Loan portfolio design and appraisal of approximately 60 energy conservation projects, including cogeneration schemes;
- Policy-oriented studies related to end-use efficiency, including barriers to cogeneration and barriers to emergence of ESCOs, conducted and disseminated; and
- 10 business associations strengthened to provide energy services and engaged in promoting policy reforms.

2.7. Project Elements

2.7.1. Power Supply Component: On the supply side of India's energy equation, an estimated \$14 million in AID-funded technical assistance, training, studies, and commodities will be furnished, primarily to and through the Power Finance Corporation. These funds, which will be used for rehabilitating and increasing the efficiency of India's electric power generation, transmission and distribution, will support several hundred million dollars in GOI lending and a World Bank loan of \$265 million to be authorized for similar purposes. In addition, an estimated \$200 million in ADB funding for the PFC for similar purposes is projected for 1991 authorization. Coordination among donor agencies will be established according to the Memorandum of Understanding drafted for this Project, negotiated with the World Bank and ADB, a copy of which is included as Annex K. This coordination is further discussed in Section 4.3.8.

2.7.2. Assistance under this component will be channelled through the Power Finance Corporation as the designated GOI entity for that purpose. EMCAT will sponsor studies and provide technical assistance to the PFC for developing its own organization and for providing assistance to SEBs, either through PFC staff or consultants. EMCAT will also address the training needs of PFC, including, to a limited extent, personnel from the Central Electricity Authority (CEA), and SEBs by providing training both in country and in U.S. for operating personnel. The PFC itself and, through the PFC, the SEBs will receive technical assistance and training in the financial appraisal of projects, as well as assistance in making technical appraisals relevant to efficiency enhancement functions, plant modernization techniques, T&D loss reduction techniques and environmental issues. Finally, the PFC will be supplied limited commodities, such as computer software and hardware and audio-visual equipment, necessary for the improved operations.

2.7.3. Project activities will be concentrated in three main areas: 1) Power Sector Investment Planning; 2) Loan Portfolio Design; and 3) Information Dissemination and Policy Dialogue.

2.7.4. In the area of Power Sector Investment Planning, the project will:

2.7.4.1. Provide technical assistance in the preparation of OFAPs. This will include training of PFC appraisal officers in the appropriate analytical techniques. The PFC program for improving the utilities' operations centers on the OFAPs, which it plans to develop with the State Electricity Boards. The preparation of an OFAP consists of a diagnostic study of an SEB's operations and management, drafting of an action plan which details remedial actions to be taken by the SEB, and a schedule for completing them.

2.7.4.2. Provide training to personnel from the PFC (including the CEA) and the SEBs as appropriate in least cost investment planning methodology, using U.S. as well as Indian institutions. Training will be provided to selected technical staff members, particularly with reference to conservation and environmental concerns, and to management and financial staffs as required. The training will be carried out locally and overseas in a variety of ways, ranging from formal seminars to on-the-job training.

2.7.4.3. Provide training in: financial operations and management; internal financial reporting; establishment and operation of cost accounting systems; and strategic planning. The training in strategic planning will include OFAP preparation, appraisal of capital infrastructure projects, and study of methods to achieve higher system efficiencies.

- 2.7.4.4. Provide training in project appraisal that includes verification of the following: technical and financial soundness of project components, including the financial condition of the utility that sponsors it; the appropriateness of project size and timing; the correctness of cost estimates; the availability of required resources and construction capital; the reasonableness of construction schedules; and the managerial aspects of the project.
- 2.7.4.5. Provide training for increasing power systems efficiencies, i.e. of maximizing the existing power system's productivity, that includes: efficiency improvements in the generating and delivery systems; technical interventions aimed at improving the system infrastructure; and behavioral modifications targeted on operating staffs. Priority areas are increasing power availability through renovation and modernization; reducing transmission and distribution losses by upgrading line specifications and network configurations; utilizing plant life extension techniques based on appropriate and timely maintenance, repair and replacement actions; upgrading overall management of the power system through more sophisticated communication and control techniques; promoting awareness of and sensitivity to environmental issues; and helping stimulate energy conservation by effecting tariff adjustments.
- 2.7.4.6. Assist in the Development of Manuals for use by the PFC in such areas as: project appraisal; OFAP preparation and review; and management information systems (MISs). These Manuals will help ensure consistent application of policies and procedures and provide valuable information to new staff members. Since PFC does not have sufficient staff resources to undertake the preparation of manuals, consultants will be retained to assist in that task. As the PFC gains additional experience, it will codify policies and procedures. It is expected that the PFC will make appropriate portions of these manuals available to the SEBs in order to obtain maximum possible uniformity in the operations of various elements within the Indian power sector. USAID will request the World Bank and ADB to review and comment on all such manuals that are prepared with EMCAT support.
- 2.7.4.7. Help the PFC strengthen its management by providing technical assistance, training and commodities in such areas as establishment of offices for training and procurement, development of MIS, personnel management, contracting, budgeting, and other areas identified during the Project.
- 2.7.4.8. The World Bank and ADB will assist the PFC and USAID in identifying suitable courses for training of PFC and SEB personnel.

- 2.7.5. In the area of Loan Portfolio Design, the Project will:
- 2.7.5.1. Assist in feasibility studies, to be done by private Indian consulting firms with U.S. technical assistance for utility investment.
 - 2.7.5.2. Provide training to PFC and SEB personnel in areas such as power plant modernization, T&D loss reduction, plant life extension, system improvement, environmental issues and cost accounting. As the GOI and PFC will require environmental assessments for investment in power generation, EMCAT will help provide them the capabilities to carry out such assessments.
 - 2.7.5.3. Provide training to assist in the review of existing power generating plants and development of programs for life extension of these plants.
- 2.7.6. In the area of Information Dissemination and Policy Dialogue, the Project will assist the PFC in establishing a Cell for Power Studies. With EMCAT support, the Studies Cell will:
- 2.7.6.1. Sponsor policy and planning studies on topics related to power generation, transmission and distribution, such as implications of pricing and subsidy policies in specific states, and load management based upon time-differentiated rates. Prior to undertaking these studies, USAID, the World Bank and ADB will have the opportunity to review and to comment on the terms of reference. USAID, the World Bank and ADB will also review and comment on the interim and final reports resulting from these studies.
 - 2.7.6.2. Assist in the development and updating of a data base covering such areas as products, technologies, plant and equipment performance, and private consultants.
 - 2.7.6.3. Publish relevant studies, develop audio-visuals (slides, films, videos, etc.); conduct workshops and conferences to disseminate the results of studies and publicize success stories in management, technical innovation, and institutional, financing, incentive structures, etc.
- 2.7.7. Energy End-Use Component: On the demand side, an estimated \$6.0 million in AID-funded technical assistance, training, studies and commodities will be directed primarily to and through the Industrial Development Bank of India. It will assist Indian industrial and other enterprises to increase the efficiency of their energy utilization, in support of a World Bank loan of \$250 million (under IEEP) to be authorized for similar purposes. Donor coordination will be insured primarily by the GOI Energy Management Centre (EMC), under the Department of Power.
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The EMC has been mandated to lead in the area of donor coordination and provision of policy advice to the GOI, and it will be represented on the EMCAT Project Review Committee (PRC) for this component. Further details are given in Section 4.2.3.

2.7.8. IDBI currently operates two programs in the field of energy: the Energy Audit Scheme (EAS) and the Equipment Finance for Energy Conservation (EFEC) Scheme. In collaboration with the planned World Bank Industrial Energy Efficiency Project and with EMCAT support, IDBI will expand these programs and introduce new efforts in energy conservation. IDBI will operate as a facilitator and promoter by reaching out to the Indian private sector.

2.7.9. This component will work in three areas: Private Sector Energy Consulting; Loan Portfolio Design; and Information Dissemination and Policy Dialogue.

2.7.10. In the area of Private Sector Energy Consulting, the following activities will be undertaken:

- 2.7.10.1. Training of energy auditors from private consulting industry. Private consultants providing energy audit services will be selected to receive training in India and the U.S. in order to help upgrade the quality of their consultancy services. They will be trained in detailed analysis of conservation investments, including technical, financial, environmental, and other issues. Auditors will also receive on-the-job training in India: while carrying out actual energy audits, they will be assisted by U.S. consultants.
- 2.7.10.2. Provision of commodities to energy auditors. In conjunction with the energy audit training, the Project will provide specialized diagnostic energy audit instruments for participating in energy audit firms. The instruments will be provided through the existing IDBI scheme, but with some of the cost being borne by EMCAT on a grant basis.
- 2.7.10.3. Support for monitoring energy conservation implementation. EMCAT will assist IDBI to expand its Energy Audit Scheme to provide periodic follow-up monitoring of enterprises that have been audited with IDBI support. This follow-up will help IDBI monitor the enterprises' progress in implementing measures and determine the impact of implementation on energy use. This information will also be valuable for assessing the success of EMCAT.
- 2.7.10.4. U.S. observation visit of IDBI and EMC personnel for ESCO familiarization. Examination of the operation and organization of ESCOs in the U.S. will help the observers understand the various issues involved and gain insight into the possibilities for ESCOs in India.

- 2.7.10.5. Feasibility study on ESCOs and formation of a model ESCO. A study will examine the feasibility of ESCO operation in India with a view to mobilizing the private sector for energy conservation. It will investigate barriers to the formation of ESCOs and will elaborate the precise role and conditions under which they would operate in India. The study will also propose a detailed action plan for IDBI to assist, with EMCAT support, in launching a private ESCO in India. This study also forms part of the proposed World Bank project to be implemented through the Energy Management Centre, and the terms of reference for the study will be framed by IDBI in consultation with EMC. EMCAT will also support the publication and dissemination of the study (such as through workshops) in consultation with the EMC.
- 2.7.10.6. Assuming the study finds the ESCO concept valid and feasible for India, the Project will provide funds for formation of a model ESCO. The study would propose financing modalities, but a good possibility is the "conditional grant" through IDBI (along PACT lines). Under this type of grant, the private firm would finance a part of the costs of establishing the ESCO, and IDBI would grant it the balance of the costs, to be repaid with interest if the venture succeeds. These funds could be used for purchase and installation of equipment, technical assistance and training, and other establishment costs. Any repayments from the successful venture would be programmed by IDBI in support of ESCO development.
- 2.7.11. In the area of Loan Portfolio Design, the following activities will be undertaken:
- 2.7.11.1. Observation visit on cogeneration for IDBI and EMC personnel. IDBI and EMC personnel will take a study tour to observe the progress made and the experience gained in cogeneration in the U.S., as well as the policy measures adopted in the U.S. for promoting cogeneration.
- 2.7.11.2. Study on cogeneration. Building on the work already done in this area by USAID, the World Bank and others, IDBI will sponsor a study to examine impediments to and opportunities for more widespread adoption of cogeneration in India. The study will examine specific changes necessary in policies, tariffs, etc. to identify and implement cost-effective projects. It will develop generic contracts for cogeneration arrangements between cogenerators and grid, power purchase agreements on the basis of avoided costs, etc. Like the ESCO study, this study on cogeneration also forms part of the World Bank project to be implemented by the EMC, and the terms of reference for this study will be prepared by IDBI in consultation with the EMC. EMCAT will also support the publication and dissemination of this study in consultation with the EMC.

- 2.7.11.3. Establishing demonstration units for promoting Cogeneration/Waste-Heat-Recovery. The Project will provide for setting up cogeneration/waste-heat-recovery demonstration units to provide technical personnel from industrial and other sectors an opportunity to observe their operation. The demonstration units will be specifically designed to function in such areas as packaged cogeneration units (100KW to 500KW range) and biomass power generation through cogeneration. The demonstration units will only be put in establishments that are willing to share their experiences with other enterprises on the performance of the units.
- 2.7.11.4. Information dissemination on cogeneration. In conjunction with setting up the demonstration units, a program will be established for dissemination of information on cogeneration by Indian business associations with collaboration of counterpart organizations in the U.S. The program will cover areas such as technical developments related to cogeneration, policy measures, incentives etc., and will serve to inform industries that might wish to produce, as well as use, cogeneration equipment.
- 2.7.11.5. Organization of workshops. In addition, IDBI will organize a series of workshops concerning cogeneration in specific industrial and commercial subsectors where potential for cogeneration is high.
- 2.7.11.6. Study tours and training for industrial and other enterprises. IDBI will organize study tours in the U.S. for senior executives of industrial and other firms to expose them to new developments in energy conservation and cogeneration.
- 2.7.11.7. Preparation of detailed feasibility reports for energy efficiency projects, including cogeneration. Detailed feasibility reports will be required of enterprises proposing energy efficiency projects (including cogeneration) for World Bank/IDBI/ICICI financing in industrial subsectors such as aluminum, mini-steel plants, sugar, pulp and paper, refineries and fertilizers, and such commercial subsectors as hospitals and hotels. These reports will require detailed technical and financial analysis. Approximately 60 feasibility studies are expected to be funded under this element, with EMCAT financing all U.S. consultant costs and 50% of Indian consultant costs.
- 2.7.12. In the area of Information Dissemination and Policy Dialogue, EMCAT will support at least 10 business associations through a grants program administered by IDBI. These grants, at a maximum funding of Rs. 1.0 million each, will fund initiatives proposed by the associations in the area of energy efficiency and conservation.

2.7.12.1. Activities eligible for funding would include:

- Policy studies on energy use by industry and other sectors, such as commerce and agriculture;
- Workshops/conferences/seminars to promote dialogue on policies and other issues concerning energy use;
- Establishment of data bases to be used to facilitate investments in energy conservation;
- Development of audio visual and promotional materials/publicity to increase awareness of energy conservation issues, technologies, etc.; and
- Study tours for increasing awareness about energy conservation technologies and practices. These tours would establish links between Indian and U.S. business associations and provide opportunities for Indian and U.S. business leaders to meet and explore joint ventures in areas promoting energy conservation.

2.7.12.2. The objective of the grants program to the associations is to increase the outreach of EMCAT to Indian business and to promote GOI policy reform by strengthening the existing, considerable dialogue between the GOI and associations on energy issues. By funding grants for proposals made by the associations themselves, EMCAT will thus explicitly account for the diversity of India's numerous business associations, support their interests, and build on their strengths in the energy conservation area.

2.7.12.3. In awarding grants to the associations, IDBI will evaluate their proposals against such criteria as:

- Support for EMCAT energy conservation objectives;
- Coherence of the proposal;
- Feasibility: association's capability to implement the proposed activity and the likelihood of the activity actually leading to significant gains in energy conservation;
- Outreach to enterprises, particularly those in the private sector;
- Potential for the activity to lead to policy dialogue and reform;
- Assured implementation within 2 years;

- Evidence that it funds new initiatives and does not simply substitute for what the association would do anyway; and
- Level of association's commitment to energy conservation and to its proposal to EMCAT, including size of its own contribution to the proposal (in cash and/or kind).

2.7.12.4. Associations that are awarded grants would be responsible to report to IDBI on a semi-annual basis on their progress, problems encountered, and accomplishments.

3. COST ESTIMATE AND FINANCIAL PLAN

3.1 Energy End-use (IDBI) Component

3.1.1. The budget of the IDBI component of the six-year project is estimated to be \$8 million. Of this, AID will provide a grant of \$6 million; the Host Country contribution of \$2 million will be provided by IDBI, the private sector industries, and business associations. The budget estimate of \$8 million includes a physical contingency of \$0.36 million and a price contingency (inflation) of \$0.52 million. The financial plan assumes a 5% physical contingency on all dollar-financed foreign exchange costs. An inflation factor of 8% has been assumed on all dollar-financed foreign exchange costs. No inflation has been used for dollar-financed local currency costs as the financial plan assumes that inflation for such costs will be neutralized by the depreciation in the rupee-dollar parity rates. The AID contribution comprises a Foreign Exchange element of \$3.62 million (60.37%) and a Local currency element of \$2.38 million (39.63%).

3.1.2. Financial Analysis: As shown in Table 1 (Summary of Project Budget by Input Elements), the total project cost of \$8 million is broken down as follows: 49.21% for Technical Assistance, 28.96% for Commodities, 8.83% for In-country & US Training, and 2.10% for Project Evaluation/Audit and Administration. Inflation and Contingencies account for the remaining 10.9%. While provision for contingencies has been made at 5% on the entire base cost, inflation has been reckoned only on the foreign exchange element of the budget at a rate of 8%.

3.1.3. The PP has taken into account the probable devaluation of the Indian Rupee vis-a-vis the U.S. Dollar. An analysis of the past Rupee depreciation trend shows that the Rupee has depreciated on an average of 9.3% annually against the U.S. Dollar over the past three years. Since the expected inflation rate on the local currency costs is likely to equal the expected depreciation rate of the rupee, no inflation has been provided on the dollar-financed local currency costs.

3.1.4. Inflation has been computed by using the average of the inflation rates prevailing between two years, since growth in the rate of inflation from one year to the next will be gradual. Moreover, the expenditure is expected to accrue evenly over any given year. The rate of inflation has been computed by taking the estimated actual rate for the year 1990-91 and then compounding it from year to year to arrive at the rate applicable for each of the six years of the project life. This basis has been used to simulate a realistic effect of inflation on the expenditures. The contingency and inflation together aggregate to 11.9% of the total project cost and are considered reasonable enough to pay for price contingencies and unforeseen costs.

3.1.5. Table 2 (Summary of Project Budget by Project Elements) illustrates the breakdown of the project cost by the specific Project Elements. Loan Portfolio Design accounts for 40.69% of the total cost; Private Sector Energy Consultancy accounts for 30.82%; Information Dissemination and Policy Dialogue accounts for 9.77%; while Project Administration & Evaluation accounts for 7.82%. The remaining 10.9% is accounted for by Contingency & Inflation. The detailed project budget by elements is given in Annex O.

3.1.6. An analysis of the accrual of costs over the life of the project reveals that significant expenditures are scheduled to take place in the second, third, and fourth year. Thus nearly 80% of the project funds will be programmed through the fourth year. The last two years of the project account for 20% of the total project spending. Since the first four years will see a preponderance of project activities, one hopes that the results of these will become perceptible in the final stages of the project (see Table 4 - Projection of Expenditure by Fiscal Year).

3.1.7. Recurrent Cost Analysis: The host country's contribution of \$2 million will be provided by IDBI, private sector firms and business associations. This accounts for 25% of the project cost. Thus the stipulation of Section 110 of the FAA, that the host country must contribute "... at least 25% of the costs of the entire program, project or activity, ..." has been complied with in so far as the costs relate to the program to be implemented by IDBI.

3.1.8. Recurrent costs are defined as the operating expenditures needed to carry out the project activities. The recurrent costs envisaged under this project include salary payments of staff directly/indirectly associated with the implementation of the project, the costs of office space to be provided by IDBI, private firms and associations to carry out identified activities, costs of domestic travel of participants attending seminars, workshops, outreach programs and training courses to be conducted within India, operation & maintenance costs, and costs involved in operating and maintaining the equipment to be procured under the project - especially the cogeneration and energy audit equipment. Since IDBI is an autonomous "for profit" institution, it does not have to seek approval/assistance from any agency of the GOI in planning for its recurring costs.

3.1.9. Since IDBI already has a cell which manages its energy related programs, the recurring costs associated with this project will be provided out of the budgets of that cell. IDBI will also provide floor space and other infrastructural support within its office premises to the staff assigned to manage this project and to related consultants. The maintenance and operating costs of the equipments will be borne by the industrial units which will house/use these equipments, as these equipments will be operated on a commercial basis and will generate

commensurate revenue for these industrial units. The detailed analysis outlined above assures that all the recurring costs estimated will be adequately financed and will not be a hindrance to the successful implementation of the project.

3.1.10. Sustainability: All recurrent costs of the project since the inception will be borne by IDBI, the private firms, and business associations. The overall impact of these costs on their respective budgets will be minimal as most of these costs are already being incurred by these constituents as either fixed annual costs or normal operating costs. Incremental costs attributable to this project are very few and thus will not have any significant impact on their overall cost structure. Thus such minimal impact on the overall budget of IDBI or other agencies involved will not give rise to the recurrent cost problem highlighted by AID's policy paper on recurrent costs.

3.1.11. Audit: IDBI is a financial institution incorporated by an act of the Indian Parliament. It is statutorily required to maintain various books and records. Also, IDBI is required to have its books of accounts audited by a Chartered Accountant (Indian equivalent of a CPA) each year. AID will have access to all IDBI's records of operations pertaining to the project. To assist AID in evaluating the success of the project, IDBI will also periodically provide AID with such information and reports as AID should deem necessary.

3.1.12. The Project Agreement will contain the standard provisions allowing AID reasonable access to project records and accounts. In addition, AID may directly contract for non-federal audits during the course of the project; \$7,000 has been included in the budget for local accounting services for the audits. It should be noted that USAID and the GOI have recently negotiated an agreement to begin using the services of the Controller and Auditor General (CAG) to audit some of USAID's ongoing bilateral projects. During the implementation of the project a decision will be made as to whether or not this new procedure will be utilized under the project or USAID will rely on its more standard auditing procedures.

3.1.13. Disbursement Procedures: The foreign exchange element of the project will be contracted out by AID to contractors or a consortium of contractors who will manage the different elements of the project, such as: Training in U.S., Procurement of Equipments, and Procurement of Technical Assistance. Payments under these procurement actions will be made directly by AID to the Contractors (Lead contractor in case of a consortium) and charged to the project.

3.1.14. Disbursements for local currency costs on domestic training, technical assistance and equipment procurement will be reimbursed periodically on the basis of expenditure statements to be submitted directly by IDBI to AID in the manner prescribed by AID.

3.1.15. Financing Methods: The methods of implementation and financing of the various project elements are shown in Table 5. Host Country reimbursements will be for all local currency costs of the different elements. The total base cost of the AID-financed local currency component is \$2.26 million. Payments to the contractor for the offshore costs shall be through direct payment by AID. For AID-contracted procurement, commodity procurement may be effected through Direct L/Comm or Bank L/Comm depending upon the nature of commodities. However, the AID Controller's Office will review and approve each procurement action in case Bank L/Comm is required for procurement of commodities. Bank L/Comm will be approved for financing only in those cases where a myriad of small purchases are involved.

3.2. Power Supply (PFC) Component

3.2.1. The budget of the PFC component of the project is estimated to be \$18.67 million. Of this, AID will provide a grant of \$14 million while the host country contribution of \$4.67 million will be provided by PFC and SEBs. The budget estimate of \$18.67 million includes a physical contingency of \$0.82 million and a price contingency (inflation) of \$1.48 million. The financial plan assumes a 5% physical contingency on all line items. An inflation factor of 8% has been assumed on all dollar-financed foreign exchange costs. No inflation has been used for dollar-financed local currency costs as the financial plan assumes that inflation for such costs will be neutralized by the depreciation in the rupee-dollar parity rates. The AID contribution comprises a foreign exchange element of \$11.27 million (80.52%) and a local currency element of \$2.73 million (19.48%).

3.2.2. Financial Analysis: As shown in Table 6 (Summary of Project Budget by Input Elements), the total project cost of \$18.67 million is broken down as follows: 41.06% for Technical Assistance, 4.75% for Commodities, 38.14% for In country & US Training, and 3.75% for Project Administration and Evaluation. Inflation and Contingencies account for the remaining 12.30%. While provision for contingencies has been made at 5% on the entire base cost, inflation has been computed only on the foreign exchange element of the budget at a rate of 8%.

3.2.3. The contingency and inflation together aggregate to 12.30% of the total project cost and are considered reasonable to pay for price contingencies and unforeseen costs. They are estimated using the same method as for the IDBI component.

3.2.4. Table 7 (Summary of Project Budget by Project Elements) illustrates the breakdown of the project cost by the specific project elements. Training accounts for 38.15%, Cell to be set up for Power Studies - 8.22%, consulting services for improving management capabilities of SEBs and PFC - 13.28%, technical assistance for

pre-investment surveys and studies - 17.95% and administration and evaluation and other project specific activities 10.10%. The remaining 12.30% is accounted for by contingency & inflation. The detailed project budget by elements is given in Annex O.

3.2.5. An analysis of the accrual of costs over the life of the project reveals the project activities peak in the fourth year. Nearly 84% of the project funds are expected to be utilized by the fifth year (see Table 9 - Projection of Expenditure by Fiscal Years).

3.2.6. Recurrent Cost Analysis: The Host Country's contribution of \$4.67 million will be provided by the PFC and the various SEBs involved. This accounts for 25% of the project cost. Thus the stipulation of Section 110 of the FAA, that the host country must contribute "... at least 25% of the costs of the entire program, project or activity, ..." has therefore been complied with in so far as the costs relate to the program to be implemented by PFC.

3.2.7. Recurrent costs are defined as the operating expenditures needed to carry out the project activities. The recurrent costs envisaged under this project include salary payments of staff directly/indirectly associated with the implementation of the project, particularly the cells to be set up in-house to manage such activities as project oversight, training and selection of trainees, and power studies. Also included are the costs of office space to be provided by PFC to carry out identified activities, costs of to & fro Air fare of participants selected for training in the U.S., domestic travel of participants attending seminars, workshops, outreach programs and training courses to be conducted within India, operation and maintenance costs, and costs involved in operating and maintaining the equipment to be procured under the project especially the hardware for the Cell for Power Studies and equipment to be procured to demonstrate life extension of existing power plants. Since PFC is an autonomous "for profit" institution, it does not have to seek approval/assistance from any agency of the GOI in planning for its recurring costs.

3.2.8. The PFC will set up a cell which will manage and provide oversight for this project. Funds to finance the recurring costs associated with this project shall be provided from the overall annual expenditure budget of PFC. PFC will also provide floor space and other infrastructural support within its office premises to the staff assigned to manage this project. The maintenance and operating costs of the project-financed equipment shall be borne by the SEBs which will house/use the equipment. These equipments will be operated on a commercial basis and will generate commensurate revenue for these SEBs. The detailed analysis outlined above assures that all the recurring costs estimated will be adequately financed and will not be a hindrance to the successful implementation of the project.

3.2.9. Sustainability: All recurrent costs of the project since the inception will be borne by PFC and the SEBs associated with this project. The overall impact of these costs on their respective budgets will be minimal as most of these costs are already being incurred by these constituents either as fixed annual costs or as normal operating costs. Incremental costs attributable to this project are very few and thus will not have any significant impact on their overall cost structure. While it is undeniable that most SEBs are not currently operating on a fully self-sustaining basis, EMCAT seeks to rectify this situation and will only assist SEBs committed to taking the necessary measures to improve their financial as well as operational performance per the OFAP process. Thus such minimal impact on the overall budget of PFC or SEBs involved in EMCAT will not give rise to the recurrent cost problem highlighted by AID's policy paper on recurrent costs.

3.2.10. Audit: The PFC is a financial institution incorporated under the Indian Companies Act, 1956 and is statutorily required to maintain various books and records as laid down in the Indian Companies Act. Under Section 226 of the Indian Companies Act, PFC is required to have its books of accounts audited by a Chartered Accountant (Indian equivalent of a CPA) each year. AID will have access to all PFC's records of operations pertaining to the project. To assist AID in evaluating the success of the project, PFC will also periodically provide AID with such information and reports as AID should deem necessary. As for the IDBI component, AID may directly contract for non-federal audits (\$7,000 has been budgeted for this), and during implementation a decision will be made about utilizing the CAG to audit the project.

3.2.11. Disbursement Procedures: These procedures will be the same as for the IDBI component.

3.2.12. Financing Methods: The methods of implementation and financing of the various project elements are shown in Table 10. Host Country reimbursements will be for local currency costs of the different elements. The total base cost of AID-financed local currency component is \$2.6 million. Payment methods will be the same as for the IDBI.

TABLE - 1

COMPONENT: I D B I
ILLUSTRATIVE SUMMARY OF PROJECT BUDGET
(BY INPUT ELEMENTS)
(\$ 000)

ELEMENTS	A I D			H C C	TOTAL
	FX	LC	Total		
1. Technical Assistance	1,238	1,596	2,834	1,104	3,938
2. Training:					
+ In-country	200	103	303	83	386
+ U.S.	270	0	270	50	320
3. Commodities	1,376	470	1,846	471	2,317
4. Project Evaluation & Audit	57	50	107	9	116
5. Project Administration	0	43	43	9	52
AT CURRENT COST	3,141	2,262	5,403	1,726	7,129
Contingency	157	113	270	85	355
Inflation	327	0	327	189	516
AT CURRENT COST	3,625	2,375	6,000	2,000	8,000

TABLE - 2

COMPONENT: I D B I
 ILLUSTRATIVE SUMMARY OF PROJECT BUDGET
 (BY PROJECT ELEMENTS)
 (\$ 000)

ELEMENTS	A I D			H C C	TOTAL
	FX	LC	Total		
1. Loan Portfolio Design	1,386	858	2,244	1,012	3,256
2. Private Sector Consultation	1,325	719	2,044	421	2,465
3. Information Dissemination	100	442	542	240	782
4. Project Evaluation	57	50	107	9	116
5. Project Administration	273	193	466	44	510
AT CURRENT COST	3,141	2,262	5,403	1,726	7,129
Contingency	157	113	270	85	355
Inflation	327	0	327	189	516
TOTAL	3,625	2,375	6,000	2,000	8,000

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TABLE - 3
COMPONENT: IDBI
COSTING OF PROJECT INPUTS AND OUTPUTS
(\$ 000)

INPUTS	T.A.	Training In-country	Training U.S.	Commo- dities	Adminis- tration	TOTAL
A.I.D.						
1. Loan Portfolio Design	1,523	59	26	636	0	2,244
2. Private Industry Consultation and Training	346	244	244	1,210	0	2,044
3. Information Dissemination	542	0	0	0	0	542
7. Administration & Evaluation	423	0	0	0	150	573
HCC:						
+ IDBI	1,104	83	50	471	18	1,726
+ Pvt. Ind./Assn						
CONTINGENCY	197	9	26	115	8	355
INFLATION	238	9	48	219	2	516
TOTAL	4,373	404	394	2,651	178	8,000

TABLE - 4

COMPONENT: I D B I
PROJECTION OF EXPENDITURE BY FISCAL YEARS
(\$ 000)

FISCAL YEAR	A I D	H C C	TOTAL
1990-91	75	8	83
1991-92	765	211	976
1992-93	1,890	539	2,429
1993-94	1,594	502	2,096
1994-95	555	238	793
1995-96	341	151	492
1996-97	183	76	259
AT CURRENT COST	5,403	1,725	7,128
Contingency	270	86	356
Inflation	327	189	516
TOTAL	6,000	2,000	8,000

TABLE - 5

COMPONENT: IDBI
METHOD OF IMPLEMENTATION & FINANCING

ITEM	METHOD OF IMPLEMENTATION	METHOD OF FINANCING	ESTIMATED COST (\$) (000)
- Equipment (Imported)	Direct Contracts	Direct L/Comm &/Or Bank L/Comm	1,588
- Equipment (Local)	Host Country Contracts	HC Reimbursement	493
- Technical Assistance (US)	Direct Contracts	Direct Payment	1,428
- Technical (Local)	Host Country Contracts	HC Reimbursement	1,675
- Training (US)	Direct Contracts	Direct Payment	311
- Training (In Country)	Host Country Contracts	HC Reimbursement	109
	Direct Contracts	Direct Payment	231
- Evaluation & Audit	Direct Contract	Direct Payment	119
- Administration and Other Costs	Host Country Contracts	HC Reimbursement	46
TOTAL			<u>6,000</u> =====

NOTE:

- 1) The estimated cost is inclusive of the price and physical contingencies.
- 2) The above plan is only an illustrative one and may undergo some changes between Direct Payment and HC Reimbursement based upon the Scope of Work to be prepared for the Consortium of Contractors.

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TABLE - 6

COMPONENT: P F C
ILLUSTRATIVE SUMMARY OF PROJECT BUDGET
(BY INPUT ELEMENTS)
(\$ 000)

ELEMENTS	A I D			H C C	TOTAL
	FX	LC	Total		
1. Technical Assistance	4,581	1,862	6,443	1,222	7,665
2. Training:					
+ India	0	351	351	75	426
+ U.S.	4,610	0	4,610	2,084	6,694
3. Commodities	525	300	825	63	888
4. Project Evaluation	107	0	107	34	141
5. Project Administration	0	84	84	473	557
AT CURRENT COST	9,823	2,597	12,420	3,951	16,371
Contingency	490	130	620	198	818
Inflation	960	0	960	517	1,477
AT ADJUSTED COST	11,273	2,727	14,000	4,666	18,666

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TABLE - 7
COMPONENT: P F C
ILLUSTRATIVE SUMMARY OF PROJECT BUDGET
(BY PROJECT ELEMENTS)
(\$ 000)

ELEMENTS	A I D			H C C	TOTAL
	FX	LC	Total		
1. Training:					
+ Financial & Technical	2,263	199	2,462	1,029	3,491
+ Capital Improvement	561	83	644	206	850
+ Management Improvement	1,786	69	1,855	924	2,779
2. Cell for Power Studies	425	650	1,075	459	1,534
3. Consulting Services	865	1,390	2,255	226	2,481
4. Project Evaluation	107	0	107	34	141
5. Pre Investment Studies	2,700	50	2,750	600	3,350
6. Project Specific Activities	1,082	72	1,154	170	1,324
7. Administration	34	84	118	303	421
AT CURRENT COST	9,823	2,597	12,420	3,951	16,371
Contingency	490	130	620	198	818
Inflation	960	0	960	517	1,477
AT ADJUSTED COST	11,273	2,727	14,000	4,666	18,666

TABLE - 8

COMPONENT: P F C
COSTING OF PROJECT INPUTS AND OUTPUTS
(\$ 000)

INPUTS	T.A.	Training U.S.	Training In Country	Commo- dities	Adminis- tration	TOTAL
A.I.D.						
1. Managerial Training	0	4,610	351	0	0	4,961
2. Cell for Power Studies	800	0	0	275	0	1,075
3. Consulting Services	2,255	0	0	0	0	2,255
4. Project Evaluation	107	0	0	0	0	107
5. Pre Investment Studies	2,200	0	0	550	0	2,750
6. Project Specific Activities	1,154	0	0	0	0	1,154
7. Administration	34	0	0	0	84	118
TOTAL AID	6,550	4,610	351	825	84	12,420
HCC	1,256	2,084	75	63	473	3,951
AT CURRENT COST	7,806	6,694	426	888	557	16,371
CONTINGENCY	389	335	22	44	28	818
INFLATION	496	0	752	56	173	1,477
TOTAL PROJECT COST	8,691	7,029	1,200	988	758	18,666

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TABLE - 9

**COMPONENT: P F C
PROJECTION OF EXPENDITURE BY FISCAL YEARS
(\$ 000)**

FISCAL YEAR	A I D	H C C	TOTAL
1990-91	384	64	448
1991-92	1,385	315	1,700
1992-93	2,715	776	3,491
1993-94	3,249	1,046	4,295
1994-95	2,559	920	3,479
1995-96	1,575	614	2,189
1996-97	553	216	769
AT CURRENT COST	12,420	3,951	16,371
Contingency	620	198	818
Inflation	960	517	1,477
TOTAL	14,000	4,666	18,666

TABLE - 10

COMPONENT: PFC
METHOD OF IMPLEMENTATION & PAYMENT

ITEM	METHOD OF IMPLEMENTATION	METHOD OF FINANCING	ESTIMATED COST (\$) (000)
- Equipment (Imported)	Direct Contracts	Direct L/Comm &/Or Bank L/Comm	603
- Equipment (Local)	Host Country Contracts	HC Reimbursement	315
- Technical Assistance (US)	Direct Contracts	Direct Payment	5,257
- Technical (Local)	Host Country Contracts	HC Reimbursement	1,955
- Training (US)	Direct Contracts	Direct Payment	5,291
- Training (In Country)	Host Country Contracts	HC Reimbursement	368
- Evaluation & Audit	Direct Contract	Direct Payment	122
- Administration and Other Costs	Host Country Contracts	HC Reimbursement	89
		TOTAL	<u>14,000</u> =====

NOTE:

- 1) The estimated cost is inclusive of the price and physical contingencies.
- 2) The above plan is only an illustrative one and may undergo some changes between Direct Payment and HC Reimbursement based upon the Scope of Work to be prepared for the Consortium of Contractors.

TABLE-11

ENERGY MANAGEMENT CONSULTATION AND TRAINING PROJECT (386 0517)
ILLUSTRATIVE SUMMARY OF PROJECT COSTS FOR LIFE OF PROJECT

PROJECT ELEMENT	IFC COMPONENT			IDBI COMPONENT			TOTAL PROJECT				
	A.I.D.			A.I.D.			A.I.D.				
	FX	LC	TOTAL	FX	LC	TOTAL	FX	LC	TOTAL		
1. Technical Assistance	5,257	1,955	7,212	1,428	1,675	3,103	6,685	3,630	10,315	2,722	13,037
2. Training	5,291	368	5,659	542	109	651	5,833	477	6,310	2,703	9,013
3. Commodities	602	315	917	1,588	493	2,081	2,190	808	2,998	620	3,618
4. Project Evaluation	123	-	123	67	52	119	190	52	242	53	295
5. Project Administration	-	89	89	-	46	46	-	135	135	568	703
TOTAL	11,273	2,727	14,000	4,666	3,625	6,000	2,000	14,898	5,102	20,000	26,666

(In '000 Dollars)

4. IMPLEMENTATION PLAN

4.1. Introduction

4.1.1. EMCAT has two major sub-projects: one with the IDBI and one with the PFC. Each of these components involves technical assistance, training, commodities, and studies to strengthen those institutions and the organizations with which they deal. While they share project objectives, they will be implemented separately. However, coordination between the two will be promoted by the IDBI and PFC each having the opportunity to make inputs for the other's component via the Project Review Committees.

4.1.2. In the larger sense, EMCAT is also part of a coordinated effort with the World Bank working on both sides and the ADB on the supply side of the energy equation, plus various bilateral donors planning to work primarily on the demand side, all to the same ends.

4.2. Implementation of Energy End-Use Component

4.2.1. Implementing Agency: This Project component will be implemented for the GOI by IDBI. Technical Assistance, training, commodities and studies will be provided either for that institution or through it to various private sector firms and associations.

4.2.2. Within IDBI, EMCAT will be managed by the Technology Department. This Department is responsible for both the energy schemes and the venture capital funds of IDBI. Planning and day-to-day management of the Project will be carried out by the Officer In Charge who will be at the level of Deputy General Manager. The Secretariat for the management of the Project will consist of the Officer In Charge and such additional personnel as are necessary. From time to time, the Secretariat will draw upon the expertise and skills of the other departments of the Bank.

4.2.3. Project Review Committee(PRC): In order to bring a variety of perspectives and expertise to the Project and to promote the Project's outreach to key players in India's efforts to promote energy conservation, the Project Review Committee will be established to provide guidance, review and approve proposed and on-going activities. The Committee will be chaired by the Executive Director (Technical) of IDBI and will be supported by the Secretariat. The other members are expected to be:

- The General Manager - Technology Department of IDBI;
- A representative from the Indian Institute of Technology (IIT), Bombay;
- A representative from private industry;

- A representative from the ICICI (also representing PACER);
- A representative from the Energy Management Centre (EMC);
- A representative from the Power Finance Corporation; and
- A representative from USAID/India.

4.2.4. The Project Secretariat will be in charge of carrying out the staff functions of the PRC and will prepare all necessary documentation, including work plans, proposals, and progress reports, for presentation to the PRC.

4.2.5. The PRC will meet quarterly at a place decided by IDBI. Every fourth meeting of the PRC will encompass an expanded agenda. It will include the Annual Project Review to examine progress of the previous year's activities, to review the Annual Work Plan for the coming year. Preparation of the Annual Work Plan by the IDBI Project Secretariat and its review by the PRC will serve as an opportunity to refine project objectives and activities; subsequent quarterly meetings can revise the Plan as necessary. Specific procedures for the PRC will be developed by IDBI in consultation with USAID and set forth in a PIL.

4.2.6. Following the Annual Review and PRC approval of the Annual Work Plan, USAID will issue a Project Implementation Letter (PIL) confirming the Plan's review and approval and earmarking local currency for project costs not borne by IDBI or included under the Consortium Contract discussed below.

4.2.7. Consortium Contract: In order to mobilize the various inputs (technical assistance, training, etc.) necessary to implement EMCAT activities in India and the U.S., USAID will request proposals from and directly contract for the services of U.S. and Indian private organizations. It is unlikely that one firm can meet the range of inputs required. Since many of the services can be provided more cost effectively by Indian organizations, while others require expertise available only in the U.S., it is likely that offerors will propose that both Indian and U.S. organizations be combined as a consortium under one contract with USAID. Such a consortium, which would likely include one U.S. firm as prime contractor with other American and Indian organizations as sub-contractors, would help simplify Project administration. The consortium will be responsible for providing the following services to IDBI:

- Providing short-term consultants to assist IDBI in:
 - a) preparation of work plans, scopes of work for studies, activity proposals, reports;
 - b) establishing Project management information and monitoring systems;
 - c) providing support to industrial and other enterprises for preparation of detailed project reports for energy-related investments;
 - d) organization of workshops, seminars, etc.;
 - e) identifying opportunities for new IDBI-led energy conservation initiatives;
- Organizing observation tours in the U.S.;
- Identifying appropriate training institutions in the U.S. and India and organizing the training;
- Promoting linkages between Indian and U.S. business associations in furtherance of EMCAT objectives;
- Procuring commodities, as required, for IDBI and its clients; and
- Handling all logistics for consultants, training, and commodity procurement as required.

This list will be refined, and a detailed terms of reference for the Contractor and Request for Proposals (RFP) will be prepared by USAID and IDBI shortly after the signing of the EMCAT Project Agreement.

4.2.8. The services of the Contractor will be initially utilized to assist IDBI in developing a detailed implementation and monitoring plan, including the collation of baseline data, for the Project. This will be done immediately after mobilization. To identify and coordinate U.S. and Indian resources (TA, training, equipment, etc.) to be provided for specific EMCAT needs, the Contractor will include a part-time U.S. Resources Coordinator (RC) and a full-time Indian Resources Coordinator funded from the contract for the life of the project. The U.S. RC will make periodic trips to India, as required for the coordination of the numerous activities covered under the Project. The Contractor will also report on the progress of its work to IDBI and to the USAID Office of Technology Development and Enterprise, and will furnish information as requested by the PRC Secretariat for the PRC meetings.

4.2.9. For a variety of reasons based on both Indian and U.S. government policies and regulations, direct AID contracting will be done. The Contractor will be recruited through full and open competition according to AID regulations, and ten per cent Gray Amendment subcontracting will be required.

4.2.10. Services outside the Consortium Contract: While most EMCAT inputs for IDBI will be provided through the Contractor, the need for flexibility dictates that some inputs be provided by other means. Especially in the first year, before the Contractor is mobilized, USAID will arrange for observation tours and studies (on ESCOs and cogeneration) through quick contracting means, such as buying in to existing AID S&T/EY projects or using an Indefinite Quantity Contract.

4.2.11. Coordination with the GOI and other donors: Since other GOI agencies and donors are becoming increasingly involved in energy conservation, coordination with them will be essential for EMCAT. The principal means for accomplishing this is inclusion of the EMC, the GOI's designated agency for coordinating GOI and donor efforts in energy management, on the Project Review Committee. In addition, under the aegis of the World Bank's planned Industrial Energy Efficiency Project, which is to be coordinated by the EMC and will involve the IDBI, ICICI and several bilateral donors (including USAID, which is "buying" a piece of the IEEP with EMCAT), formal coordination is planned via annual progress reviews. Besides this formal coordination, USAID will continue its frequent informal discussions with the GOI and other donors on energy issues.

4.2.12. EMCAT will account for a small part of the IEEP technical assistance program (to support \$250 million in World Bank credits to the IDBI and ICICI for energy conservation-related investments) -- about \$2 million of a planned total \$28 million in bilateral donor contributions. EMCAT's contribution consists of studies (ESCOs and cogeneration), in-country training for industry personnel, study tours, energy audits, and detailed project reports for energy efficiency investments. The much larger balance of EMCAT activities with IDBI are also supportive of IEEP, as is the PACER project in the area of energy research and development.

4.3. Implementation of Power Supply Component

Implementation mechanisms for the PFC's Power Supply Component in many ways parallel those for the IDBI's component.

4.3.1. Implementing Agency: The Project will be implemented for the GOI by the PFC. Technical Assistance, training, commodities and studies will be provided either for that institution or through it to the CEA and State Electricity Boards.

4.3.2. Within the PFC, this component of EMCAT will be managed by its Operations Department. This Department will provide support for the development of OFAPs and will monitor their implementation. Planning and day-to-day management of the Project will be carried out by the Officer In Charge who will be at the level of Manager in the Operations Department. The Secretariat for the management of the Project will consist of the Manager in charge of the Project and such additional personnel as appear necessary. From time to time, the Secretariat will draw upon the expertise and skills of the other departments of the PFC.

4.3.3. Project Review Committee: Analagous to the IDBI component, a PRC will be established for the PFC component to bring a wider range of expertise to EMCAT and to expand the Project's outreach in the electric power sector. The Committee will be chaired by the Director (Operations) of the PFC. It is expected the other members will be:

- A representative from IDBI;
- A representative from the Central Electricity Authority (CEA);
- A representative from the DEA - Ministry of Finance;
- A representative from the Indian Institute of Technology - Delhi;
- 2 representatives from SEBs;
- A representative from the GOI Department of Power;
- A senior officer of PFC; and
- A representative from USAID/India.

The composition of the PRC will be finalized shortly after the Project begins.

4.3.4. The Secretariat for the Project will carry out the staff functions of the Committee and will prepare all necessary documentation, including annual plans, activity proposals, and reports for presentation to the Committee.

4.3.5. The general functions and procedures of the PRC for this component will be the same as for IDBI's, including quarterly meetings at locales specified by the PFC, annual reviews, approval of annual work plans, and earmarking of funds by USAID with PILs. Specific procedures for the PRC will be developed by the PFC in consultation with USAID and set forth in a PIL.

4.3.6. Consortium Contract: As in the IDBI component for the PFC, USAID will contract directly for the services of U.S. and Indian private organizations in order to mobilize the various inputs (technical assistance, training, etc.) necessary to implement EMCAT activities in India and the U.S. Given the range of inputs required, the consortium approach discussed for the IDBI component is also likely for the PFC side of the Project. Important criteria in selecting a contractor are that it have knowledge and experience working in power utilities in the U.S. The consortium will be responsible for providing the following services to the PFC:

- Providing short-term consultants to assist the PFC in: a) preparing work plans and management information and monitoring systems; b) carrying out the various activities discussed in Section 2.7, including establishing a Studies Cell and Training Unit; and c) identifying opportunities for new PFC-led initiatives in the electric power sector;
- Identifying appropriate training institutions in the U.S. and India and organizing the training;
- Procuring commodities, as required, for the PFC and its client SEBs; and
- Handling all required logistics for consultants, training, and commodity procurement.

This list will be refined, and a detailed terms of reference for the Consortium Contractor and an RFP will be prepared by the PFC and USAID shortly after the signing of the Project Agreement. Given the magnitude and complexity of inputs for this component, it is likely that an American Resource Coordinator will be required to be based full-time in India for at least two years of the Project and part-time thereafter.

4.3.7. Detailed training needs assessments for the PRC and SEBs must be completed early in the Project before the Consortium Contract is signed. These will be done shortly after the conditions precedent to disbursement are satisfied. A few other activities such as an observation tour for PFC personnel to the U.S. to learn more about U.S. experience with plant life extensions may also be undertaken before the Consortium Contract is in place.

4.3.8. Coordination with other donors: The PFC component of EMCAT involves three primary donors: World Bank, ADB and USAID. A Memorandum of Understanding (MOU) has been agreed upon among them covering the coordination of implementation, monitoring and evaluation. Salient points of the MOU include:

- USAID has agreed that a condition precedent to first disbursement of its Grant to the PFC will be a duly executed Loan Agreement between the PFC and either ADB or World Bank.
- In implementing the PFC Component to the mutual benefit of all parties involved in the overall program, USAID will make maximum use of ADB's and World Bank's technical expertise in the areas of electric power generation, transmission and distribution. USAID will ensure that its financing of technical assistance, training, studies, and other support for PFC is closely coordinated with the projects being financed by the World Bank and ADB, so that the PFC obtains the maximum utility from the combined assistance.

- The World Bank and ADB will be invited to review and to comment on the proposed terms of reference for consultants and for the individual studies to be supported by EMCAT.
- USAID will request ADB and World Bank to review and comment on PFC annual work plans under EMCAT.
- USAID will be provided an opportunity to comment on OFAPs prior to their approval by the PFC and the World Bank and/or ADB (prior to provision of financing of SEBs).
- World Bank and ADB will be invited to suggest training courses for PFC and SEB personnel to be supported under EMCAT and to recommend consultants under the Project.
- World Bank and ADB will cooperate with the PFC and USAID in planning, carrying out, and reviewing the mid-term evaluation of the Project.

4.4. Role of USAID

4.4.1. While IDBI and PFC will be responsible for executing the Project, USAID will maintain oversight to ensure that EMCAT is meeting its objectives, and it will undertake key procurements to provide project inputs.

4.4.2. EMCAT will be managed by the Technology Development and Enterprise Office (TDE) of USAID. The Energy Specialist in the office will be the Manager for the Project and will be working under the supervision of the Director of the Office. Since the Manager-designate is already handling one energy project of the Mission, plus another which will be completed by June 30, 1992, he may need support in the management of the Project. An FSN slot is available for this purpose. This individual may be called upon to facilitate overall implementation or to assist in specific tasks, such as review of OFAPs, studies, and activity proposals.

4.4.3. The Program Development and Project Support Office (PDPS) will designate a backstop officer for providing implementation support to the Project. This will include getting GOI clearances, drafting the Project Agreement, and assisting in drafting of implementation documents such as PIO/Ts, RFPs, and PILs.

4.4.4. The Office of the Controller (CO) will designate a financial analyst to assist in the sound financial management of the Project and review of OFAPs. The CO will also review and certify vouchers for payment to those providing services to IDBI and PFC.

4.4.4. The Regional Contracting Officer (RCO), based in New Delhi, will assist in recruitment of the Consortium Contractors and other consultants as required. The RCO will advise on procurement methods, preparation of RFPs, and negotiation of contracts.

4.4.5. The Regional Legal Adviser (RLA), also based in New Delhi, will assist in preparing the Project Agreement and will advise on satisfaction of CPs and on other legal matters as they may arise.

4.4.6. AID/W technical personnel in the regional Bureau for Asia and Private Enterprise (APRE) and in S&T/EY will assist in identifying and arranging various EMCAT activities, such as observation tours, training, and consultancies. The Project Development Office of APRE will also provide backstopping support for EMCAT.

4.5. Project Agreement

It is expected that USAID will sign the ProAg for the project with the DEA, and that it will be cosigned by PFC and IDBI; with DEA being an authorized representative for the entire project and PFC and IDBI being authorized representatives for each of their components.

4.6. Schedule of Key Actions

<u>Action</u>	<u>Responsible party</u>	<u>Target date</u>
World Bank/GOI Negotiations (PFC)	PFC, IBRD	9/90
Project authorized, ProAg signed	USAID, DEA	3/91
Basic PIL issued	USAID, DEA, PFC, IDBI	4/91
IDBI Proj. Mgt. Staff/PRC designated	IDBI	5/91
PFC Proj. Mgt. Staff/PRC designated	PFC	5/91
SOWs for Consortium Contractors prepared	IDBI, PFC, USAID	5/91
1st annual work plan for IDBI prepared	IDBI, USAID	6/91
Work plan for IDBI reviewed, approved	PRC, IDBI, USAID	7/91
CPs to initial disbursement for IDBI met	IDBI, USAID	6/91
RFP for IDBI Consortium Contractor issued	IDBI, USAID	6/91
IDBI/EMC observation tours (ESCOs, cogen)	IDBI, USAID	7/91
IBRD/GOI Loan Agreement signed, CPs to initial disbursement for PFC met	IBRD, PFC, USAID	7/91
RFP for PFC Consortium Contractor issued	PFC, USAID	8/91
Training needs assessment (PFC, SEBs) launched	PFC, USAID	8/91
ESCOs, cogen. studies launched	IDBI, USAID	10/91
IDBI Consortium Contractor selected, contract executed	IDBI, USAID	12/91
IDBI Consortium contractor mobilized	IDBI, USAID	1/92
PFC Consortium Contractor selected, contract executed	PFC, USAID	2/92
PFC Consortium Contractor mobilized	PFC, USAID	3/92
ESCO, cogeneration studies completed	IDBI	2/92
IDBI Annual Impl. Plan prepared	IDBI	3/92
PFC Annual Impl. Plan prepared	PFC	3/92
IDBI PRC annual review, plan approved, implementation begins	IDBI, USAID	4/92
PFC PRC annual review, plan approved, implementation begins	PFC, USAID	6/92
Annual Reviews, Work Plans - PFC, IDBI	IDBI, PFC, USAID	3/92-96
Mid-Term Evaluations - PFC, IDBI	IDBI, PFC, IBRD, ADB, USAID	4/94
Final Evaluations - PFC, IDBI	ADB, USAID	11/96
PACD		3/97

5. MONITORING & EVALUATION PLAN

5.1. Summary

For a comprehensive technology transfer, training and policy-oriented project such as EMCAT, it is essential to perform close and continuous monitoring and periodic evaluation, not only of the Project, but also of the progress of policy reforms and technological achievement as envisioned by the Project and related GOI programs in the energy sector. In both of these functions, an agreed division of effort between AID and other donors is indicated in Section 4 above. Close monitoring will ensure that nothing important is omitted or duplicated and that the appropriate coordination among the program elements provided by the different parties is effected. The basic parameters of the systems for monitoring and evaluation are set out in this Section. Final details will be jointly developed by AID, the PFC, the IDBI, and other donors as dictated by the MOU. There will be need for periodic review of EMCAT indicators to permit the measurement of progress toward achieving objectives.

5.2. Monitoring

5.2.1. Management information systems: Important for EMCAT is the development of expertise in effective management of energy sector elements by and for the benefit of all involved institutions, public and private, on the basis of information assembled, organized and presented to the decision-makers of those organizations in an orderly manner. Critical to fulfillment of this function is the development within the institutions of suitable management information systems (MIS). Early in the Project, shortly after the Consortium Contractors are mobilized, IDBI and PFC will use with contractor TA to assess their existing information systems and MIS needs for EMCAT. They will establish simple, cost-effective information systems including compilation of baseline data which disaggregate data by gender. Key sources of data for measuring achievement of project objectives, which will be developed with EMCAT assistance are OFAPs for the PFC, and energy auditors' initial and follow-up reports for the IDBI.

5.2.2. Monitoring mechanisms: In quarterly meetings and annual project reviews the PRCs will review project progress against work plans and consequently serve as the main mechanism for project monitoring. They will review the periodic reports prepared by the PRC Secretariats and Contractors. Meetings between USAID, other donors, IDBI and the PFC will be another tool for monitoring EMCAT.

5.2.3 Financial monitoring and assessment of host country procedures: The project will be implemented by IDBI and PFC, autonomous corporations of the GOI. Their annual budgeting, contracting, payment and accounting procedures will be as prescribed by the GOI for such institutions. Based on three decades of experience in India, USAID/I has reasonable assurance that the GOI and its institutions have the necessary financial and management systems and capacity to implement projects and to assure reasonable accountability. AID will have access to all records of operations pertaining to the project as well as periodic reports deemed necessary by AID.

5.3. Evaluation

5.3.1. The Project's mid-term and final evaluations will be collaborative efforts of USAID, IDBI, and PFC. For the PFC project component, collaboration with the World Bank and ADB is called for in the Memorandum of Understanding. At present it is contemplated that the two Project Components will be evaluated separately. Detailed evaluation plans will be elaborated during the course of the Project.

5.3.2. Mid-term evaluations: These evaluations will be conducted about midway during the life of the project, in early or mid-1994. They will focus on the implementation of the Project to assess the effectiveness and appropriateness of implementation mechanisms such as the PRCs, the Contractors, and AID monitoring. The evaluations will determine a) whether the right inputs are being provided to achieve objectives, b) whether the project is on track towards meeting its objectives, c) what has been accomplished to date and d) whether the objectives and the activities to achieve them are still appropriate. The evaluation will identify any problems or external factors influencing the project and propose measures for remedying them. The evaluations will conclude with recommendations to improve implementation and, if necessary, to modify project objectives.

5.3.3. Final evaluations: These evaluations which will be done at the end of the Project, around November 1996 will focus on achievement of project objectives, particularly at the purpose level. When measuring project impact, evaluators will consider the multi-donor nature of assistance to the energy sector and the consequent substantial degree of indivisibility of results. The evaluations will discuss lessons learned and make recommendations for possible future AID efforts in the energy sector.

5.3.4. Evaluation teams: The teams will be comprised of AID, and if available, PFC and IDBI personnel who are not directly connected with the Project. They will probably be assisted by consultants directly contracted by AID as funded in the Project budget. For evaluation of the PFC, World Bank and ADB personnel are expected to be part of the evaluation teams.

5.4. Audit

In order to ensure optimum use of resources and minimum delay in correcting errors, the USAID Controller's Office will conduct periodic examinations of records and, as part of its voucher examination program, will review PFC and IDBI accounting procedures and documentation relating to host country expenditures financed under the Project. Similar reviews will be conducted of expenditures directly financed by AID, such as under the direct AID contracts with the Consortium Contractors. Such additional auditing services by local accounting firms as appear necessary to comply with AID guidelines are also included in the Project budget. AID itself or the GOI Comptroller and Accountant General may audit the project.

6. SUMMARIES OF ANALYSES

6.1. Technical Analysis

6.1.1. Introduction: The demand for power is growing at the rate of about 11% per annum. In spite of commendable achievements during recent years, the all-India energy shortage is still about 8% and the shortage for peaking demand is 17%. In the period 1990-95, a target of 38,000 MW additional generating capacity has been proposed which, if achieved, would help improve the power situation in the country. However, not only is the requisite capital unlikely to be available, but even if the target were achieved, shortages would persist. Therefore, in addition to capacity addition, attention must be paid to both optimal utilization of existing power assets and management of power demand.

6.1.2. Power Supply Side - PFC Component: The three major areas of focus will be improvement of transmission and distribution systems, the optimum utilization of existing assets in the power sector and reforms to encourage more rational pricing. The program for renovation and modernization of thermal power plants offers scope for efficiency improvements.

6.1.3. EMCAT will provide assistance to the PFC in developing its own organization and to SEBs through the PFC and consultants for preparation of Operational and Financial Action Plans. In addition to the OFAPs, SEBs will be required to prepare least-cost investment plans and feasibility studies for each separate investment for PFC approval. Meanwhile, the PFC will review all existing generating plants in the country and develop programs for life extension. EMCAT will help develop, through the PFC and SEBs, a national program of modernization and rehabilitation, plus policy reforms to encourage more rational pricing and a more reliable supply of power.

6.1.4. Training personnel from both the PFC and SEBs is necessary to improve their technical and financial performance. The PFC must provide its staff with manuals that outline business policies and procedures, project appraisal, OFAPs, procurement of goods and services, internal audit and MIS. EMCAT will provide both the training and assistance for preparing the manuals.

6.1.5. An unfortunate consequence of India's rapid industrial growth has been environmental degradation and concerns about its contribution to global warming. A major contributor to air pollution is power generation by coal-fired thermal plants. EMCAT will, therefore, provide technical assistance and training for the SEBs to prepare environmental assessments as part of their investment proposals.

6.1.6. There is need for critically reviewing the present operation of the SEBs, for defining inefficiencies and shortcomings and describing steps to improve their operations. Studies of power system development, financial planning, and structural changes necessary for optimal development of the power sector must be executed. For these purposes, a Cell for Power Studies will be created in the PFC with EMCAT assistance.

6.1.7. Energy End-use - IDBI Component: Because India possesses a highly energy-intensive industrial sector, India's inability to meet energy requirements is a constraint to maintaining high rates of GDP and industrial growth. Demand management offers a means to bridge the supply-demand gap in industry that has been inefficient in its use of energy.

6.1.8. A joint effort on both the Supply and End-Use Sides for augmenting power generation by the utilities is through cogeneration. By generating electricity in conjunction with production of steam for industrial or commercial processes, considerably less energy is used than when steam and electricity are produced separately. Cogeneration is a reliable economic investment for a firm only if the value of the energy produced is greater than the incremental capital and operating costs incurred -- financial issues not unlike those of other capital intensive engineering projects. These and other institutional and policy issues will be addressed by Project studies.

6.1.9. The World Bank proposes to provide a credit of \$250 million for implementing energy conservation schemes. EMCAT will provide support for preparation of detailed feasibility reports for these schemes, including economic and technical analysis.

6.1.10. Private sector energy consulting services, or energy auditors, are expected to supplement if not supplant energy efficiency consultancy services previously provided by GOI-supported organizations. The Project will support energy audit training and the provision of necessary instrumentation for private engineering consultants.

6.1.11. The lack of incentives to consider conservation investments, particularly those that entail technical and financial risks, require innovative solutions. Energy Services Companies (ESCOs) provide a single, complete approach to energy conservation: auditing energy use to identify an optimal mix of measures for energy efficiency, installing/maintaining these measures, and often paying for the whole project at no up-front cost to the energy consumer. In exchange, the ESCO gets a mutually agreed upon share of the savings that the project produces. Since the concept of ESCOs is new to India, the Project will provide support for formation of the first ESCO through IDBI if an in-depth study shows it to be feasible.

6.1.12. It will be necessary to create awareness about the importance of energy conservation through business associations, which play important roles in their respective sectors. Grants will be provided to the most capable and active of these groups under the Project to strengthen their ongoing initiatives in energy efficiency. These associations can also play a key role in sensitizing managements to the need to formalize energy management structures in energy-intensive industrial and other establishments. The associations will also meet with the government officials on energy efficiency issues and policy formulation for promoting energy conservation.

6.2. Financial Analysis

6.2.1. Efforts to improve energy efficiency by the Indian industrial sector are largely driven by the reliability, price and quality of delivered energy, with the most common response to unreliable electric power being standby captive diesel systems. However, the high price of diesel has led to a set of conservation efforts. Low capital, low risk projects normally termed as house-keeping measures, are generally accepted, funded and implemented. These produce from 3 to 15% savings, with investments ranging from negligible to \$25,000 and a payback of 3 to 12 months.

6.2.2. Medium-term efficiency measures require investments upward of \$20-50,000 with moderate risks and a return on investment that varies from 6-24 months and generates savings of 15% to 30-40%. Indian entrepreneurs have thus far proved reluctant to take these risks.

6.2.3. However, for firms that are planning to cross the 15% energy savings barrier an energy audit study in 1989 by FICCI showed energy savings potentials ranging from 15% to a staggering 50%, with payback periods from as low as three months to a high of 36 months, averaging 16. Such findings are encouraging.

6.2.4. High capital investment areas are those where anticipated benefits as well as the risks are high, such as cogeneration and innovative systems. In such instances, management is reluctant to invest unless financial incentives (such as concessional loans) and the regulatory environment (sale of excess power at profitable rates) are in place. Such investments are generally preferred at the time of inception or during an expansion/modernization phase where a major revamping of the unit's facilities is already planned. That investment decisions tend to favor first cost over life-cycle costing is a reflection of the tight capital situation as well as a generalized aversion to taking risks.

6.2.5. The following facilities for funding energy efficiency projects are now available: loans for modernization from the Development Finance Institutions (e.g. IDBI); financing for boiler replacement under a scheme operated by Petroleum Conservation Research Association; IDBI-sponsored Equipment Finance for Energy Conservation Scheme (EFEC); and subsidies for energy audits (IDBI). However, problems exist with each of these facilities and the number of takers are few. EMCAT will help IDBI improve its energy schemes.

6.2.6. The government has already taken a number of steps to make investments in energy conservation more attractive, such as reducing import duties on certain equipments and allowance of 100% depreciation. The GOI is planning greater import duty reductions under the 8th Five-Year Plan, which will further increase the attractiveness of such investments.

6.2.7. EMCAT, with its goal of promoting energy efficiency, will work to sensitize corporate leaders to the needs and benefits of institutionalization of Energy Management. Experience in industrialized nations indicates that the integration of this function in the corporate organization ensures the staff commitment and line responsibility that are prerequisites to success.

6.3. Economic Analysis

6.3.1. India will experience major national economic benefits if an effective program of industrial and commercial electricity and fuel efficiency is implemented and sustained over the coming decades. An illustrative economic analysis has been conducted to show the implications of such a program over the next 15 years. The analysis indicates that, in the conservative scenario, the aggregate direct economic savings in power plant fuel use alone could easily exceed \$10 billion in domestic currency and foreign exchange over this period. Optimistically the cumulative fuel savings are closer to \$25 billion over the fifteen year time period. To the degree that EMCAT is responsible for catalyzing the actions resulting in just five percent of these savings, it will have repaid its investment a minimum of fifty times over.

6.3.2. In addition to the substantial direct economic benefits of a successful EMCAT program, there will be significant indirect economic benefits in industrial and commercial energy, power conservation, and efficiency measures. These were not explicitly calculated in the analysis but include the following:

- Industrial energy and commercial efficiency do not require fuel.
- Industrial and commercial energy efficiency and conservation are non-polluting at the source (of displaced power generation) and potentially reduce pollution at the point of use.
- The investment in industrial and commercial plant equipment and subsequent savings in power plant investments and fuel will save foreign exchange costs for imported fuels and equipment.
- Most investments in industrial and commercial energy efficiency will have lower capital requirements per KWh saved than new supply. In principle, scarce capital is freed for other productive uses, both within and outside the industrial, commercial and power sectors.

6.3.3. A key assumption behind the analysis is that the economic output of industry will remain the same with gradually decreasing energy use per unit of value added.

6.3.4. The additional savings in new power plant construction are approximately \$22 billion. By contrast, the total accumulated cost to industry will be about \$9 billion over the same 15-year period, assuming an average cost of \$400/kWh (saved) to install energy efficiency measures in existing and new industrial facilities.

6.3.5. The energy efficiency measures required to achieve these long-term savings were assumed to diffuse gradually into the industrial sector, with 10% penetration in the year 1992 and 90% penetration by the year 2012.

6.4. Social Soundness Analysis

6.4.1. Introduction: In attempting to analyze the social implications of the Project, it must be kept in mind that the interventions planned are at the policy cum institutional development level and are, therefore, not readily attributable to individuals, other than direct beneficiaries, or even to specific groups in the Indian economy or society. Moreover, although the value of EMCAT interventions even standing alone would be considerable, their greatest importance lies in their catalytic effect upon the far larger investments of the IBRD and ADB, and the immense capital input of the GOI and the Indian private sector. While it is clear that benefits from the development of the Indian power sector, on both the supply and demand sides, will accrue in some manner to all segments of the economy, not all of them will benefit in the same way, or within the same time frame.

6.4.2. Direct Beneficiaries: The immediate beneficiaries of EMCAT will be the management and employees of the PFC, the SEBs and the private sector energy consulting organizations assisted by Project activities. Another important group of direct beneficiaries will be the owners, managers and employees of private enterprises which are able to reduce their energy consumption and improve their energy efficiency.

6.4.3. Indirect Beneficiaries: A wide spectrum of primarily private sector electric power consumers (agricultural, industrial, commercial and residential users) will be long-term beneficiaries of EMCAT as will be urban populations who will benefit from less environmental pollution. Farmers will be major indirect beneficiaries through improved reliability of supply for irrigation pumping, and rural women will benefit from better lighting and supply of power for household enterprises.

6.4.4. Attitudinal Constraints: A potential source of difficulty for implementation of any economically rational program involves certain political/economic attitudes. Opposition to economic rationalization, in particular acceptance of private enterprise and economic pricing of power both purchased from cogenerators and sold to end consumers, will arise from civil servants who believe that the government should maintain its exclusive control over the power sector or who believe subsidized electric rates are good; from inside the SEBs, where there are widespread views that they have a "social responsibility" to price power according to "ability to pay"; and from employee organizations fearing reduction of excessively high staffing levels. Because of the importance of this last issue, one of the criteria for technical analysis of Consultant Consortia proposals will be demonstrated success in working with situations of labor sensitivity in an LDC context, preferably in South Asia.

6.4.5. Another potential problem involving the feasibility of the ESCO concept is the frequent reluctance of Indian entrepreneurs to admit outsiders into the inner working of their businesses. Since the essence of an ESCO operation is the sharing of both the risks and the benefits of the newly introduced energy conservation measures through financial investment and reward, the ESCO patently requires full access to the company's records. This matter will be of prime importance in the ESCO feasibility study.

6.4.6. Nature of the Energy Consultancy Business: Energy consulting firms in the power sector have developed rather slowly in India. Nevertheless, the oil crises have created an awareness of the vast untapped energy conservation potential existing in Indian industry and commerce. In the area of supply management, most utilities have been performing planning activities such as preparation of feasibility reports for new generation, transmission and distribution, load despatch, evaluation of non-utility power generation projects etc., and have been gradually building their own expertise. In complex activities, they are provided with technical guidance including support for design engineering

by the Central Electricity Authority. Working primarily on the supply side are large business organizations that provide basic as well as detailed engineering, environmental, modernization and renovation programs.

6.4.7. In the field of rural transmission and distribution systems, there are over 50 minor organizations, mostly organized on a regional basis. On the demand management side, there are perhaps 100 consulting organizations; about 30 of them are affiliated to central government administrative ministries and financial institutions. There is demand for these services in both the public and private sectors. In recent years, there has been an increased demand for these activities in the public sector, with the public sector engaging private consultants.

6.5. Administrative Analysis

6.5.1. The two primary GOI institutions through which EMCAT will function are the Industrial Development Bank of India and the Power Finance Corporation. The organization and functioning of these agencies is set forth in the Administrative Annex and summarized below.

6.5.2. Industrial Development Bank of India (IDBI) - Status:

The Industrial Development Bank of India (IDBI) was set up in 1964 and given status as an autonomous apex financial institution in 1976. The major sources of funds for IDBI are: i) share capital and reserves; ii) borrowings from the Government of India; iii) loan capital from the Reserve Bank of India; iv) market borrowings by way of bonds; v) foreign currency borrowings from multilateral institutions such as the World Bank and the ADB, and international capital market; vi) deposits and borrowings; and vii) repayment of past assistance by borrowers. The total resources available to the IDBI in 1989-1990 were approximately Rs. 94 billion (\$5.4 billion). IDBI has strong outreach with five regional and 21 branch offices which cover almost the entire country.

6.5.3. IDBI - Objectives and Strategy: The Government of India has assigned the following functions to IDBI: "i) planning, promoting and developing industries to fill the gaps in the industrial structure in India; ii) coordinating the working of institutions engaged in financing, promoting or developing industries and assisting in the development of such institutions; iii) providing technical and administrative assistance for promotion, management or expansion of industry; iv) undertaking market and investment research and surveys and techno-economic studies in connection with development of industry; and v) promoting, forming or associating in the promotion, formation or conduct of companies, subsidiaries, societies, trusts or such other associations."

6.5.4. IDBI - Administration and Management: The IDBI has its corporate office in Bombay where it is managed by a Board of Directors. The Board in turn has constituted an Executive Committee, which is empowered to sanction financial assistance and exercise other powers designated by the Board. The day-to-day functioning of the IDBI is under the direct supervision of the Chairman and Managing Director, assisted by the Executive Directors. IDBI has a staff of 2802, a strong professional staff base, and in-house expertise in both technical and financial matters. The Project will be implemented by the Technology Department of the IDBI, headed by an Executive Director.

6.5.5. IDBI - Staffing for EMCAT: IDBI is already working in the area of energy and has two innovative programs in operation: the Energy Audit Scheme and the Equipment Finance for Energy Conservation Scheme. EMCAT will strengthen these efforts within the Technology Department; the person who will be in charge of EMCAT is a Deputy General Manager, assisted by a Project Secretariat.

6.5.6. Power Finance Corporation (PFC) - Status: The Power Finance Corporation (PFC) was incorporated in July 1986 as a company wholly owned by the Government of India; it started operations in 1988. PFC generates funds from equity and market borrowings. The total resources available to the PFC in the year 1989-1990 was approximately Rs.6.75 billion (\$398 million); in the 8th Plan period it is expected that the PFC would be financing 20% of the total investment in the power sector in the states amounting to Rs.125 billion (\$7.3 billion). However, in the future, the GOI expects the PFC to fund 25-35% of the SEBs' total financing requirements.

6.5.7. PFC - Objectives and Strategy: The performance of the power sector has been a major concern for many years. Seventy-five per cent of the total electric power generating capacity and the responsibility of distributing power to the final consumer is with the SEBs, yet the Central Government cannot exercise budgetary restrictions on them because electric power is a state prerogative under the Indian constitution. In an attempt to overcome this problem, the Government has designated the PFC to ensure that the non-budget funding that goes to the SEBs is linked to performance. The PFC works as a specialized financial institution which has a sectoral focus on power and a primary objective of improving the systemic efficiency of the Indian power sector. To achieve this objective, the PFC has established a set of priorities which includes: a) renovation and modernization of generating plants; b) system improvement; c) expansion of transmission and distribution systems; and d) completion of on-going generation projects. The PFC plans to use OFAPs to promote institutional improvements by SEBs, and the PFC, World Bank and ADB plan to limit their lending to only those SEBs with approved OFAPs. Technical, financial, economic, environmental, and private sector-related criteria will be applied by the PFC in reviewing OFAPs.

6.5.8. PFC - Administration and Management: PFC, which is governed by a Board of Directors and headed by the Chairman and Managing Director has its Corporate Office in New Delhi. As of now, it has no regional or

branch offices. The PFC is divided into three groups each headed by a Director: technical, financial, and operations. The PFC also has a small division specializing in the preparation and supervision of OFAPs, but this division still needs to be staffed by a group with experience in disciplines related to the power sector. In order for the PFC to effectively fulfill its mandate, it will need substantial technical assistance and training, as well as additional staff, which are expected over the next few years.

6.5.9. Both Components - Participation of Private Sector:. In view of the fact that India has a mixed economy and the private sector has, over the years, developed as a major contributor to the economy, private sector institutions have emerged as a forceful forum for policy dialogue and intervention. This phenomenon, in keeping with the trend of the liberalization process, is expected to develop further. The importance of energy for industry has led these associations to take a leading role in bringing about policy changes in terms of energy pricing, the involvement of private sector in the generation of energy, the use of avoided cost formula for power purchase, etc. There are many business associations in India, but not more than a dozen have the capabilities and the staff strength to approach the problems of the industry with rigorous research and in the framework of national priorities and concerns. The leaders among these associations are the Federation of Indian Chambers of Commerce and Industry (FICCI), the Associated Chambers of Commerce & Industry of India (ASSOCHAM), the Confederation of Engineering Industry (CEI) and the PHD Chamber of Commerce & Industry. All of these associations have well-defined energy programs.

6.5.10. The involvement of the business associations in the implementation of the Project is a vital means of direct access to the private sector in India. Because the private sector is important in the determination of policy, it becomes all the more necessary that the needs of the private sector and national priorities are harmonized. The business associations can play an important role in this exercise.

6.5.11. There are also some sectoral associations (e.g., the sugar manufacturers association, the air conditioner manufacturers' association, the cable manufacturers' association) concerned about the various economic aspects of the conservation and management of energy. These associations are seen as a major potential force for bringing about a change in the attitude towards energy management at the medium-scale industry level.

7. CONDITIONS AND COVENANTS

7.1 Conditions

The Project Grant Agreement will contain conditions precedent to disbursement in substance as follows:

7.1.1. Prior to the initial disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Grantee shall furnish to AID, in form and substance satisfactory to AID, a statement of the name(s) of person(s) who will be acting on behalf of the Grantee, together with a specimen signature of each such person specified in such statement.

7.1.2. Prior to the first disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, for the Power Finance Corporation component of the project, the PFC shall furnish to AID, in form and substance satisfactory to AID, a copy of a duly executed loan agreement, certified to be true and correct copy of original, between the PFC and either the World Bank or Asian Development Bank for a project concerning investment in the electric power sector.

7.1.3. Prior to the first disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, for the Power Finance Corporation component of the project, the PFC shall furnish to AID, in form and substance satisfactory to AID, evidence that it has designated an Officer-in-Charge at the level of Manager or higher to manage the project.

7.1.4. Prior to the first disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, for the Industrial Development Bank of India component of the project, the IDBI shall furnish to AID, in form and substance satisfactory to AID, evidence that it has designated an Officer-in-Charge at the level of Manager or higher to manage the project.

7.1.5. Prior to disbursement of project funds to PFC for assistance to any State Electricity Board (SEB), an Operational and Financial Action Plan (OFAP), duly approved by PFC, will be required of that SEB. Exceptions to this are: (1) project funds may be provided for the preparation of an OFAP or for environmental analysis related to the preparation of such an OFAP, subject to prior written approval by A.I.D.; and (2) project funds may be provided for short-term technical assistance and training for any SEB as determined necessary by PFC; and (3) other exceptions as the Parties may agree in writing.

7.1.6. PFC will establish procedures for the contracting, commodity procurement, accounting and payment verification. AID will review and document these procedures within one year of signing the Agreement and make recommendations where deficiencies must be corrected to meet AID requirements.

7.2 Covenants

The Project Grant Agreement will contain covenants in substance as follows:

7.2.1. IDBI will create and maintain in operation for the life of the Project a Project Review Committee, chaired by the IDBI, to provide overall guidance and approve all major Project Activities pertaining to IDBI component of the project.

7.2.2. PFC will create and maintain in operation for the life of the Project a Project Review Committee, chaired by the PFC, to provide overall guidance and approve all major Project Activities pertaining to PFC component of the project.

7.2.3. IDBI will prepare annual plans pertaining to IDBI component of the project for PRC review and approval, for utilization of the AID Grant for the succeeding twelve months.

7.2.4. PFC will prepare annual plans pertaining to PFC component of the project for PRC review and approval, for utilization of the AID Grant for the succeeding twelve months.

7.2.5. IDBI and PFC will make all training and receipt of all technical assistance under the Project available to their personnel without regard to gender.

7.2.6. IDBI and PFC will exercise every reasonable effort to require that each of their personnel or other government personnel trained under the Project to work in activities related to the Project or in activities approved for financing under this Project Agreement, in India, for not less than three times the length of his or her training program.

7.2.7. The Parties will establish an evaluation program as part of the project. Except as the Parties otherwise agree in writing, the program will occur at least twice during the implementation of the Project.

ENCAT PROJECT (386-0517)
LOGICAL FRAMEWORK

ANNEX A

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal	Measure of Goal Achievement		
To improve the efficiency of both energy supply and its utilization in the industrial and other sectors including agriculture and commerce.	(i) Reduction in T&D losses by 5 percent (ii) 5 percent increase in Plant Load Factor (of thermal Power Plants) (iii) Decreasing trend in the utilization of captive diesel power plants (iv) Energy savings of 10% in the industrial sector	CEA Statistics Reports of DOP and other GOI departments Industry records Industry association reports	Strong continued World Bank and ADB support for the Indian energy development program Promotion of policies to encourage power generation by private utilities Increased GOI investment in T&D

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose	End of Project Status		
To improve India's technological and management capabilities for the supply of energy and for the efficiency of its end-use by private industry and other sectors, including agriculture and commerce	A national power system modernization and rehabilitation program in place Policy reforms in place that encourage a more reliable power supply and promotion of energy efficient technologies Increased power generation capacity through SEB acceptance of power flowing from industrial cogeneration Improvement in efficiency of energy utilisation through development of capability to design manufacture and implement energy efficient technologies devices and techniques Increased involvement of industry and business associations in promoting energy conservation and policy reforms	Planning Commission and other GOI reports Industry visits Loan agreement of DFIs for cogeneration Industry association reports and meetings Ministry of Industry reports Other site visits	Liberalization of government policies to promote import and domestic manufacture of energy equipment Imposition of conditionalities by PFC for lending to the SEBs World Bank and ADB support the Indian energy program Successful policy dialogue leading to policy reforms regarding energy pricing and avoided cost formulas, import and domestic manufacture of equipment

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs	!Magnitude of Outputs		
Energy Supply Component			
Operational and financial action plans (OFAP) prepared and used	!Incorporated in all major SEBs		
Training of Officers in analytical and planning techniques	!100 Key officers of PFC AND SEB !trained		
PFC and SEB operating personnel trained in areas such as plant modernization techniques, T&D loss reduction techniques etc.	!250 PFC and SEB operating personnel !trained	!Independent review !Company records	!SEBs amenable to planning !interventions
Pre-investment and feasibility studies	!20-30 studies completed	!PFC and IOBI monitoring !reports	!Incentives provided for !conduct of energy audits
Policy-oriented studies	!A series of 10 studies conducted !and disseminated.		!Industry associations !take active interest in !energy conservation
Plant life extension demonstration	!one demonstration unit established !for demonstrating life extension !methodology		!Users amenable to audits
Energy end-use efficiency component:			
Private sector engineering consultancy firms trained in energy management and provision of diagnostic instruments for conduct of energy audit	!Key personnel of 70 firms trained !in energy consulting		
Industry associations strengthened to provide energy services	!Conduct of atleast 50 workshops/ !seminars and awareness programs on !national basis		
	!Provision of consultancy services !to industry as and when requested		
Energy Service Companies formed	!Minimum of one ESCO formed		
Loan portfolio design of energy conservation/cogeneration projects	!60 project reports prepared		
Cogeneration and waste heat recovery demonstration units	!3 units established and visited		
Policy-oriented studies	!A series of studies conducted and !disseminated		

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
INPUTS	IMPLEMENTATION TARGETS		
USAID grant - \$20.0M	USAID - TA, training, commodities, studies, consultancy etc.	Monitoring reports, financial statements, field visits etc.	AID and GOI provide inputs on a timely basis
GOI & private sector - \$6.6M	GOI/Private Sector-Personnel cost of IDBI and PFC counterparts, facilities, international travel cost of Indian participants etc		
BREAKDOWN			
Energy Supply Component			
USAID - 14M T.A. 5.5M, Training 4.7M, Commodities 0.8M, Administration 0.9M, Contin and Infla 2.1M			
GOI - 4.6M T.A. 1.5, Training 1.8, Commodities 0.1M, Administration 0.4, Contin and Infla 0.8M			
Energy end-use component:			
USAID - 6M T.A. 2.6M, Training 0.6M., Commodities 1.8, Project Admin 0.1, Contin and Infla 0.9			
GOI - 2M T.A. 1M, Training 0.1M, Commodities 0.5M, Contin and Infla 0.4M			

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ACTION: AID-3 INFO AMB DCM POL ECON-2 SCI FAS FCS (10)

GHPEVZCZCNEO991
 OO RUEHNE
 DE RUEHC #8375 2322043
 ZNR UUUUU ZZH
 O 202042Z AUG 90
 FM SECSTATE WASHDC
 TO AMEMBASSY NEW DELHI IMMEDIATE 5713
 BT
 UNCLAS STATE 278375

21-AUG-90

TOR: 20:32
 CN: 01461
 CHRQ: AID
 DIST: AID
 ADD:

Proj. 386-0517

AIDAC

E.O. 12356: N/A

TAGS:

SUBJECT: INDIA - ENERGY MANAGEMENT CONSULTATION AND
 TRAINING (EMCAT) PROJECT (386-0517) - PP AUTHORIZATION

REF: A. NEW DELHI 18177; B) STATE 191762; C) NEW
 DELHI 13924; D) NEW DELHI 14590; E) STATE 188598;
 F) NEW DELHI 14131

.08/21/90
 09:30

ACTION:

TDE-3

INFO:

PDPS

RCO

CO

CHRON

BUREAU APPRECIATES THOROUGH MISSION RESPONSE TO ISSUES IDENTIFIED DURING THE PID REVIEW. FOLLOWING LAST MISSION INPUTS (REF A), ALL PID REVIEW ISSUES HAVE BEEN ADEQUATELY ADDRESSED. BUREAU IS PLEASED WITH THE MISSION AGREEMENT WITH AID/W VIEWS ABOUT ESTABLISHING FINANCIAL, OPERATIONAL ENVIRONMENTAL AND PRIVATE SECTOR CRITERIA FOR APPROVAL OF OPERATIONAL AND FINANCIAL ACTION PLANS (OFAPS) AS A KEY ELEMENT FOR PROCEEDING WITH ASSISTANCE TO THE POWER FINANCE CORPORATION. BUREAU ALSO APPRECIATES MISSION CONCURRENCE (REF F) WITH POSITION THAT EMCAT RESOURCES WILL BE AVAILABLE (A) TO SEBS FOR PREPARATION OF OFAP, (B) TO SEBS WITH AN APPROVED OFAP, AND (C) ON AN EXCEPTIONAL BASIS TO ASSIST ANY SEB WITH SIGNIFICANT ENVIRONMENTAL PROBLEMS TO PREPARE ENVIRONMENTAL ASSESSMENTS/IMPACT ANALYSES.

RECENT OPENINGS FOR AN INCREASED ROLE OF PRIVATE FIRMS IN THE ENERGY SECTOR FOR INDIA IS ALSO ENCOURAGING. MISSION SHOULD CONTINUE ALL EFFORTS TO ENHANCE THE PRIVATE SECTOR ROLE AS IT IMPLEMENTS THE PROJECT. AA/PRE HEREBY CONCURS WITH THE PID AS SUBMITTED AND MODIFIED BY ABOVE NEW DELHI CABLES AND DELEGATES AUTHORITY TO THE MISSION DIRECTOR TO AUTHORIZE THE PROJECT FOR AN FY90 OBLIGATION. EAGLEBURGER

BT

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65

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NEW DELHI 18177/01

ACTION AID-3 INFO AMB DCM FAS FCS SCI

RZCZCNEI *
OO RUEHC
DE RUEHNE #8177/01 222 **
ZNR UUUUU ZZH
O 101158Z AUG 90
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC IMMEDIATE 0898
BT
UNCLAS SECTION 01 OF * NEW DELHI 18177

CLASS: UNCLASSIFIED
CHRG: AID 08/09/90
APPRV: DIR (A) :DBPFEI FF
DRFTD: TDE:RWRECKMAN:HO
CLEAR: 1) TDE:NVSESHADR1
2) PDPS:ASISSON
3) PDPS:SFREUNDLIC
DISTR: AID

AIDAC

PROJ. 386-0517

FOR ANE/PD, ANE/SA, DONNA STAUFFER

E.O. 12356: N/A
SUBJECT: ENERGY MANAGEMENT CONSULTATION AND TRAINING
(EMCAT) PROJECT 386-0517-PID ISSUES

- REF: A) STATE 191762
- B) NEW DELHI 13924
- C) NEW DELHI 14590
- D) STATE 168598
- E) NEW DELHI 14131

TDE-3

PDPS

1. SUMMARY: THE PURPOSE OF THIS MESSAGE IS TO RESPOND TO PARAS 3 AND 4 OF REF (A). REF (B) RESPONDED TO PARA 2 OF REF (A) AND TO PROCUREMENT ISSUES RAISED IN PARA 5 OF REF (A) AND IN REF (D), THE INITIAL PID GUIDANCE MESSAGE. USAID HAS THUS RESPONDED TO ALL THE ISSUES RAISED BY AID/W IN THE PID REVIEW PROCESS AND REQUESTS AID/W CONCURRENCE AND DELEGATION OF AUTHORITY TO AUTHORIZE THE PROJECT IN THE FIELD FOR FY 90 OBLIGATION. END SUMMARY.

RCO

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CHRON

2. REF (A) PARA 3: CRITERIA FOR APPROVAL OF OFAPS.

A) THE PURPOSE OF THE OPERATIONAL AND FINANCIAL ACTION PLAN (OFAP) IS TO CREATE A FRAMEWORK FOR THE ACHIEVEMENT OF LONG-TERM FINANCIAL STABILITY OF THE STATE ELECTRICITY BOARDS (SEBS), AS A NECESSARY PRECONDITION AND BASE FOR OTHER SYSTEM IMPROVEMENTS. IT IS UNDERSTOOD BY THE POWER FINANCE CORPORATION (PFC) AND THE DONORS THAT REVIEW OF OFAPS MUST ENGAGE SUBSTANTIVE ISSUES AND MUST INVOLVE HARD NEGOTIATION TO AVOID A "BUSINESS AS USUAL" OUTCOME. THE OFAP MECHANISM WAS CREATED TO SET THE STAGE FOR SUCH NEGOTIATIONS.
B) MISSION HAS DISCUSSED THE QUESTION OF CRITERIA FOR APPROVAL OF OFAPS WITH WORLD BANK AND PFC. THERE IS FULL AGREEMENT THAT THE BASIC CRITERIA NOTED REFTEL (A), I.E. FINANCIAL, OPERATIONAL, ENVIRONMENTAL AND PRIVATE SECTOR ROLE WILL BE INCLUDED. THE DETAILED LIST OF CRITERIA WILL BE DEVELOPED IN CONJUNCTION WITH FINALIZATION OF THE WORLD BANK PFC CREDIT, NOW IN PROCESS.

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C) USAID WILL REVIEW AND COMMENT ON OFAPS, BUT APPROVAL WILL BE GIVEN OR WITHHELD ONLY BY PFC. DONOR REVIEW AND COMMENT WILL HOWEVER CLEARLY PLAY A MAJOR ROLE IN PFC'S REVIEW, SINCE A MAJOR PURPOSE IS TO QUALIFY THE SEBS FOR EVENTUAL DONOR SUPPORT. A KEY OBJECTIVE OF USAID-FUNDED TA & TRAINING UNDER EMCAT IS TO STRENGTHEN PFC'S ABILITY TO CONDUCT A HIGHLY PROFESSIONAL REVIEW AND ALSO TO ASSIST SERS IN PREPARING GOOD OFAPS. WE EXPECT THAT STAFF OF THE CONSULTANT CONSORTIUM (TO BE CONTRACTED FOR PROVIDING SERVICES TO PFC) WILL PROVIDE MAJOR INPUTS FOR THE OFAP REVIEW PROCESS. HOWEVER, FOR ITS INDEPENDENT OFAP REVIEW, MISSION HAS ON ITS STAFF AN ENGINEER WITH OVER 17 YEARS EXPERIENCE IN THE ENERGY FIELD IN INDIA, AS WELL AS STRONG FINANCIAL ANALYSIS STAFF, AND IS PREPARED TO SUPPLEMENT THESE CAPABILITIES IF/WHEN NECESSARY WITH ANOTHER ENERGY SPECIALIST, FOR WHICH AN FSN POSITION HAS ALREADY BEEN ESTABLISHED.

3. REF (A) PARA 4: PRIVATE SECTOR ROLE.

A) AS REPORTED IN REF (C), THE GOI ENERGY MINISTRY HAS RECENTLY PROMULGATED A NEW POLICY WHICH AUTHORIZES AND ENCOURAGES PRIVATE SECTOR INVESTMENT IN NEW GENERATING PLANTS. THIS POLICY FORMALIZED WHAT WAS ALREADY A STRONGLY EMERGING TREND OF STATE-LEVEL EFFORTS TO ENGAGE PRIVATE SECTOR RESOURCES IN AMELIORATING THE POWER CRISIS AND CLEARLY SETS THE SEAL OF APPROVAL ON BROAD INVOLVEMENT OF THE PRIVATE SECTOR IN ELECTRICAL ENERGY SUPPLY INCLUDING COGENERATION.

B) IN KEEPING WITH ITS PAST EFFORTS, WORLD BANK IN REVIEWING POWER INVESTMENT PROGRAMS FOR A GIVEN STATE (INCLUDING SEBS AS REFLECTED IN THE OFAP) WILL GIVE CAREFUL ATTENTION TO THE POTENTIAL FOR PRIVATE SECTOR GENERATION/COGENERATION IN TERMS OF EFFICIENCY, LEAST-COST PLANNING, AND THE MOBILIZATION OF RESOURCES IN VIEW OF SEVERE PUBLIC SECTOR FINANCIAL CONSTRAINTS. PFC HAS AGREED THAT OFAPS WILL INCORPORATE REFERENCE TO POTENTIAL FOR GENERATION/COGENERATION BY THE PRIVATE SECTOR. INCREASINGLY, WE EXPECT THAT THIS PERSPECTIVE WILL ALSO INFLUENCE THE WORK OF THE CENTRAL ELECTRICITY AUTHORITY, INDIA'S POWER PLANNING AGENCY.

C) THE MISSION CERTAINLY CONCURS WITH THE PRIVATE SECTOR THEME IN THE ENERGY END-USE/CONSERVATION COMPONENT AND

HAS INCORPORATED THE PROVISION OF TECHNICAL ASSISTANCE AND OTHER INPUTS TO THE PRIVATE SECTOR VIA THE INDUSTRIAL DEVELOPMENT BANK OF INDIA (IDBI) TO FOSTER COGENERATION DEVELOPMENT. UNDER THIS COMPONENT, EMCAT WILL ALSO WORK CLOSELY WITH INDUSTRIAL ASSOCIATIONS TO PROMOTE COGENERATION. THE MISSION VIEWS COGENERATION AS THE BRIDGE BETWEEN THE SUPPLY AND DEMAND SIDES OF THE INDIAN ENERGY EQUATION. EMCAT IS INTENDED TO LEVERAGE MDB LENDING WITH A KEY OBJECTIVE OF CREATING THE INSTITUTIONAL, PRICING AND TECHNOLOGICAL "ENABLING ENVIRONMENT" FOR SIGNIFICANTLY EXPANDED COGENERATION IN INDIA.

4. WITH THIS RESPONSE TO REF (A), MISSION BELIEVES IT HAS COMPLETED ITS RESPONSE TO ALL ISSUES RAISED BY AID/W DURING PID REVIEW. ANE/PD IS REQUESTED TO OBTAIN NECESSARY AID/W CONCURRENCE AND DELEGATION OF AUTHORITY TO AUTHORIZE THE PROJECT IN THE FIELD FOR FY90 OBLIGATION. WE WOULD APPRECIATE REPLY ASAP. CLARK

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NEW DELHI 18177

68

(9) ORIGIN: AID-3 INFO AMB DCM POL ECON-2 SCI FAS

VZCZCNEI *
 RR RUEHC
 DE RUEHNE #4590 177 **
 ZNR UUUUU ZZH
 R 260540Z JUN 90 ZFD
 FM AMEMBASSY NEW DELHI
 TO SECSTATE WASHDC 8757
 BT
 UNCLAS NEW DELHI 14590

CLASS: UNCLASSIFIED
 CHAR3: AID 8/22/90
 APPRV: D:RNBKLEY
 DRFTD: D:RNBKLEY:CK
 CLEAR: PDPS/PDI:ASISSON
 DISTR: AID
 ORIGIN: OCR

AIDAC

PROJ. 386-0517

E.O. 12356: N/A
 SUBJECT: EMCAT: PRIVATE SECTOR POWER

1. AT A PRESS CONFERENCE HELD ON JUNE 20, 1990, THE MINISTER OF POWER ANNOUNCED THE FOLLOWING CHANGES IN GOVERNMENT POLICY DESIGNED TO ENCOURAGE INVESTMENT BY PRIVATE SECTOR FIRMS (DOMESTIC AND FOREIGN) IN THE ELECTRIC POWER SECTOR:

-- PRIVATE SECTOR FIRMS MAY OWN AND OPERATE GENERATING STATIONS AND SELL THE OUTPUT TO EXISTING PUBLIC UTILITIES.

-- PRIVATE SECTOR FIRMS MAY, IN ASSOCIATION WITH EXISTING UTILITIES, OWN AND OPERATE ELECTRIC DISTRIBUTION COMPANIES.

-- A RATE OF RETURN ON EQUITY OF FIVE PERCENT ABOVE THE RESERVE BANK OF INDIA'S SPECIFIED RATE WILL BE ALLOWED (COMPARABLE TO THE FEDERAL RESERVE'S DISCOUNT RATE; THE CURRENT SPECIFIED RATE IS TEN PERCENT).

-- EACH LICENSE GRANTED WILL BE VALID FOR 30 YEARS.

-- COMPANIES INVESTING IN ELECTRIC POWER WILL BE EXEMPT FROM THE PROVISIONS OF THE MONOPOLIES AND RESTRICTIVE TRADE PRACTICES ACT.

-- THE DEBT/EQUITY RATIO ALLOWED WILL BE FOUR TO ONE, WITH A STIPULATION THAT (A) THE PROMOTOR'S INVESTMENT MUST BE AT LEAST 11 PERCENT AND (B) NO MORE THAN 40 PERCENT OF TOTAL INVESTMENT CAN BE RAISED FROM GOVERNMENT OWNED FINANCIAL INSTITUTIONS.

-- ELECTRICITY SALES TO STATE ELECTRICITY BOARDS WILL BE BASED ON A TWO-PART TARIFF.

-- A SINGLE CLEARANCE POINT WILL BE ESTABLISHED FOR THE PROCESSING OF APPLICATIONS.

2. ON JUNE 21, 1990, BOTH MAJOR INDIAN CHAMBERS OF COMMERCE (THE ASSOCIATION OF CHAMBERS OF COMMERCE -- ASSOCHAM; AND THE FEDERATION OF CHAMBERS OF COMMERCE AND INDUSTRY -- FICCI) ENDORSED AND SUPPORTED THE

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CHANGES. ALSO, ON THURSDAY SHARE PRICES OF THE FOUR PRIVATE SECTOR POWER COMPANIES QUOTED ON INDIA'S STOCK EXCHANGES ROSE BY ABOUT 20 PERCENT (PRIVATE SECTOR INSTALLED GENERATING CAPACITY TOTALS 2,490 MW WITH AN ADDITIONAL 725 MW UNDER CONSTRUCTION; AND A SIGNIFICANT NUMBER OF INDIA'S CONSUMERS ARE SUPPLIED BY PRIVATE SECTOR POWER COMPANIES).

3. COMMENT: THE CHANGES LOOK GOOD, BUT IT WILL BE IMPORTANT TO TAKE A HARD LOOK AT THE DETAILS. FOR EXAMPLE, ABOUT 40 PERCENT OF THE DEBT FINANCING WILL NEED TO BE RAISED FROM THE MARKET THROUGH BOND ISSUES, WHICH MAY REQUIRE A TWO TO THREE PERCENTAGE INCREASE IN CURRENT MARKET RATES IN ORDER TO SELL THE ISSUE; AND WE WONDER WHETHER THE GOVERNMENT WILL ALLOW THESE HIGHER RATES TO BE DEDUCTED AS EXPENSES WHEN CALCULATING RATES OF RETURN. ALSO, WE WILL NEED TO SEE WHETHER THE QUOTE SINGLE CLEARANCE POINT UNQUOTE WILL ACTUALLY SPEED UP THE PROCESS OR WORK AS JUST ANOTHER BUREAUCRATIC HURDLE. CLARK

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#4590

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UNCLASSIFIED NEWDELHI 314590

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(C) ORIGIN: AID-3 INFO AMB TCM POL ECON SCI FAS

VZCZCNEI *
RR RUEHC
DE RUEHNE #4131 170 **
ZNR UUUUU ZZH
P 191254Z JUN 90
FM AMEMPASSY NEW DELHI
TO SECSTATE WASHDC 8462
BT
UNCLAS NEW DELHI 14131

CLASS: UNCLASSIFIED
CHRG: AID 6/19/90
APPRV: D:RNBKLEY
DRFTD: D:RNBKLEY:CK
CLEAR: NONE
DISTR: AID
ORGIN: OCR

AIDAC

PROJ. 386-0517

FCF DAA/ANE REESE FROM BAKLEY

F.O. 12356: N/A
SUBJECT: FMCAT GUIDANCE

REF: (A) NEW DELHI 13924 (B) STATE 191752

1. FURTHER TO PARAGRAPH SIX OF REF (A) AND IN ACCORDANCE WITH GUIDANCE PROVIDED IN REF (B), PLEASE BE ADVISED THAT WE HAVE REACHED AGREEMENT WITH WORLD BANK'S NEW DELHI OFFICE THAT NEITHER ITS FUNDS NOR OUR TECHNICAL ASSISTANCE WILL BE USED FOR LIFE EXTENSION ANALYSIS/REHABILITATION OF EXISTING ASSETS OF STATE ELECTRICITY BOARDS THAT DO NOT HAVE AN APPROVED OPERATIONAL AND FINANCIAL PLAN (OFAP). PURSUANT TO THAT AGREEMENT, WE HAVE TERMINATED NEGOTIATIONS WITH GENERAL ELECTRIC FOR ITS REVIEW OF THE TALCHER THERMAL POWER STATION IN THE STATE OF ORISSA, SINCE IT IS UNLIKELY THAT THE ORISSA STATE ELECTRICITY BOARD WILL BE ABLE TO PROVIDE AN ACCEPTABLE OFAP IN THE FORESEEABLE FUTURE. CLARK

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#4131

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(9) ORIGIN: AID-3 INFO AMB DCM POL ECON SCI FAS

VZCZCNEI *
OO RUEHC
FM RUEHNE #3924/01 186 **
ZNR UUUUU ZZH
O 151231Z JUN 90
FM AMEMBASSY NEW DELHI
TO SECSTATE WASHDC IMMEDIATE 0300
BT
UNCLAS SECTION 01 OF 02 NEW DELHI 13924

CLASS: UNCLASSIFIED
CRJF: AID 6/15/90
APPRV: D:RNBKLEY
DRFTD: D:RNBKLEY:CK
CLEAR: 1. PDPS:TMHONEY
2. PDPS/PDI:ASISSON
3. TDE:RKBERRY
DISTR: AID
ORGIN: OCR

PROJ. 386-0517

AIDAC

FOR DAA/AMB REESE FROM BAKLEY

E.O. 12356: N/A
SUBJECT: FMCAT GUIDANCE

REF: STATE 191762

1. THANK YOU FOR THE GUIDANCE AND CLARIFICATION PROVIDED BY RFFTEL. WE HAVE INFORMED THE WORLD BANK THAT, SUBJECT TO THE RESULTS OF THEIR NEGOTIATIONS, WE WILL PROVIDE ASSISTANCE TO THE POWER FINANCE CORPORATION AND, UNDER CONDITIONS STILL UNDER REVIEW, TO SELECTED STATE ELECTRICITY BOARDS (SEB'S).

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2. GIVEN THE MAGNITUDE OF THE INFORMATION REQUESTED, WE WILL RESPOND THROUGH A SERIES OF CABLES AS THE MATERIAL IS DEVELOPED. THIS CABLE REPRESENTS OUR FIRST RESPONSE.

3. CONTRACTING METHOD. ALL ASSISTANCE WILL BE OBTAINED THROUGH FULL AND OPEN COMPETITION ALTHOUGH THERE COULD BE INSTANCES WHERE SOLE SOURCE PROCUREMENT MAY BE THE ONLY FEASIBLE OPTION. FOR EXAMPLE, THE ANALYSIS OF A USED WESTINGHOUSE TG SET MAY REQUIRE AN EXPERT FROM WESTINGHOUSE.

4. AS WE EXPLAINED IN NEW DELHI 12607, WE HAVE STILL NOT DECIDED WHETHER IT WOULD BE DESIRABLE TO OBTAIN ALL OF THE SERVICES FROM A CONSORTIUM OF FIRMS -- THAT WOULD BE SELECTED THROUGH FULL AND OPEN COMPETITION -- OR TO OBTAIN THE SERVICES, AS NEEDED, THROUGH INDIVIDUAL PROCUREMENT ACTIONS EACH OF WHICH WOULD BE SELECTED THROUGH FULL AND OPEN COMPETITION. THE FORMER METHOD ALLOWS FOR LESS PAPERWORK AND THE ABILITY TO RESPOND RAPIDLY TO NEEDS AS THEY EMERGE, BUT COULD RESULT IN SOME ACTIVITIES BEING COVERED BY LESS THAN FIRST RANK CONSULTANTS. THE LATTER, WHILE BEING MUCH MORE CUMBERSOME, WILL (GENERALLY) ENSURE THAT ALL EXPERTS ARE OF HIGH QUALITY.

5. WE ASSUME PARAS THREE AND FOUR ABOVE SATISFY AID/W CONCERNS ON THIS POINT.

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6. USE OF TA FUNDS FOR LIFE EXTENSION ANALYSES FOR SEB'S WITHOUT AN APPROVED OPERATIONAL AND FINANCIAL ACTION PLAN. AS MENTIONED PREVIOUSLY, THERE ARE MORE THAN 250 POWER STATIONS IN INDIA, MOST OF WHICH REQUIRE REHABILITATION -- SOME MINOR AND SOME MAJOR. GIVEN THE SCARCITY OF CAPITAL TO FINANCE NEW FACILITIES, THE FIFTH FIVE-YEAR PLAN, NOW IN DRAFT, PLACES EMPHASIS ON EFFICIENCY -- ESPECIALLY IMPROVEMENTS IN THE OPERATING PERFORMANCE OF EXISTING ASSETS. OVER THE NEXT FEW YEARS, APPROXIMATELY TEN BILLION U.S. DOLLARS WILL BE DEVOTED TO IMPROVING THE PERFORMANCE OF THE EXISTING POWER STATIONS. MOST OF THE FINANCIAL RESOURCES FOR THESE REHABILITATIONS WILL BE PROVIDED EITHER FROM INTERNAL CASH GENERATIONS OF THE SEB'S OR FROM EQUITY/ECA INJECTIONS FROM THE STATE GOVERNMENTS. WORLD BANK AND ADB FUNDS WILL, OF COURSE, BE AVAILABLE FOR A PART OF THIS EFFORT, AS WILL THE FUNDS FROM OTHER DONOR AGENCIES. BUT, AS AID/W MUST KNOW, INDIA PROVIDES NINETY-FIVE (95) PERCENT OF ITS DEVELOPMENT RESOURCES FROM ITS OWN SAVINGS AND ONLY DEPENDS ON FOREIGN SAVINGS FOR ABOUT FIVE (5) PERCENT, OF WHICH THE COMBINED ASSISTANCE FROM THE WORLD BANK AND ADB REPRESENTS ONLY ABOUT TWO (2) PERCENT (OR ABOUT THIRTY-THREE PERCENT OF THE FOREIGN FINANCIAL FLOWS). THUS, LIMITING OUR ASSISTANCE IN THE REHABILITATION/LIFE EXTENSION ARFA WILL SEVERELY LIMIT U.S. PROCUREMENT. WHILE WE DO NOT HAVE FIGURES ON THE AMOUNT OF PROCUREMENT WHICH WILL BE LOST IF WE DO NOT PARTICIPATE IN THIS ACTIVITY, WE CAN CITE THE ACTIVITY WE ARE NOW NEGOTIATING WITH GENERAL ELECTRIC AS AN EXAMPLE; THAT IS, THE TALCHER THERMAL POWER PROJECT. IT IS LOCATED IN THE STATE OF ORISSA, WHICH IS UNLIKELY TO HAVE AN APPROVED OFAP IN THE NEAR FUTURE (MAYBE NEVER). THE TC UNITS ARE FROM GENERAL ELECTRIC, THE BOILER IS FROM FOSTER-WHEELER, AND ABOUT HALF OF THE INSTRUMENTATION IS FROM U.S. SUPPLIERS. GENERAL ELECTRIC WILL REVIEW THE ENTIRE PLANT TO DETERMINE WHAT EQUIPMENT/PARTS MUST BE REPLACED TO ENSURE A LONGER PLANT LIFE WITH INCREASED ENERGY OUTPUT. GENERAL ELECTRIC'S CONSERVATIVE ESTIMATE OF U.S. PROCUREMENT THAT WILL RESULT FROM THIS EXERCISE IS USD TEN MILLION. THIS ESTIMATE CAN BE CONFIRMED BY MR. J. CARR, MANAGER, INTERNATIONAL SALES SUPPORT, OR MR. J. MERRY, BA PROGRAMS, AT GENERAL ELECTRIC'S SCHENECTADY OFFICE. LASTLY, PARA TWO OF REFTEL STATES THAT DENYING

AID FUNDS FOR THIS ACTIVITY QUOTE AVOIDS SUPPORT TO UNJUSTIFIABLE PROJECTS UNQUOTE. PLEASE BE ADVISED THAT WE ARE NOT DISCUSSING NEW PROJECTS PER SE, BUT ONLY THE REHABILITATION OF EXISTING ASSETS.

7. WE ARE AMBIVALENT ON THE ISSUE DISCUSSED IN PARA SIX ABOVE. WE CAN LIMIT OUR FUNDS TO ONLY THOSE STATES WITH AN APPROVED OFAP, BUT THERE WILL BE A VERY LARGE OUTCRY FROM THE INDUSTRY, WHICH WE ASSUME AID/W WILL HANDLE. PLEASE ADVISE.

8. GOI ROADBLOCKS TO U.S. PROCUREMENT. WE ARE UNSURE OF ISSUE BEING RAISED HERE. INDIA, TO OUR KNOWLEDGE, DOES NOT DISCRIMINATE AGAINST U.S. GOODS AND SERVICES. IN FACT, INDIAN COMPANIES -- BOTH PUBLIC AND PRIVATE -- HAVE A DECIDED PREFERENCE FOR U.S. PROCUREMENT. INDIA DOES, HOWEVER, HAVE A SHORTAGE OF FOREIGN EXCHANGE AND IT IS MUCH EASIER FOR A COMPANY TO PURCHASE GOODS AND SERVICES OF INDIAN ORIGIN, EVEN IF THESE GOODS AND SERVICES ARE OF A LESSER QUALITY, RATHER THAN WAIT IN THE QUEUE FOR A FOREIGN EXCHANGE ALLOCATION. ALSO, AS YOU KNOW, PART OF INDIA'S FOREIGN EXCHANGE RESOURCES COME FROM BILATERAL DONORS WITH TIED FOREIGN AID. IN THESE CASES, THE GOI TRIES TO IDENTIFY PROJECTS WHERE THE TIED AID CAN BE USED ECONOMICALLY AND EFFICIENTLY. AND, WE HAVE BEEN ACTIVE IN CONVINCING OTHER DONORS TO FINANCE A HIGHER PORTION OF LOCAL CURRENCY COSTS, THEREBY REDUCING THE TIED PORTION OF THE ASSISTANCE AND INCREASING INDIA'S FREE FOREIGN EXCHANGE RESERVES (OUR MOST NOTABLE SUCCESS HAS BEEN WITH THE GOVERNMENT OF JAPAN; SEE THE QUALITY CONTROL OF HEALTH TECHNOLOGIES PROJECT). LASTLY, ALL WORLD BANK AND ADB PROCUREMENT IS THROUGH INTERNATIONAL COMPETITIVE BIDDING WITH REPEAT WITH A FIFTEEN (15) PERCENT PREFERENCE FOR DOMESTIC SUPPLIERS. BUT, ASIDE FROM THE FX ISSUES, THE MAJOR IMPEDIMENT TO U.S. PROCUREMENT COMES AT THE PROJECT DESIGN STAGE WHERE CONSULTANTS CONSTRUCT SPECIFICATIONS WHICH PROVIDE A PREFERENCE FOR EQUIPMENT FROM THEIR COUNTRY OF ORIGIN. THIS PROJECT SEEKS TO NEGATE THIS ADVANTAGE. PLEASE ADVISE IF YOU NEED MORE INFORMATION ON THIS ISSUE. CLARK

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(B) ACTION: AID-3 INFO AMB DCM POL EON SCI FAS

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14-JUN-90 TOR: 21:27
CN: 48933
CHRG: AID
DIST: AID
ADD:

Proj. 386-0517

AIDAC FOR DIP. BAKLEY FROM DAA/ANE T. REESE

E.O. 12356: N/A
TAGS:
SUBJECT: EMCAT GUIDANCE

REFS: (A) NEW DELHI 12603 (B) STATE 16898

1. APPRECIATE YOUR THOUGHTFUL RESPONSE TO THE ANPAC GUIDANCE ON THE EMCAT PROJECT, AND YOUR CONCERN OVER FORTHCOMING IBRD NEGOTIATIONS. YOU CAN ASSURE THE BANK THAT AID DOES INDEED INTEND TO AUTHORIZE THE PROJECT THIS FISCAL YEAR ASSUMING THAT THE ISSUES DESCRIBED BELOW ARE RESOLVED DURING THE PP DESIGN.

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10:00
ACTION:

2. APPLICATION OF USAID TA

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REFTEL A PARA 8 INDICATES THAT (A) USAID TA SHOULD BE AVAILABLE TO EVERY SEB FOR THE PREPARATION OF AN OPERATIONAL AND FINANCIAL ACTION PLAN (OFAP), (B) AVAILABLE FOR ALL SEBS WITH AN APPROVED OFAP, AND (C) AVAILABLE TO ALL UTILITIES FOR ENVIRONMENTAL ASSESSMENT/IMPACT HELP AND FOR REHABILITATION/LIFE EXTENSION ANALYSIS.

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ANE CONCURS WITH THE MISSION POSITION THAT OUR TA CAN BE

USED IN CATEGORIES A AND B. WITH REGARD TO CATEGORY C, WHILE THE RATIONALE FOR THE USE OF LIMITED TA RESOURCES FOR THIS CATEGORY IS THAT STATE BUDGET RESOURCES COULD BE USED FOR PROCUREMENTS FROM WHICH U.S. FIRMS MIGHT BENEFIT -- THE POTENTIAL FOR TRADE GAINS FROM INDIAN STATE RESOURCES IS UNCLEAR. IT WOULD SEEM THAT THE GREATEST TRADE BENEFITS WOULD BE ACHIEVED BY ASSURING A LEVEL PLAYING FIELD FOR PROJECTS THAT WILL BE FINANCED BY INTERNATIONAL COMPETITIVE BID WITH IBRD/ADB FUNDS. NOT PROVIDING TA TO SEBS WITHOUT AN APPROVED OFAP DOES NOT UNDERCUT OUR COLLABORATIVE SUPPORT FOR THE IBRD/ADB LENDING; RATHER IT FOCUSES OUR IMPACT AND PROBABLY AVOIDS SUPPORT TO UNJUSTIFIABLE PROJECTS. BY APPLYING OUR LIMITED TA RESOURCES IN SUPPORT OF THE IBRD/ADB/PFC APPROVED UTILITIES (I.E., CATEGORIES A AND B), WE CAN ACHIEVE BOTH OUR TRADE AND DEVELOPMENT OBJECTIVES. IF MISSION CONTINUES TO BELIEVE THAT SUBSTANTIAL TRADE BENEFITS CAN BE DERIVED FROM CATEGORY C ASSISTANCE,

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PLEASE PROVIDE ADDITIONAL EVIDENCE IN SUPPORT OF THIS POINT.

WE WOULD FURTHER AGREE THAT OUR TA COULD BE USED ON AN EXCEPTIONAL BASIS TO ASSIST ANY SEB WITH SIGNIFICANT ENVIRONMENTAL PROBLEMS TO PREPARE ENVIRONMENTAL ASSESSMENTS/IMPACT ANALYSES.

3. CRITERIA FOR APPROVAL OF OFAPS

CENTRAL TO IMPROVED SEB PERFORMANCE IS THE PREPARATION OF AN ACCEPTABLE OFAP. PARA 5 OF REFTTEL A STATES THAT AN SEB MUST "SUBMIT AN OPERATIONAL AND FINANCIAL ACTION PLAN WHICH WILL INDICATE FINANCIAL PROJECTIONS FOR A MINIMUM OF THREE FORWARD YEARS, LEAST COST INVESTMENT PLANS AND REHABILITATION/LIFE EXTENSION PLANS FOR ITS EXISTING ASSETS". WHAT IS NOT YET CLEAR IS WHAT CRITERIA WILL BE APPLIED TO APPROVE AN OFAP BY THE PFC (AND BY THE IBRD, ADB AND USAID). WITHOUT EXPLICIT CRITERIA, A BUSINESS AS USUAL PLAN COULD RESULT. EXAMPLES OF CRITERIA THAT MIGHT BE CONSIDERED FOR INCLUSION ARE A) FINANCIAL CRITERIA: E.G., ESTABLISHMENT OF SELF-FINANCING RATIOS AND PROGRESS TOWARD ACHIEVING THEM, TARIFF MOVEMENT TOWARD LONG-RUN MARGINAL COSTS; B) OPERATIONAL CRITERIA: E.G., STAFFING/ELECTRICITY SALES RATIOS, C) INCLUSION OF ENVIRONMENTAL IMPACT ANALYSIS; D) PRIVATE SECTOR CRITERION: E.G., ADEQUATE TREATMENT OF PRIVATE POWER GENERATION. EQUALLY UNCLEAR IS HOW USAID APPROVAL WILL BE PROVIDED AND LEVEL OF STAFF INVOLVEMENT THIS WILL

REQUIRE. WILL WE RELY ON CONTRACTOR RECOMMENDATIONS OR MAINTAIN AN AID STAFFER WITH REQUISITE TECHNICAL AND FINANCIAL SKILLS?

4. PRIVATE SECTOR ROLE

THE PID GUIDANCE CONCLUDED THAT INCREASED PRIVATE SECTOR INVOLVEMENT IN POWER GENERATION CAN BE ACHIEVED THROUGH BOTH PROJECT COMPONENTS. WHILE REFTTEL A MENTIONED THAT THE OFAP WOULD BE A PERFECT VEHICLE TO ADDRESS PRIVATE SECTOR ISSUES IT WAS NOT CLEAR THAT THIS WOULD BE A REQUIRED PART OF THE OFAP. WE RECOMMEND THAT THE OFAP EXPLICITLY INCLUDE A SECTION THAT ADDRESSES THE SEB'S ANALYSIS OF THE ROLE OF THE PRIVATE SECTOR IN POWER GENERATION (E.G., INDUSTRIAL COGENERATION AND INDEPENDENT POWER PLANTS SELLING POWER TO THE SEBS.

THE INCORPORATION OF PRIVATE SECTOR CRITERIA IS REASONABLE AND ACHIEVABLE GIVEN THE GOI LIBERALIZATION AND GRADUAL MOVEMENT TO EXPAND THE PRIVATE SECTOR ROLE IN POWER GENERATION. WE ASSUME THE MISSION CONCURS WITH

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THE PRIVATE SECTOR THEME IN THE IDBI COMPONENT AS WELL AND WILL INCORPORATE TA FOR FOSTERING COGENERATION DEVELOPMENT.

5. ACTION REQUESTED: CONSIDERING THE AMPLIFICATIONS IN YOUR CABLE, WE CONCUR THAT IT WILL NOT BE NECESSARY TO SUBMIT FORMALLY KEY SECTIONS OF THE PP TO AID/W FOR REVIEW AND APPROVAL. INSTEAD, THE MISSION SHOULD SUMMARIZE AND REPORT BY CABLE FOR OUR CONCURRENCE MAJOR CONCLUSIONS OF THE PP DESIGN EFFORT IN THE FOLLOWING AREAS: CRITERIA FOR USE OF AID TECHNICAL ASSISTANCE FUNDS FOR THE PFC AND FOR THE SEBS BEYOND THE OFAP STAGE; DESCRIPTION OF IBRD/ADE CRITERIA AND APPROACH FOR LENDING INCLUDING CRITERIA FOR APPROVAL OF AN OFAP AND HOW USAID WILL MANAGE ITS APPROVAL PROCESS; AND APPROACH TO FOSTERING PRIVATE POWER GENERATION. IF THE CONTRACTING METHOD SELECTED IS OTHER THAN FULL COMPETITION, THE MISSION SHOULD ALSO PROVIDE A DESCRIPTION AND RATIONALE FOR THE METHOD TO BE UTILIZED. FINALLY, THE CABLE SHOULD INCLUDE A DISCUSSION OF POSSIBLE JOI ROADBLOCKS TO US PROCUREMENT. FOR THOSE SECTIONS OF GREAT COMPLEXITY OR RELATIVE LENGTH, SUPPLEMENTARY INFORMATION MIGHT BE FAXED TO THE BUREAU.

6. FOLLOWING RECEIPT OF CABLE AND CONCURRENCE BY AID/W, MISSION WILL BE DELEGATED AUTHORITY TO AUTHORIZE THE PROJECT. BAKER

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(9) ORIGIN: AID-3 INFO AMB DCM POL ECON SCI FAS

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CLASS: UNCLASSIFIED
 CHR3K: AID 5/31/90
 APPRV: A/D:DBFFEIFFER
 DRFTD: D:RNBKLEY:CK
 CLEAR: 1. TIE:R#BECKMAN
 2. PDPS:TMAGNEY
 3. PDPS:ASISSON
 DISR: AID

AIDAC

Proj. 386-0517

FOR ANE/PD R. NACHTRIEB FROM BAKLEY

E.O. 12356: N/A
 SUBJECT: ENERGY MANAGEMENT CONSULTATION AND TRAINING
 PROJECT (EMCAT) - PID GUIDANCE

REF: STATE 168598

1. SUMMARY. THIS CABLE RESPONDS PRIMARILY TO THE COMMENTS AND QUESTIONS RELATED TO THE QUOTE UTILITY COMPONENT UNQUOTE OF THE SUBJECT PROJECT COVERED IN REFTEL. IT ALSO RESPONDS BRIEFLY TO COMMENTS ON THE QUOTE INDUSTRIAL ENERGY EFFICIENCY COMPONENT UNQUOTE AND ON OTHER CONCERNS SUCH AS MULTILATERAL BANK PARTICIPATION, PROCUREMENT REGULATIONS, AND TECHNICAL ASSISTANCE. WITH THIS RESPONSE, USAID/INDIA BELIEVES IT HAS ADEQUATELY RESPONDED TO CONCERNS OF ANPAC AND THAT SUBMISSION OF QUOTE THE SUBSTANCE OF THE PP TO ANE FOR REVIEW AND APPROVAL UNQUOTE IS NOT NECESSARY. IN THE INTERESTS OF A TIMELY FY 90 OBLIGATION, MISSION REQUESTS FULL DELEGATION TO AUTHORIZE PP IN THE FIELD. END SUMMARY.

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2. THE SUPPORT PLANNED FOR THE UTILITY COMPONENT INCLUDES TECHNICAL ASSISTANCE AND TRAINING FOR: FINANCIAL AND ECONOMIC ANALYSIS OF ELECTRIC UTILITIES INCLUDING PRICING; INVESTMENT PLANNING OF PLANT CAPACITY USING MODERN AND SOPHISTICATED TOOLS SUCH AS A WASP MODEL; OPERATION AND MAINTENANCE OF GENERATION, TRANSMISSION AND DISTRIBUTION FACILITIES; PROCEDURES AND POLICIES FOR THE BUYING AND SELLING OF POWER BETWEEN UTILITIES AND PRIVATE SECTOR ENTITIES (CAPTIVE, CO-GENERATION, BUY-OWN OPERATION AND BUY-OWN TRANSFER); ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL IMPACT STATEMENTS; LIFE EXTENSION ANALYSIS OF EXISTING FACILITIES; AND FEASIBILITY STUDIES FOR SEPARATE PROJECTS. THE ASSISTANCE WILL BE PROVIDED THROUGH TRAINING (BOTH IN INDIA AND ABROAD); INDIVIDUALS OR CORPORATE CONSULTANTS TASKED TO UNDERTAKE SPECIFIC ASSIGNMENTS (SUCH AS THE PREPARATION OF MODEL PURCHASE AGREEMENTS, EXPERTS ON SPECIFIC MATTERS SUCH AS THE ENVIRONMENT, LONG RUN MARGINAL COST APPLICATIONS, FINANCIAL RESTRUCTURING OF BANKRUPT UTILITIES); AND

SOME RELATED MATERIALS (TRAINING MANUALS, SOFTWARE).

3. ALL ASSISTANCE FOR THE UTILITY COMPONENT WILL BE EITHER TO OR THROUGH THE POWER FINANCE CORPORATION (PFC). THE ASSISTANCE TO PFC WILL BE DIRECTED TO TRAINING AND ASSISTING PFC'S STAFF IN ALL ASPECTS OF THE ELECTRIC POWER UTILITY ECONOMICS, FINANCING, MANAGEMENT, OPERATION AND PLANNING TO THE EXTENT NEEDED (PFC PRESENTLY HAS 60 PROFESSIONAL EMPLOYEES WHOSE ABILITIES RANGE FROM VERY GOOD TO SLIGHTLY BELOW AVERAGE, COMPARED TO INTERNATIONAL STANDARD). MOST IMPORTANTLY, WE WILL BE SUPPORTING THE CREATION OF A POLICY STUDIES UNIT IN PFC TO FOCUS ON ECONOMICS AND PRIVATE SECTOR ISSUES. ASSISTANCE WILL ALSO BE PROVIDED TO PFC FOR THE MANAGEMENT AND OPERATION OF A FINANCIAL INSTITUTION SINCE THAT IS WHAT PFC IS. IT PRESENTLY RAISES THE EQUIVALENT OF USD 500 MILLION BY FLOATING ITS OWN BONDS. IT ALSO WILL BE BORROWING FROM THE INTERNATIONAL COMMERCIAL MARKET THROUGH THE ASIAN DEVELOPMENT BANK (ADB) COMPLEMENTARY FINANCING SCHEME.

4. THE TECHNICAL ASSISTANCE THROUGH PFC WILL BE TO EXISTING ELECTRIC UTILITIES BOTH PUBLIC AND PRIVATE (WHILE THE FIGURES AREN'T AVAILABLE, WE BELIEVE THAT THE INSTALLED GENERATION CAPACITY, TRANSMISSION AND DISTRIBUTION NETWORK AND NUMBERS OF CUSTOMERS SERVICED BY INDIA'S PRIVATE SECTOR POWER COMPANIES IS SECOND ONLY TO THE U.S.) AND NEW FACILITIES PLANNED BY EITHER THE PUBLIC OR PRIVATE SECTOR. IT IS NOT POSSIBLE TO DETERMINE WITH ANY PRECISION, AT THIS TIME, THE TYPES OR QUANTITY OF THIS ASSISTANCE SINCE PFC CANNOT FORCE AN ENTITY TO BORROW FROM IT ESPECIALLY IF ITS TERMS AND CONDITIONS (E.G., RAISE PRICES) ARE TOO ONEROUS. NOR CAN PFC DETERMINE IN ADVANCE THE QUALITY OF THE WORK SUBMITTED TO IT FOR REVIEW AND APPROVAL AND, ULTIMATELY, A LOAN. HOWEVER, GIVEN THE ENORMOUS FINANCIAL NEEDS OF THE ELECTRIC POWER SECTOR OVER THE NEXT FIVE YEARS (50 TO 30 BILLION U.S. DOLLARS) AND THE LACK OF STATE BUDGET RESOURCES TO CONTINUE FUNDING THEIR ELECTRICITY BOARDS, ALL UTILITIES ARE EXPECTED TO AT LEAST TRY TO BORROW FROM PFC. ALSO, MOST SUBMISSIONS (APPLICATIONS) FOR LOANS ARE EXPECTED TO BE DEFICIENT IN SOME ASPECTS (FINANCIAL PROJECTIONS WILL BE UNIFORMLY WEAK).

PROJECT (EMCAT) - BID GUIDANCE

5. PROCEDURALLY, THE MODUS OPERANDI AGREED TO AMONG PFC, USAID, THE WORLD BANK AND ADB IS THAT BEFORE A UTILITY IS ELIGIBLE FOR A LOAN USING EITHER WORLD BANK OR ADB FUNDS (ESTIMATED TO BE ABOUT USD FIVE BILLION OVER THE NEXT FIVE YEARS WHEN COMPLEMENTARY CO-FINANCING IS INCLUDED), IT MUST SUBMIT A QUOTE OPERATIONAL AND FINANCIAL ACTION PLAN (OFAP) UNQUOTE WHICH INTER ALIA WILL INDICATE FINANCIAL PROJECTIONS FOR A MINIMUM OF THREE FORWARD YEARS, LEAST COST INVESTMENT PLANS AND REHABILITATION/LIFE EXTENSION PLANS FOR ITS EXISTING ASSETS. THE OFAP ALSO PROVIDES A PERFECT VEHICLE TO ADDRESS PRIVATE SECTOR ISSUES IN INVESTMENT PLANNING. OFAP INVESTMENT SEQUENCING WILL IDENTIFY POINTS WHERE PROJECTS COULD BE PUT OUT FOR BID TO PRIVATE SECTOR INVESTORS/OPERATORS, WHERE CO-GENERATION OPPORTUNITIES CAN BE MOST PROFITABLY EXPLOITED, ETC. THESE ACTION PLANS MUST BE APPROVED BY THE WORLD BANK, ADB AND USAID. THE TEXT OF THE MEMORANDUM OF UNDERSTANDING AMONG USAID, THE WORLD BANK AND ADB HAS BEEN FORWARDED BY SEPTEL.

6. INITIALLY USAID-FINANCED TECHNICAL ASSISTANCE IS EXPECTED TO BE REQUIRED TO ASSIST EACH UTILITY IN THE PREPARATION OF AN OFAP (TWO HAVE BEEN SUBMITTED TO DATE, AND NEITHER ONE IS APPROVABLE IN ITS PRESENT FORM ALTHOUGH THE ONE FROM THE PUNJAB STATE ELECTRICITY BOARD IS CLOSE) AND IN THE PLANT-BY-PLANT REHABILITATION ANALYSIS (THERE ARE 150 POWER STATIONS IN INDIA). SUBSEQUENTLY, AND ASSUMING AN OFAP IS APPROVED, WE EXPECT USAID ASSISTANCE WILL BE REQUIRED TO BRING FEASIBILITY STUDIES UP TO INVESTMENT LEVELS, ASSESSMENT OF SPECIFIC ENVIRONMENTAL PROBLEMS, RATE STRUCTURE ANALYSIS AND PURCHASE AGREEMENTS WITH PRIVATE SECTOR UTILITIES (ALTHOUGH THERE ARE AT LEAST A DOZEN PRIVATE SECTOR COMPANIES THAT ARE CONSIDERING INVESTMENT IN GENERATION PLANTS BUT CLOSURE CANNOT BE REACHED UNTIL OVERALL TARIFF PROBLEMS ARE CORRECTED).

NOTE: THIS IS A WELL RECOGNIZED PROBLEM AND THE PRIMARY CONSTRAINT TO THE ENTRY OF THE PRIVATE SECTOR INTO THE ELECTRIC ENERGY SECTOR. THE AGENCY'S FY 87 CONGRESSIONAL PRESENTATION STATES THAT AN ECONOMICALLY EFFICIENT PRICING ENVIRONMENT IS CRITICAL FOR THE PRIVATE SECTOR TO ACTUALLY ASSUME A MORE ACTIVE ROLE IN PRIVATE SECTOR ELECTRICITY GENERATION. THE ECONOMIC TIMES -- INDIA'S LEADING FINANCIAL/ECONOMIC DAILY NEWSPAPER -- IN AN EDITORIAL APPEARING IN ITS MAY 23, 1986 EDITION WHICH STRONGLY SUPPORTED PRIVATE SECTOR INVOLVEMENT IN THE ELECTRIC POWER SECTOR STATES, IN PART, THAT GIVEN THE TENDENCY OF STATE ELECTRICITY BOARDS TO CONTINUE CONGRESSIONAL PRICING FOR VARIOUS SEGMENTS OF THE POPULATION, THE PRESENT ECONOMICS OF POWER GENERATION JUST DO NOT MAKE IT FEASIBLE FOR THE PRIVATE SECTOR TO ENTER INTO THIS BUSINESS.

7. WITH THE ABOVE AS BACKGROUND ON THE DESIGN AND OPERATION OF THE UTILITY COMPONENT OF THE PROJECT, FOLLOWING ARE OUR RESPONSES TO THE SPECIFIC ISSUES AND

COMMENTS CONTAINED IN REFTEL.

B. TARGETING OF SELECTED SEB'S. WE CANNOT RESTRICT OUR ASSISTANCE TO A QUOTE FEW SEB'S WHO ARE GOOD OR IMPROVING PERFORMERS UNQUOTE NOR WOULD WE BE WILLING TO EVEN IF WE COULD. EVERY STATE THAT INTENDS TO SUBMIT AN OFAP NEEDS ASSISTANCE IN THE PREPARATION OF THE OFAP, INCLUDING EVEN BIHAR WHICH IS AT THE BOTTOM OF THE BARREL. HOW ELSE CAN WE HAVE ANY IMPACT ON THE UTILITY? HOW ELSE CAN WE CREATE THE CONDITIONS FOR THE EXPANSION/INVOLVEMENT OF THE PRIVATE SECTOR? HOW ELSE CAN WE IMPROVE THE FINANCIAL VIABILITY OF THE UTILITY SO THAT THE UTILITY CAN FINANCE A REASONABLE PERCENTAGE OF ITS EXPANSION PLANS AND REDUCE THE CURRENT FINANCIAL DRAIN? IN ADDITION TO ASSISTANCE ON THE PREPARATION OF OFAP'S, USAID ASSISTANCE WILL BE AVAILABLE TO ALL UTILITIES FOR ENVIRONMENTAL ASSESSMENT/IMPACT HELP AND FOR THE REHABILITATION/LIFE EXTENSION ANALYSIS OF EXISTING PLANTS, WHETHER OR NOT THE UTILITY HAS AN APPROVED OFAP. WHILE THE FORMER ASSISTANCE (ENVIRONMENTAL) WILL BE MAINLY AIMED AT THE INTENT OF H.R. 3743 REGARDING MDB LENDING, IT ALSO PERMITS US TO OFFER SUPPORT WHETHER OR NOT THE ACTIVITY WILL BE FINANCED BY WORLD BANK OR ADB FUNDS SINCE THERE MAY BE ACTIVITIES STILL FINANCED FROM STATE BUDGET RESOURCES, AND INDIA CANNOT CONTINUE TO DEGRADE ITS ENVIRONMENT. THE LATTER ASSISTANCE (REHABILITATION) WILL BE PROVIDED

PROJECT (EMCAT) - PID GUIDANCE
ALMOST EXCLUSIVELY FOR PAROCIAL, SELF-INTEREST
REASONS; THE TRADE IMPLICATIONS OF THIS ACTIVITY ARE
GARGANTUAN AND WE WOULD RATHER SEE THE U.S. BENEFIT
THAN ANOTHER COUNTRY.

9. TECHNICAL ASSISTANCE FROM OTHER DONORS. THIS
PROJECT WILL BE DIFFICULT TO MANAGE AT BEST, AND IT IS
ONLY POSSIBLE WITH THE COLLABORATIVE ASSISTANCE WE WILL
OBTAIN FROM THE WORLD BANK AND ADB. IT CANNOT -- AND
WE CANNOT EMPHASIZE THIS MORE STRONGLY -- BE MANAGED BY
BRINGING IN A MULTITUDE OF OTHER DONORS EACH PROVIDING
TECHNICAL ASSISTANCE AND ADVICE WHICH MAY BE
INCOMPATIBLE WITH OUR OBJECTIVES. IT WOULD BE A
MADHOUSE. AT THIS POINT, PFC HAS ALREADY AGREED TO
ACCEPT THE EQUIVALENT OF USD ONE MILLION FROM THE U.K.
FORTUNATELY, THIS ASSISTANCE WILL BE CONFINED TO
TRANSMISSION (WHERE U.K. SUPPLIERS HAVE A LARGE
APPETITE). THERE ARE ANOTHER THREE OR FOUR DONORS IN
THE WINGS. OUR POSITION IS THAT EITHER WE CONTROL IT
ALL OR WE DO NOT WANT TO BE INVOLVED IN THE PROJECT.
THIS POSITION HAS BEEN ACCEPTED BY PFC, THE WORLD BANK
AND ADB.

10. LIMITING MAJOR INVESTMENTS WHERE POLICY
ENVIRONMENT IS ACCEPTABLE. THE DISCUSSION IN PARAGRAPH
TWO OF RFFTEL SEEMS TO IMPLY THAT WE WILL BE FINANCING
CAPITAL INVESTMENTS IN THE POWER SECTOR. WE WILL NOT.
THE MAJOR INVESTMENTS WILL BE FINANCED BY THE STATES.
THUS, IF A STATE WANTS TO PROCEED WITH AN IRRATIONAL
INVESTMENT, IT CAN DO SO AND WE, THE WORLD BANK, ADB
AND THE CENTRAL GOVERNMENT WILL BE POWERLESS TO STOP
IT. IF, HOWEVER, THAT STATE DOES SO, IT WOULD NOT BE
ELIGIBLE FOR WORLD BANK OR ADB FUNDS FOR ANY REPEAT ANY
ACTIVITY IN ITS POWER SECTOR SINCE, OBVIOUSLY, IT WOULD
NOT HAVE AN OFAP APPROVED BY USAID, THE WORLD BANK AND
ADB. WE BELIEVE THIS IS A REASONABLY GOOD DETERRENT.
WE ALSO BELIEVE OTHER BILATERAL DONORS WILL BE
RELUCTANT TO FINANCE A POWER ACTIVITY IN THAT STATE IF
USAID AND THE TWO MAJOR MDR'S HAVE BOYCOTTED THE STATE.

11. TECHNICAL ASSISTANCE CONTRACTING. WE HAVE NOT
FINALIZED THE CONTRACTING ARRANGEMENTS AND WILL NEED
ANOTHER MEETING OR TWO WITH PFC, THE WORLD BANK AND
ADB. AT THIS POINT, IT HAS BEEN AGREED THAT MOST
CONTRACTING WILL BE VIA HOST COUNTRY CONTRACTING MODE.
INITIALLY, VIA DIRECT CONTRACTING, WE WILL PROVIDE AN
EXPERT IN CONTRACTING AND AN EXPERT IN TRAINING. THESE
INDIVIDUALS WILL BE TASKED WITH ESTABLISHING A
CONTRACTING UNIT AND A TRAINING UNIT WITHIN PFC (A
START HAS BEEN MADE ALREADY BY PFC, AND THE WORLD BANK
HAS TWO EXPERTS WORKING WITH PFC ON THE FIRST YEAR'S
TRAINING PROGRAM). THE MATTERS THAT ARE STILL UP IN
THE AIR ARE (1) THE PLACEMENT OF A FULL-TIME LONG-TERM
EXPATRIATE TO ASSIST PFC'S CHAIRMAN AND (2) WHETHER TO
GO FOR ONE BLANKET CONTRACT FOR MOST OF THE REQUIRED
SERVICES OR RELY ON SEPARATE CONTRACTS WITH
FIRMS/INDIVIDUALS AS THE TASK IS DEVELOPED. ON (1),

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NEITHER WE NOR THE WORLD BANK SUPPORTS THIS PROPOSAL, BUT ADB IS STILL THINKING ABOUT IT.

12. WORLD BANK AND ADB RELATIONSHIP. PLEASE SEE SEPTTEL WHICH PROVIDES THE DRAFT MEMORANDUM OF UNDERSTANDING AMONG USAID, WORLD BANK AND ADB. THIS MOU HAS BEEN APPROVED BY WORLD BANK AND ADB. WE BELIEVE THAT THIS WILL BE THE FIRST TIME IN AID'S HISTORY THAT, FOR ALL PRACTICAL PURPOSES, WE WILL BE MANAGING MDR FUNDS TOTALING ABOUT USD FIVE BILLION (THE FIVE YEAR LIFE OF THIS PROJECT) FOR AN INVESTMENT OF ONLY USD 15 MILLION. THIS IS A HEIST OF MAJOR PROPORTIONS (OF WHICH EVEN ROYALD BIGGS WOULD BE JEALOUS) AND SHOULD NOT BE LOST SIGHT OF. OUR INVOLVEMENT WITH PFC IS STRONGLY SUPPORTED BY THE EXECUTIVE DIRECTORS AT THE WORLD BANK AND ADB.

13. PROCUREMENT-TRADE IMPLICATIONS. WE CANNOT ASSURE THAT OUR INVOLVEMENT WITH PFC WILL AUTOMATICALLY ENSURE LARGE EXPORTS FROM THE U.S. WE CAN, HOWEVER, ASSURE THAT IF ANOTHER DONOR PROVIDES THIS TECHNICAL ASSISTANCE, THE U.S. WILL GET VERY LITTLE, IF ANY, OF THE BUSINESS. BUT, FOR YOUR INFORMATION, USING OUR VERY LIMITED PD&S FUNDS, WE ARE CONTRACTING WITH GENERAL ELECTRIC FOR A REVIEW OF THE TALCHER THERMAL POWER PLANT IN ORISSA. THIS PLANT--ORIGINALLY FINANCED BY USAID--NEEDS REPAIRS BADLY. THE CONTRACT WITH GE

PROJECT (EMCAT) - PID GUIDANCE
WILL COST ABOUT USD 55,000. THE IMPORTS FROM THE U.S.
TO REPAIR THE PLANT ARE CONSERVATIVELY ESTIMATED AS USD
12 MILLION. IF A FIRM FROM ANOTHER COUNTRY PERFORMED
ANALYSIS, MUCH OF THIS PROCUREMENT WOULD BE FROM THAT
COUNTRY SINCE NOT ALL OF THE EQUIPMENT NEED BE SUPPLIED
BY THE ORIGINAL MANUFACTURER (E.G., INSTRUMENTATION,
BOILER FEED PUMPS).

14. CONCERNING PROCUREMENT REGULATIONS OF OTHER
DONORS, MOST DONOR-FUNDED POWER SECTOR PROCUREMENT WILL
BE WITH WORLD BANK AND ADB FUNDS. THIS PROCUREMENT
WILL FOLLOW THEIR STANDARD PROCEDURES WHICH CALL FOR
INTERNATIONAL COMPETITIVE BIDDING. THE MISSION IS NOW
INVESTIGATING INDIAN PROCUREMENT REGULATIONS. OUR
CURRENT KNOWLEDGE IS THAT INDIA OFFERS IMPORT DUTY
ROLLBACKS ON SOME IMPORTS OF ENERGY EFFICIENCY
EQUIPMENT AND THAT THERE ARE NO TARIFFS ON RENEWABLES,
E.G., WIND GENERATORS. TO THE EXTENT THAT REGULATIONS
ARE RESTRICTIVE, WE DO NOT NOW BELIEVE THEY
DISCRIMINATE AGAINST THE U.S. AFTER WE INVESTIGATE
THIS FURTHER, WE WILL SEEK TO PROMOTE LESS RESTRICTIVE
REGULATIONS THROUGH THE POLICY STUDIES/DIALOGUE
ACTIVITIES OF THE PROJECT. HOWEVER, WE WOULD LIKE TO
REITERATE THAT UNDER EMCAT, WE ARE LEVERAGING PRIMARILY
WORLD BANK AND ADB FUNDS.

15. PRIVATE INDUSTRY ASSOCIATIONS. THE MISSION
CONSULTED WITH THESE ASSOCIATIONS IN PREPARING THE PID
AND IS CONTINUING TO DO SO FOR THE PP. WHAT WE HAVE
LEARNED IN THIS PROCESS HAS BEEN CRUCIAL FOR DEVELOPING
EMCAT CONCEPTS. WE HAVE EVERY INTENTION OF FULLY
INVOLVING THESE ASSOCIATIONS IN THE IMPLEMENTATION OF
EMCAT, AND STRENGTHENING THEIR ROLE IN SUCH IMPORTANT
AREAS AS POLICY ANALYSIS AND DIALOGUE IN THE ENERGY
SECTOR, BUILDING RELATIONSHIPS WITH U.S. ASSOCIATIONS
IN ENERGY CONSERVATION, AND EXPANDING THE PROJECT'S
OUTREACH TO THE PRIVATE SECTOR IN DISSEMINATING ENERGY
CONSERVATION TECHNOLOGY.

16. PROJECT OBJECTIVES AND INDICATORS. EMCAT
OBJECTIVES AND INDICATORS ARE FAIRLY WELL STATED IN THE
PID AND ARE NOW BEING REFINED FOR THE PP. WHILE THEY
WILL NOT BE SUBSTANTIALLY DIFFERENT, IT IS TOO EARLY TO
STATE THEM EXACTLY. HOWEVER, THEY WILL REFLECT REFFL
CONCEPTS ABOUT POLICY REFORM, TRAINING OF ENERGY
AUDITORS IN ENVIRONMENT, SUPPORT FOR PRIVATE INDUSTRY
ASSOCIATIONS, ETC., AND THEY WILL BE SPECIFIED IN A WAY
THAT THEY CAN BE READILY MONITORED.

17. WE TRUST THE ABOVE SATISFIES AID/W CONCERNS.
PLEASE LET US KNOW BY COB JUNE 3, AS THE WORLD BANK HAS
SCHEDULED LOAN NEGOTIATIONS FOR ITS LOAN TO PFC ON JUNE
29, 1992, AND IF WE ARE UNABLE TO PROCEED WITH PROJECT,
IT IS IMPERATIVE THAT WE INFORM THEM WELL IN ADVANCE OF
THESE NEGOTIATIONS SINCE THEY WILL NEED TO APPROACH
OTHER DONORS. ALSO, IF WE ARE NOT GOING TO PROCESS
THIS PROJECT, WE WILL NEED TO RE-THINK WHETHER WE WANT
TO PROCEED WITH THE JE-TALCHER CONTRACT SINCE THIS

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ACTIVITY -- AND THE RELATED PROCUREMENT -- IS A QUOTE
ADVANCE PROJECT ACTIVITY UNQJOPE WHICH IS BEING
FINANCED INDEPENDENTLY SINCE THE ANNUAL PLANT SHUTDOWN
AT TALCHER IS SCHEDULED FOR LATE JUNE.

19. AUTHORIZATION OF PP. SINCE WE BELIEVE THE ABOVE
SATISFIES REPTEL CONCERNS, WE ALSO REQUEST THAT FULL
DELEGATION TO AUTHORIZE THE PP BE GIVEN TO THE
MISSION. IN ORDER TO REMAIN IN SYNC WITH WORLD BANK
AND ADB PROJECTS, IT IS ESSENTIAL THAT WE OBLIGATE
FUNDS THIS FISCAL YEAR. SENDING PARTS OF THE PP TO AHE
FOR REVIEW WOULD REQUIRE SIGNIFICANT TIME THAT WOULD
PUT AN FY 90 OBLIGATION AT GREAT RISK. GIVEN OUR
RESPONSE ABOVE, WE FEEL SUCH A RISK IS UNNECESSARY.
PLEASE ADVISE. CLARK

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ACTION: AID-3 INFO AMB DCM POL ECON SCI FAS

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 DE RUEHC #8598/01 1442043
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 TO AMEMBASSY NEW DELHI PRIORITY 1053
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 UNCLAS SECTION 01 OF 03 STATE 168598

25-MAY-90

TCR 22:04
 CN: 43233
 CHRG: AID
 DIST: AID
 ADD:

PROJ: 386-0517

AIDAC

E.O. 12356: N/A

TAGS:

SUBJECT: ENERGY MANAGEMENT, CONSULTATION AND TRAINING

PROJECT: PID GUIDANCE

SUMMARY

ANPAC MET ON APRIL 17TH IN MEETING CHAIRED BY BOB NACHTRIFB, ANE/PD. BOB BECKMAN PROVIDED MISSION REPRESENTATION. PROJECT WAS APPROVED WITH DECISION THAT PORTIONS OF THE PP WOULD HAVE TO BE RETURNED TO AID/W FOR REVIEW AND APPROVAL PRIOR TO AUTHORIZATION. FOLLOWING ARE THE RESULTS OF THE ANPAC MEETING.

1. STRATEGIC FIT OF PROJECT WITH OPEN MARKETS OBJECTIVES

THE PID IDENTIFIED PRIVATE SECTOR BENEFICIARIES AS: (1) ELECTRICITY USERS BENEFITING FROM IMPROVED AND MORE RELIABLE POWER SUPPLY, (2) ENGINEERING FIRMS THAT PERFORM ENERGY AUDITS AND TECHNICAL SERVICES, AND (3) U.S. FIRMS SEEKING TRADE AND INVESTMENT OPPORTUNITIES.

THE ANPAC CONCLUDED THAT INCREASED PRIVATE SECTOR INVOLVEMENT IN POWER GENERATION CAN BE ACHIEVED THROUGH

BOTH PROJECT COMPONENTS:

A) IN THE UTILITY COMPONENT, EXPANSION OF THE PRIVATE SECTOR ROLE IS DEPENDENT ON TECHNICAL ASSISTANCE AND TRAINING TO THE PFC (AND SELECTED SEBS) IN SUCH AREAS AS PURCHASE PRICE METHODOLOGIES AND PROCEDURES FOR SOLICITATION, EVALUATION, NEGOTIATION AND FINANCING ARRANGEMENTS. IN ADDITION, THE COGENERATION/PRIVATE POWER OPTION COULD BE BUILT INTO THE PFC LENDING CRITERIA AND INTO SEB OPERATION AND FINANCE PLANS.

B) IN THE INDUSTRIAL ENERGY EFFICIENCY COMPONENT, THE PRIVATE SECTOR ROLE IN GENERATION CAN BE STRENGTHENED BY PRIVATE INDUSTRY ASSOCIATIONS BEING ABLE TO ANALYZE AND ARTICULATE RATIONAL ENERGY POLICIES AND PROGRAMS. AN IMPORTANT ELEMENT IN THIS REGARD IS SUPPORTING PRIVATE INDIAN ASSOCIATIONS EFFORTS TO BUILD A RELATIONSHIP WITH U.S. ASSOCIATIONS ON ENERGY CONSERVATION. (THIS IN TURN

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COULD LEAD TO EXPANDED U.S. TRADE AND INVESTMENT LINKS.) SUCH A PROGRAM COULD INSTITUTIONALIZE ENERGY CONSERVATION BEYOND THE PID CONCEPT OF TRAINING AND FEASIBILITY SUPPORT TO INDIVIDUAL PRIVATE FIRMS. TO ACHIEVE AN EXPANDED PRIVATE SECTOR ROLE IN COGENERATION AND PRIVATE POWER THE PFC WILL NEED TECHNICAL ASSISTANCE IN POLICY, REGULATORY, INSTITUTIONAL AND PROCEDURAL ISSUES. THIS SHOULD BE EXPLORED IN SOME DETAIL IN THE PP AS THE PID DID NOT CONTEMPLATE SUCH AN EFFORT.

WE CONCLUDED THIS TOP DOWN AND BOTTOM UP APPROACH CAN WORK TOWARDS CREATING THE NECESSARY ENVIRONMENT FOR EXPANDED PRIVATE PARTICIPATION IN POWER GENERATION. THE PFC CAN LEND TO PRIVATE POWER ENTITIES. PFC LEVERAGE (AND SUPPORTING TECHNICAL ASSISTANCE) CAN MOVE SEBS ON THE PATH TO FAIRER PRICING IN THE PURCHASE OF PRIVATE POWER. IDBI LENDING (AND A.I.D.-FUNDED TECHNICAL ASSISTANCE) CAN STRENGTHEN INDUSTRY'S ABILITY IN POLICY FORMULATION. WITH EXPANDED PRIVATE SECTOR PARTICIPATION, THERE IS POTENTIAL FOR EXPANDED U.S. TRADE AND INVESTMENT OPPORTUNITIES. ALL OF THE ABOVE MAKE THE PROGRAM ATTRACTIVE FROM AN OPEN MARKETS PERSPECTIVE.

THE ANPAC FOUND THAT THE PROJECT IS CONSISTENT WITH:

(A) THE OVERALL U.S. POSITION THAT DONORS NEED STRONGER CONDITIONALITY IN THEIR ELECTRIC POWER LENDING TO INDIA;

(B) THE ANE PRIVATE POWER STRATEGY THAT EMPHASIZES THE ROLE OF PRIVATE INVESTMENT IN MEETING POWER NEEDS THROUGH COGENERATION AND PRIVATE POWER PLANTS;

(C) THE DRAFT ANE ENVIRONMENTAL AND NATURAL RESOURCES STRATEGY EMPHASIS ON ECONOMIC POLICY REFORM TO REDUCE WASTE AND INEFFICIENCY AND OPEN MARKETS THAT ENCOURAGE COMPETITION AND COMMERCIALIZATION OF NEW TECHNOLOGIES;

(D) U.S. CONCERNS ABOUT MULTILATERAL BANK COMPETITIVE PROCUREMENT PROCEDURES; AND

(E) CONGRESSIONAL DIRECTIVE TO FOCUS ON ENERGY EFFICIENCY AND ENVIRONMENTAL PLANNING IN KEY COUNTRIES.

2. APPLICATION OF PROJECT RESOURCES

THE WORLD BANK AND ADB RESOURCES ARE SIGNIFICANT BUT ARE ONLY PART OF THE OVERALL CAPITAL EXPENDITURES FOR POWER. SIMILARLY, THE USAID TA IS LIMITED.

THE ANPAC EXPLORED HOW THE TA FUNDS SHOULD BE APPLIED. SPECIFICALLY, WHAT CRITERIA WILL GUIDE THE USE OF THESE

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FUNDS? THE PERFORMANCE BUDGETING APPROACH WAS DISCUSSED AND THOUGHT APPLICABLE. FIRST, USAID FUNDS COULD BE TARGETED TOWARD THOSE SEBS THAT ARE GOOD (OR IMPROVING) PERFORMERS WITH PARTICULAR EMPHASIS ON TARIFF LEVELS AND STRUCTURE. SECOND, RECEPTIVITY TO PRIVATE POWER AND COGENERATION COULD BE A SCREEN, GIVEN THE PRIVATE SECTOR ORGANIZING THEME. THIRD, THE COMPARATIVE TRADE AND INVESTMENT ADVANTAGE OF THE U.S. COULD BE A CRITERION, AND FOURTH, THE ENVIRONMENTAL IMPLICATIONS OF THE ACTIVITY WOULD BE A FACTOR IN MAKING DECISIONS.

APPLICATION OF THE CRITERIA WOULD LIKELY LEAD TO A PRIMARY FOCUS ON JUST A FEW SEBS. THE PURPOSE HERE IS NOT TO IGNORE AREAS WHERE THE NEED IS GREATEST. RATHER IT IS TO HELP ENSURE THAT MAJOR INVESTMENTS IN POWER GENERATION TAKE PLACE ONLY WHERE THE POLICY ENVIRONMENT IS, OR WILL BE, CONDUCIVE TO RATIONAL INVESTMENTS AND EFFICIENT MANAGEMENT OF THE SECTOR. SEBS WHICH ARE PRESENTLY POOR PERFORMERS BUT WHICH ARE RECEPTIVE TO REFORM WILL BE ATTRACTIVE CANDIDATES FOR PROJECT FUNDED TA. THE MISSION NEEDS TO DEVELOP A RATIONALE FOR THE CRITERIA TO BE USED AS A PART OF THE PP DESIGN. THE DISCUSSION BROUGHT OUT THE COMPATIBILITY, INDEED THE SYNERGISM, OF PURSUING A THEME OF EXPANDED PRIVATE SECTOR PARTICIPATION AND THE OBJECTIVE OF EXPANDED U.S.

TRADE AND INVESTMENT.

3. COLLABORATION WITH THE WORLD BANK

WITHOUT A BETTER UNDERSTANDING OF THE IBRD/ADB PROPOSED POWER PROJECTS AND WHAT CRITERIA THEY OR THE PFC WILL USE, ANPAC COULD NOT GAUGE HOW THE ILLUSTRATIVE CRITERIA DISCUSSED ABOVE WOULD FIT WITH THE IBRD/ADB APPROACH.

WE RECOMMEND THE MISSION DISCUSS WITH OTHER DONORS OUR CRITERIA AND OUR PRIMARY THEME OF EXPANDING THE PRIVATE SECTOR ROLE IN POWER GENERATION. CONCEIVABLY, IF OBJECTIVES ARE NOT OVERLAPPING, AN ALTERNATIVE MIGHT BE FOR THE MISSION TO FOCUS ON THOSE SEBS MEETING OUR CRITERIA AND LET ANOTHER DONOR ASSIST THOSE SEBS THAT DO NOT. THE ANPAC VIEWS THE MISSION PROJECT AS A GOOD VEHICLE TO PROVIDE POLICY LEADERSHIP TO THE MULTILATERALS WITH REGARD TO PRICING AND EXPANDED PRIVATE SECTOR ROLE.

4. AUTHORIZATION OF PP

THE MISSION SHOULD SUBMIT THE SUBSTANCE OF THE PP TO ANE FOR REVIEW AND APPROVAL. THE SUBMISSION SHOULD INCLUDE THE SECTIONS ADDRESSING PROJECT OBJECTIVES, INDICATORS AND OUTPUTS, CRITERIA FOR APPLICATION OF FUNDS, CONTRACTING APPROACH FOR TA AND TRAINING, DESCRIPTION OF INTEGRATION WITH IBRD/ADB CRITERIA AND APPROACH TO LENDING.

5. U.S. TRADE

THE PID DESCRIBES THE POWER EXPANSION PLANS AND RESULTING HUGE MARKET FOR POWER EQUIPMENT OVER THE NEXT DECADE. IT ARGUES THAT THE PRESENCE OF U.S. CONSULTANTS WORKING DIRECTLY WITH THE PFC, WHICH WILL CARRY OUT PROCUREMENT FOR THE SEBS, WILL ENHANCE U.S. TRADE OPPORTUNITIES. THE ANPAC STRONGLY SUPPORTS THIS OBJECTIVE AND ASKS THAT THIS ISSUE BE ADDRESSED IN SOME DETAIL IN THE PP. GIVEN INDIA'S USUAL POLICY OF DISCOURAGING IMPORTS IT IS IMPORTANT TO IDENTIFY IMPEDIMENTS TO THEIR PURCHASE OF U.S. EQUIPMENT EARLY IN THE PROJECT. THE MISSION SHOULD CAREFULLY REVIEW INDIAN AND OTHER DONOR PROCUREMENT REGULATIONS TO ENSURE THEY DO NOT IMPEDE THE USE OF EFFICIENT U.S. AND IMPORTED TECHNOLOGY WHERE APPROPRIATE. ADDITIONALLY, THE PP SHOULD EMPHASIZE U.S. TRADE AND/OR INVESTMENT IN INDIAN MANUFACTURING FACILITIES FOR ENERGY EFFICIENCY EQUIPMENT.

6. MULTILATERAL BANK PARTICIPATION

PROJECT SUCCESS IS LINKED WITH THE IBRD AND ADF PROJECTS. CONCERN WAS EXPRESSED ABOUT DELAY OR REJECTION OF THEIR PROJECTS. THE LEVERAGE PROVIDED BY THEIR DOLS 700 MILLION IS CRITICAL TO ACHIEVING PRICING AND POLICY REFORM OBJECTIVES. THE ANPAC CONCLUDED THE MISSION SHOULD NOT PROCEED TO OBLIGATION UNLESS AT LEAST ONE OF THE OTHER MAJOR DONORS APPROVES THEIR PROJECT.

7. ENVIRONMENT

THE PID RECOGNIZES THE POTENTIAL FOR ENVIRONMENTAL DEGRADATION AND REQUIRES ENVIRONMENT ASSESSMENTS FOR EACH PFC INVESTMENT. WITH RESPECT TO THE INDUSTRIAL ENERGY EFFICIENCY AUDITS, THE PROJECT DESIGN SHOULD INCLUDE TRAINING OF ENGINEERS FOR THE ASSESSMENT OF ENVIRONMENTAL PERFORMANCE AND POLLUTION PREVENTION AS PART OF THE TRADITIONAL ENERGY AUDIT FUNCTION.

8. TECHNICAL ASSISTANCE

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THE PID DESCRIBES THE MECHANISM FOR TECHNICAL ASSISTANCE AS BUY-INS TO AID/W CONTRACTS. THE DESIGN SHOULD EXPLORE OPPORTUNITIES FOR COMPETITIVE BIDS FOR SOME OR ALL OF THE TECHNICAL ASSISTANCE FOR BOTH THE IDBI AND PFC COMPONENTS AS THERE ARE A NUMBER OF FIRMS THAT CAN PROVIDE MOST OF THE SERVICES. BAKER

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UNCLASSIFIED STATE 168598/03

ENERGY MANAGEMENT CONSULTATION AND TRAINING
PROJECT NO. 386-0517

5C(1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable to: (A) FAA funds generally; (B)(1) Development Assistance funds only; or (B)(2) the Economic Support Fund only.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FY 1990 Appropriations Act Sec. 569(b).
Has the President certified to the Congress that the government of the recipient country is failing to take adequate measures to prevent narcotic drugs or other controlled substances which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents or from entering the United States unlawfully? No

2. FAA Sec. 481(h); FY 1990 Appropriations Act Sec. 569(b). (These provisions apply to assistance of any kind provided by grant, sale, loan, lease, credit, guaranty, or insurance, except assistance from the Child Survival Fund or relating to international narcotics control, disaster and refugee relief, narcotics education and awareness, or the provision of food or medicine.)
If the recipient is a "major illicit drug producing country" (defined as a country producing during a fiscal year at least five metric tons of opium or 500 metric tons of coca or marijuana) or a "major drug-transit country" (defined as a country that is a significant direct source of illicit drugs significantly affecting the United States, through which such drugs are transported, or through which significant N/A

sums of drug-related profits are laundered with the knowledge or complicity of the government): (a) Does the country have in place a bilateral narcotics agreement with the United States, or a multilateral narcotics agreement? and (b) Has the President in the March 1 International Narcotics Control Strategy Report (INCSR) determined and certified to the Congress (without Congressional enactment, within 45 days of continuous session, of a resolution disapproving such a certification), or has the President determined and certified to the Congress on any other date (with enactment by Congress of a resolution approving such certification), that (1) during the previous year the country has cooperated fully with the United States or taken adequate steps on its own to satisfy the goals agreed to in a bilateral narcotics agreement with the United States or in a multilateral agreement, to prevent illicit drugs produced or processed in or transported through such country from being transported into the United States, to prevent and punish drug profit laundering in the country, and to prevent and punish bribery and other forms of public corruption which facilitate production or shipment of illicit drugs or discourage prosecution of such acts, or that (2) the vital national interests of the United States require the provision of such assistance?

3. 1986 Drug Act Sec. 2013.

(This section applies to the same categories of assistance subject to the restrictions in FAA Sec. 481(h), above.) If recipient country is a "major illicit drug producing country" or "major drug-transit country" (as defined for the purpose of FAA Sec. 481(h), has the President submitted a report to Congress listing such country as one: (a) which, as a matter of government policy, encourages or facilitates the production or distribution of illicit drugs;

N/A

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(b) in which any senior official of the government engages in, encourages, or facilitates the production or distribution of illegal drugs; (c) in which any member of a U.S. Government agency has suffered or been threatened with violence inflicted by or with the complicity of any government officer; or (d) which fails to provide reasonable cooperation to lawful activities of U.S. drug enforcement agents, unless the President has provided the required certification to Congress pertaining to U.S. national interests and the drug control and criminal prosecution efforts of that country?

4. FAA Sec. 620(c). If assistance is to a government, is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies; (b) the debt is not denied or contested by such government; or (c) the indebtedness arises under an unconditional guaranty of payment given by such government or controlled entity? No
5. FAA Sec. 620(e)(1). If assistance is to a government, has it (including any government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No
6. FAA Sec. 620(a), 620(f), 620D; FY 1990 Appropriations Act Secs. 512, 548. Is recipient country a Communist country? If so, has the President: (a) determined that assistance to the country is vital to the security of the United States, that the recipient country is not controlled by the international Communist conspiracy, and that such assistance will further promote the independence of the recipient No

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country from international communism, or (b) removed a country from applicable restrictions on assistance to Communist countries upon a determination and report to Congress that such action is important to the national interest of the United States? Will assistance be provided either directly or indirectly to Angola, Cambodia, Cuba, Iraq, Libya, Vietnam, South Yemen, Iran or Syria? Will assistance be provided to Afghanistan without a certification, or will assistance be provided inside Afghanistan through the Soviet-controlled government of Afghanistan?

None of the listed countries will receive assistance under this project.

7. FAA Sec. 620(j). Has the country permitted or failed to take adequate measures to prevent the damage or destruction, by mob action, of U.S. property? No
8. FAA Sec. 620(1). Has the country failed to enter into an investment guaranty agreement with OPIC? No
9. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec.5.
 (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel because of fishing activities in international waters? (a) No
 (b) If so, has any deduction required by the Fishermen's Protective Act been made? (b) N/A
10. FAA Sec. 620(q); FY 1990 Appropriations Act Sec. 518 (Brooke Amendment). (a) Has the government of the recipient country been in default for more than six months on interest or principal of any loan to the country under the FAA? (a) No
 (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the FY 1990 Appropriations Act appropriates funds? (b) No
11. FAA Sec. 620(s). If contemplated assistance is development loan or from N/A

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the Economic Support Fund, has the Administrator taken into account the percent of the country's budget and amount of the country's foreign exchange or other resources spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

12. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have relations been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No
13. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? (Reference may be made to the "Taking into Consideration" memo.) India is in arrears; however, taken into account by the Administrator at time of approval of Agency OYB.
14. FAA Sec. 620A. Has the President determined that the recipient country grants sanctuary from prosecution to any individual or group which has committed an act of international terrorism, or otherwise supports international terrorism? No
15. FY 1990 Appropriations Act Sec. 564. Has the country been determined by the President to: (a) grant sanctuary from prosecution to any individual or group which has committed an act of international terrorism, or (b) otherwise support international terrorism, unless the President has waived this restriction on grounds of national security or for humanitarian reasons? (a) No
(b) No

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16. ISDCA of 1985 Sec. 552(b). Has the Secretary of State determined that the country is a high terrorist threat country after the Secretary of Transportation has determined, pursuant to section 1115(e)(2) of the Federal Aviation Act of 1958, that an airport in the country does not maintain and administer effective security measures? No
17. FAA Sec. 666(b). Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA? No
18. FAA Secs. 669, 670. Has the country, after August 3, 1977, delivered to any other country or received nuclear enrichment or reprocessing equipment, materials or technology, without specified arrangements or safeguards, and without special certification by the President? Has it transferred a nuclear explosive device to a non-nuclear weapon state or, if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.) No such action is known to have occurred.
19. FAA Sec. 670. If the country is a non-nuclear weapon state, has it, on or after August 8, 1985, exported (or attempted to export) illegally from the United States any material, equipment, or technology which would contribute significantly to the ability of a country to manufacture a nuclear explosive device? No

20. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. on September 25 and 28, 1981, and did it fail to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the "Taking into Consideration" memo.)

Although India was represented and failed to disassociate itself from the communique, this factor was taken into account by the Administrator at time of approval of Agency OYB.

21. FY 1990 Appropriations Act Sec. 513. Has the duly elected Head of Government of the country been deposed by military coup or decree? If assistance has been terminated, has the President notified Congress that a democratically elected government has taken office prior to the resumption of assistance?

No

22. FY 1990 Appropriations Act Sec. 539. Does the recipient country fully cooperate with the international refugee assistance organizations, the United States, and other governments in facilitating lasting solutions to refugee situations, including resettlement without respect to race, sex, religion, or national origin?

Yes

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

a. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy?

No

b. FY 1990 Appropriations Act Sec. 535.

Has the President certified that use of DA funds by this country would violate any of the prohibitions against use of funds to pay for the performance of abortions as a method of family planning, to motivate or coerce any person to practice abortions, to pay for the performance of involuntary sterilization as a method of family planning, to coerce or provide any financial incentive to any person to undergo sterilizations, to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning?

No

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the President found that the country made such significant improvement in its human rights record that furnishing such assistance is in the U.S. national interest?

N/A

b. FY 1990 Appropriations Act Sec. 569(d).

Has this country met its drug eradication targets or otherwise taken significant steps to halt illicit drug production or trafficking?

N/A

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. PROCUREMENT

1. FAA Sec. 602(a). Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? As required by AID regulations, solicitations for commodity and equipment procurement will be advertised in the U.S.
2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or determined under delegation from him? Yes
3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? Yes
4. FAA Sec. 604(e). If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) N/A
5. FAA Sec. 604(g). Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those AID will not finance construction services. Any A&E services financed by the project will most likely be procured from the U.S.

countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.

6. FAA Sec. 603. Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates? No
7. FAA Sec. 621(a). If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? Yes
Yes
8. International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes
9. FY 1990 Appropriations Act Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Such a provision will be included in any AID direct contract.
10. FY 1990 Appropriations Act Sec. 524. If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? N/A

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11. Trade Act Sec. 5164 (as interpreted by conference report), amending Metric Conversion Act of 1975 Sec. 2. Does the project use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate?

Metric measurements will be used in AID-financed procurements, grants and other project activities to the maximum extent feasible.

12. FAA Secs. 612(b), 636(h); FY 1990 Appropriations Act Secs. 507, 509. Describe steps taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. are utilized in lieu of dollars to meet the cost of contractual and other services.

The U.S. owns no local currency; many local currency costs will be met by the GOI and Indian private sector.

13. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

No excess local currency is currently owned by the US.

14. FAA Sec. 601(e). Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes

B. CONSTRUCTION

1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used?

This is not a capital assistance project.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

N/A

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3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP), or does assistance have the express approval of Congress? N/A

C. OTHER RESTRICTIONS

1. FAA Sec. 122(b). If development loan repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? N/A
4. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f); FY 1990 Appropriations Act under heading "Population, DA," and Secs. 525, 535. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as a method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or Provisions specifically prohibiting the listed impermissible uses will not be included in the Project Grant Agreement. Instead, usage of project funds will be controlled by (1) requiring approval for expenditures; (2) auditing of expenditures during and immediately after the project; (3) project

involuntary sterilizations as a means of family planning; or (4) to lobby for abortion?

monitoring by AID officers; and (4) by including in the Grant Agreement a right to request a refund for ineligible uses of project funds.

- b. FAA Sec. 483. To make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated?
- c. FAA Sec. 620(g). To compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President?
- d. FAA Sec. 660. To provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?
- e. FAA Sec. 662. For CIA activities?
- f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained?
- g. FY 1990 Appropriations Act Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel?
- h. FY 1990 Appropriations Act Sec. 505. To pay U.N. assessments, arrearages or dues?
- i. FY 1990 Appropriations Act Sec. 506. To carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)?

- j. FY 1990 Appropriations Act Sec. 510.
To finance the export of nuclear equipment, fuel, or technology?
- k. FY 1990 Appropriations Act Sec. 511.
For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?
- l. FY 1990 Appropriations Act Sec. 516; State Authorization Sec. 109. To be used for publicity or propaganda purposes designed to support or defeat legislation pending before Congress, to influence in anyway the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by Congress?
5. FY 1990 Appropriations Act Sec. 574. Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate? Yes
6. FY 1990 Appropriations Act Sec. 582. Will any assistance be provided to any foreign government (including any instrumentality or agency thereof), foreign person, or United States person in exchange for that foreign government or person undertaking any action which is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law? No

TECHNICAL ANALYSIS

1. Importance of Energy for Economic Growth:

1.1. The major factor for economic growth in India is industrial performance. Over the period 1980-89, industry grew faster than all other sectors in the economy, with an annual growth rate of 7.1% compared to 4.9% for agriculture sector and 5.9% for GDP overall. The share of industry in GDP has been increasing steadily from 24% in 1980 to 29% in 1988 and in the 1990s is expected to overtake that of agriculture.

1.2. Critical to the performance of the industrial sector is the availability of sufficient energy for its development. The industrial sector and the Indian economy overall would have performed even better if not for the inadequate and unreliable supply of electric power. In the past few years severe power shortages and the poor quality of delivered power have seriously eroded profitability and operational productivity of the private industrial sector.

2. Constraints:

2.1. In spite of the rapid strides made in the power sector in terms of capacity additions, electricity use in India is supply constrained. Shortfalls in power supply and widespread power shortages have seriously limited industrial growth. In spite of increases in power generation of about 9 to 10% per year, one still finds a persistent energy shortage of 7-8%. Peaking shortages, of course are of a higher magnitude; about 18% on an all-India basis. An indicator of the severity of the problem is that to safeguard against power cuts, Indian industry is increasingly resorting to the installation of inefficient, high cost diesel captive power plants. In 1989, the total installed capacity of captive power plants (mainly diesel) in industry was 7800 MW and is projected to increase to over 9000 MW by 1995.

2.2. The power availability problem is linked to another broad ratio: the high intensity of energy use in the economy. Intensity of energy use in India in 1985-86 is estimated to be 0.55 compared to 0.29 in Japan, 0.32 in Philippines, 0.44% in Tunisia and is second only to the energy profligate U.S. (0.59%). Further, the Indian economy is one of the least energy efficient of the world's major economies. The Indian energy equipment industry (industrial boilers, motors etc.) has not made much attempt to upgrade and modernise its products to increase end use efficiency. When compared with international practices, the scope for energy savings in Indian industry is large -- on the order of 20%. There are a number of factors that inhibit adoption of technologies and practices to improve energy efficiency: outdated process and product technologies; lack of project design, consultancy and engineering services; inadequate domestic manufacture and supply of energy efficiency devices and systems; and insufficient financial programs.

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2.3. Poor end-use efficiency is only part of the broader challenge in India's power sector. There is also the imbalance in sector development between supply and management of load demand. The benefits of efficient management of India's power sector would be substantial. Improving the management and operational efficiency of the power sector promises to improve capital productivity, provide reliable electricity services, reduce capital requirements and address environmental problems.

2.4. While capacity addition is certainly the mainstay for bridging the gap between supply and demand, there is also a need to look at other possible options to reduce power shortages and bridge the supply/ demand gap. Areas that need attention include: renovation and modernisation of existing power stations; improving operating performance of these power plants through training personnel; providing consultancy services for improving operational efficiency; introducing new technologies; reduction in transmission and distribution losses; load management; and energy conservation.

3. The Generation Sector:

3.1 Capacity and Growth: The power sector in India has made rapid progress since independence. Installed capacity has gone up from 1400 MW in 1947 to 64,000 MW today. The annual compound growth rate is on the order of 9.5%. Electricity generation has increased from about 5 billion units in 1947 to 245 billion units today. The achievements made during the 7th plan, ending March 31st 1990 are significant. A record target of about 22245 MW additional generation capacity has been achieved.

3.2. Organisations: Under the Indian Electricity Act, the Central Government licenses electricity generation undertakings and defines the safety regulations; administration of the act is left to the State governments. For exercising dual control of the Central and State governments, legislation titled "Electricity Supply Act 1948" was enacted under which the Central Electricity Authority (CEA) and State Electricity Boards (SEBs) were formed. CEA is responsible for developing a national power policy and coordinating the various agencies involved in electricity supply. It is responsible for approving investment proposals, providing consultancy support to SEBs, monitoring the performance of power projects etc. CEA is administered by the Department of Power in the Ministry of Energy. The SEBs are State government-owned autonomous corporations responsible for generation, transmission and distribution of electricity at the state level. The SEBs own and operate over 70% of the power systems in the country.

3.2.1. As a first step toward power systems integration, regional electricity boards (REBs) were created in 1964. In theory, they are responsible for coordinating the operation of the SEBs on a regional level and dealing with issues such as interstate transfer of power, formulation of pricing policies for sale of power etc., but have had limited practical effect. In 1969, a separate organization, the Rural Electrification Corporation (REC), was established to plan, fund and monitor rural electrification programs. It funds over 70% of all rural electrification in the country.

3.2.2. In order to augment the efforts of the State governments in the power development program, the Central Government created the National Thermal Power Corporation (NTPC) and National Hydro-Electric Power Corporation (NHPC) in 1975 to construct and operate large power stations and their associated transmission facilities. NTPC has established a number of large coal mine pithead thermal stations and NHEPC has also established a few large hydro-electric stations. The Department of Atomic Energy is responsible for the country's nuclear power plants. In addition, there are five power utilities operating in the country of whom three are involved only in distribution activities.

3.2.3. The Power Finance Corporation (PFC) was incorporated in July 1986 as a public limited company under the administrative control of the Department of Power. It has been set up with the main objective of providing term finance for power projects. The corporation has raised funds from the public through issue of tax free bonds and sanctions loan assistance for various schemes such as ongoing thermal power project proposals, rehabilitation and modernisation programs of thermal power stations, installation of shunt capacitors, urban distribution schemes etc.

3.3. Improvements in the System: There has been marked improvement in the performance of the power sector in the last few years. The plant load factor of the thermal power stations has increased from 50 to 56.4% during the period 1985-90. The electrification programs which were limited to a few urban areas have extended far and wide, almost throughout the country, electricity now being accessible to 95% of the villages.

3.4. Areas for Attention: However, the demand for power is growing at the rate of about 11% per annum. Therefore, in spite of the commendable achievements during the last five years, the all-India energy shortage is about 8% and the shortage for meeting peaking demand is 17%. In the period 1990-95, a target of 38,000 MW additional generating capacity has been proposed, which would have significant impact on improving the power position in the country. However, even in the unlikely event sufficient capital were available to achieve the target, the growth in demand would insure that shortages would persist. Therefore, in addition to capacity addition, attention has to be paid to both management of power demand and optimal utilisation of the existing power assets. One of the major areas that needs attention is improvement of transmission and distribution systems to overcome the problem of frequent breakdowns and evacuation of power from the generating stations. These weaknesses in the transmission and distribution network have accentuated the problem of power shortage.

3.4.1. Another area which needs priority attention is the optimum utilisation of existing assets in the power sector. The program for renovation and modernisation of thermal power plants offers scope for efficiency improvements. Installation of capacitors for reduction of transmission and distribution losses also needs examination. Another problem being faced by the electricity boards relates to the low power tariff charged for certain groups of consumers, such as the agriculture sector.

3.4.2. The discussion above indicates that there are number of areas which offer potential for improvement in the supply sector. The areas that would result in significant improvements include:

- 1) Rehabilitation of thermal power plants;
- 2) Accelerate implementation of ongoing power plants;
- 3) Encourage private participation in power supply;
- 4) Increased investments in transmission and distribution relative to investment in generation;
- 5) Operational improvements to existing power plants;
- 6) Promotion of cogeneration which can meet a portion of the power generation requirements;
- 7) Least-cost investment planning techniques to be employed for power sector planning; and
- 8) Improving the skills of operating personnel through training.

3.4.3. The PFC is expected to be a major source of financing for SEBs both for rehabilitation of existing facilities and construction of new facilities for generation, transmission and distribution of power. The PFC would review all existing generating plants in the country and develop programs for life extension. The World Bank and the Asian Development Bank plan to channel all their future lending to SEBs through PFC. EMCAT will provide assistance to PFC in developing its own organisation and provide assistance to SEB through PFC and consultants for preparation of Operational and Financial Action Plans (OFAPs), least-cost investment plans etc. The technical assistance and training needs of PFC and SEBs would be supported by EMCAT. EMCAT will help develop through PFC and SEBs a national power system, modernisation and rehabilitation program and also promote policy reforms to encourage more reliable supply of power to the private sector. Since all lending by multilateral development banks for the power sector would be through the PFC, EMCAT would help leveraging a substantial volume of the MDB lending for power supply improvements to benefit the private sector.

4. Power Sector Investment Planning:

4.1. The PFC is expected to operate as a sound financial institution on a self sustaining basis. For this purpose, it is expected to lend only to those SEBs that have a PFC approved OFAP which is expected to ensure financial viability within a reasonable period of time. While the SEBs have the responsibility of preparing the OFAPs, it is critical that PFC staff provide support to them in the preparation of the diagnosis and that a participatory approach be followed. EMCAT would assist PFC in providing support through consultants and by providing training for preparation of OFAPs. These would also be closely monitored for implementation as a part of PFC's supervision activities. EMCAT will support the SEBs through PFC to facilitate the proper implementation of OFAPs.

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5. Least-Cost Investment Planning:

5.1. In addition to the OFAPs, SEBs will be required to prepare for PFC's approval least-cost investment plans and feasibility studies for each separate investment. EMCAT proposes to provide training through U.S. institutions on such least-cost investment planning. The training would be provided to engineers and managers from private sector consulting firms, PFC and SEBs.

6. Training Programs and Environmental Impact Assessments:

6.1. The need for training of personnel both from PFC and SEB is well recognised. For PFC to succeed in promoting improvements in the technical and financial performance of SEBs by agreeing on and monitoring the execution of OFAPs and for SEBs to have staff with a level of experience to implement plans for improved performance, it is imperative that PFC and SEB staff receive intensive training. The training would be imparted through both U.S. and Indian institutions. The areas where training is required would be finalised in consultation with PFC and SEBs. The training would range from formal seminars to on-the-job training for PFC technical staff. The broad areas related to training include: plant modernisation techniques; T&D loss reduction techniques; plant life extension techniques; system improvement techniques; and environmental issues. To provide its staff with manuals in which policies and procedures relating to its business are presented, PFC needs assistance in form of consultants to perform this task. The manuals would provide written guidelines and could be prepared in the areas dealing with project appraisal, OFAPs, procurement of goods and services, internal audit and MIS.

6.2. An unfortunate consequence of India's rapid industrial growth has been environmental degradation and concerns about its contribution to global warming. Along with motor vehicle traffic, the major cause for air pollution is electric power generation, since most of it is done by coal-fired thermal plants. It is proposed to provide technical assistance for the SEBs to prepare environmental assessments which it will require as a part of their investment proposals.

7. Policy Level Studies and Information Dissemination:

7.1. There is need for critically reviewing the present operation of the SEBs, to define inefficiencies and shortcomings and describe steps that will have to be taken to improve their operations. For this purpose, diagnostic studies need to be carried out either by utilities themselves or by engaging consultants. It will also be necessary to create facilities for imparting training to SEB staff in carrying out investigations and diagnostic analysis and formulation of projects. In addition, PFC would require a number of studies to be carried out in respect of power system development, financial planning and structural changes necessary for optimal development of the power sector. The studies will help in mapping out the role of PFC in the emerging power scene. For this purpose, it is proposed to create a cell for power studies in PFC as a part of EMCAT assistance. To begin with the following studies will be

taken up by the cell: 1) Study on tariff structure in some selective states, 2) Evaluation of benefits of rehabilitation modernisation and system improvement schemes financed by PFC; 3) How best to develop Management Information Systems MISs in SEBs.

8. Potential for Efficiency Improvement in Demand Sector:

8.1. In addition to the various factors mentioned above for making improvements in the supply sector, demand management offers large scope for bridging the supply-demand gap. The Indian industrial sector, while being inherently energy intensive because it consists largely of heavy industry, is also inefficient in its use of energy. Considering the six most energy-intensive subsectors, it is estimated that there exists an energy savings potential of 7-10 million Tons of Oil Equivalent (TOE) per annum. Efforts to reduce specific energy consumption in the energy intensive industrial sectors need to be pursued vigorously.

8.2. As India possesses a highly energy intensive industrial sector, it has become clear that energy requirements for maintaining high rates of GDP and industrial growth have become a constraint. The industrial sector consumes 60% of commercial energy consumption. Apart from being energy intensive, the Indian energy sector is also inefficient in its use of energy. However, surveys have revealed that 15-20% savings is possible by implementing housekeeping, low risk conservation options. These savings are clearly technically feasible as the experience in industrialised nations such as USA, Japan and Western Europe would indicate. EMCAT's demand management component would support activities in the areas of loan portfolio design, development of private energy consulting services and information dissemination and policy dialogue.

8.3. Loan Portfolio Design

8.3.1. One of the means for augmenting power generation by the utilities is through cogeneration by industrial and commercial establishments. The potential for power generation through the cogeneration route has not yet come close to being realised. A study conducted by USAID on the potential for cogeneration in Maharashtra and Gujarat revealed that about 2500 MW of power could be generated through cogeneration in these two states alone. Cogeneration has significant energy saving potential. By generating electricity in conjunction with production of steam for industrial or commercial processes, considerably less energy is used than when steam and electricity are produced separately. However, cogeneration is an economic investment for a firm only if the value of the energy produced is greater than the incremental capital and operating costs incurred by the firm. This energy includes that which the firm would normally purchase from an electric utility as well as excess electricity which could be sold to the utility or other industrial customers.

8.3.2. A second economic benefit may result if the cogenerator can produce electricity more reliably than the electric utility supplying him, thus increasing its security of supply and reducing economic losses from supply disruptions. The financial issues associated with the development of a cogeneration project are not unlike those of other capital intensive engineering projects. Among the major factors affecting the financial attractiveness of a cogeneration investment are: investment costs; capacity utilisation factor; fuel prices; price of electricity purchased by the cogenerator; price of electricity sold by cogenerator; and financing costs. Uncertainties in many of the above factors act as barriers to the penetration of cogeneration. Other institutional and policy issues such as: power purchase agreements on the basis of avoided costs; development of generic contracts for cogeneration arrangements between cogenerators and grids; provision of back-up power for cogeneration plans; etc. need to be addressed. The Project will support conduct of a study addressing the above issues as well as performing loan portfolio design for about 30 industrial cogeneration schemes.

8.4. Feasibility Reports for Energy Conservation Schemes:

8.4.1. The World Bank proposes to provide a credit of \$200 million through IDBI and Industrial Credit and Investment Corporation of India Ltd (ICICI) for implementing energy conservation schemes. For this purpose, it will be necessary to prepare detailed feasibility reports for appraisal by the financial institutions. The feasibility reports will contain technical economic analysis on the schemes and provide detailed information on the scheme proposed. EMCAT will provide support in the form of consultants, both Indian and U.S., for preparation of the feasibility reports. The World Bank line of credit will have an impact on energy conservation in the industrial sector and, depending on its success, could lead to further lines of credit for energy conservation from World Bank and other multilateral donors.

8.5. Development of Private Sector Energy Consulting Services:

8.5.1. The advent of private sector energy consulting services or Energy Auditors as they are referred to in India is a fairly recent development. Through the '70s and in the mid-'80s, energy efficiency consultancy was vested in GOI institutions and programs. The services were provided by GOI-supported organisations and some industry associations, but had some severe drawbacks. These Studies: a) Were predominantly aimed at diagnostic services; b) Lacked turnkey or implementation services; c) When they attempted to make detailed energy audits they suffered from lack of sound engineering design and drawings, poor accuracy and reliability of measured parameters and a tendency to focus on traditional areas (boilers, furnaces etc) over process-related energy efficiency; d) Provided inadequate treatment of financial analysis and preparation of financial packages and options; e) Lacked reliable commercial information, including an absence of coherent implementation plans involving equipment suppliers, contractors, etc.; and e) Had an absence of contractual guarantees to cover risks associated with introduction of energy efficiency systems.

8.5.2. As a result of these shortcomings, and in response to the needs of industry, a nascent and growing private sector energy consultancy service has begun to emerge. These private groups are beginning to make their presence felt, though not without problems. The non-availability of skilled manpower is acute. Another area that needs support for improving the quality of consultancy is availability of accurate and reliable diagnostic instruments. The Project would support application-oriented energy audit training both incountry and in the U.S. for personnel from 50-75 private engineering consultancy firms.

8.6. Energy Services Companies (ESCOs):

8.6.1. The lack of progressive incentives to address the barriers to conservation investments, particularly those that relate to moderate to high technical and financial risk, require innovative solutions. It is in this context that the concept of energy services companies (ESCOs) deserve careful attention and the evaluation for their introduction, as a possible solution. Further, ESCOs are expected to promote business alliances thereby greatly influencing the possibility of conservation measures being implemented.

8.6.2. ESCOs provide a one stop shopping approach to energy conservation. They audit energy use in firms and buildings to identify the optimal mix of measures for energy efficiency, then install/maintain these measures, often paying for the whole project at no up-front cost to the energy consumer. In exchange, the ESCOs get a mutually agreed upon share of the savings that the project produces. The user is guaranteed to pay no more for energy than would have been the cost without the efficiency measures. This type of business arrangement in which payment of cost of services rendered is contingent on their successful operation (performance contracting) is a new concept in India. It appears to combine the advantage of minimising the technical risk and addressing the capital scarcity situation faced while considering energy efficiency measures. As a financing mechanism, it allocates risk differently and relies very little upon the financing strength of the energy consumer. ESCO essentially puts the project financing together. Since the concept of ESCO is new in India, it would be worthwhile to provide support for the formation of the first ESCO through IDBI. However, it will first be necessary to carry out an in depth study on the role of ESCOs, to address issues like contract terms, authority to execute contracts, etc. Following the conduct of the study, a program of action could be drawn for this project component.

8.7. Information Dissemination and Policy Dialogue:

8.7.1. It will be necessary to create awareness about the importance of energy conservation through industry associations and other non-governmental organizations (NGOs) which play an important role in the industrial sector. End-use energy efficiency is a subject of abiding interest to various industry associations. Most, if not all associations have been mandated by their respective members to promote and disseminate programs and information on the techniques of implementing energy efficiency.

8.7.2. Associations such as the Confederation of Engineering Industry (CEI), Federation of Indian Chambers of Commerce and Industry (FICCI) and Associated Chamber of Commerce and Industry (ASSOCHAM) have been very active in pursuing a variety of programs that involve a policy dialogue with GOI, promotion of trade and investment opportunities and in providing a forum for sensitising industry, commerce and business interests to the scope and potential for energy conservation. It is in the interest of the Project that linkages are provided with these groups to strengthen their ongoing initiatives in energy efficiency. Associations can also play a key role in sensitising managements to the need to formalise energy management structures in key energy intensive industries and thereby facilitate adoption of the energy management function. The associations and NGOs can also play an important role in dialogue with the government on energy efficiency issues and policy formulation for promoting energy conservation. It is proposed to provide grants to these agencies for activities related energy efficiency to be carried out by them.

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INDUSTRIAL COGENERATION

1. Introduction

The term cogeneration is not strictly an engineering or a scientific term. This term seems to have evolved as a result of social and political considerations and has been perceived to mean simultaneous on-site generation of heat and power. Cogeneration as a potential means of reducing overall energy consumption was recognized at the highest levels of government in the United States, which resulted in the enactment of Public Utilities Regulatory Policies Act (PURPA 210) in March 1980 during President Carter's administration. While there was ~~been~~ opposition to the enactment of this law by some large utility companies, industries and other interested professional bodies by and large have welcomed this act. PURPA has provided a major boost to non-utility power generation (NUG) including cogeneration in the U.S. It has been estimated that 15,000 MW of NUG capacity was added in the period 1980-86, almost all of it cogeneration. PURPA gave cogenerators the opportunity to sell all their production to their local utilities at the marginal cost of supply.

By cogeneration is meant simply the sequential use of energy from the same fuel source. In other words both work and heat producing ability of a given fuel is fully exploited, thereby minimising instance of "lost work". Because of the recent advance in low temperature heat utilization technology, one could visualize two types of cogeneration systems, namely the topping and bottoming cycles. In the case of the topping cycle, generation of shaft power or electricity always precedes the utilization of heat while in the bottoming cycle, the generation of electricity from the waste heat is the last sequence.

A cogeneration system at the industry level implies on-site heat and power generation wherein simultaneously process heat and electrical power are required. At the semi-micro and macro levels it implies establishing optimum systems in a region or a cluster of industries so as to minimise the energy input, redundant standby capacity and fuel/energy transportation requirements into the region. Energy conservation, reliability and minimization of cost of energy are its principal aims. This implies on one hand that the industrial unit meets its energy requirement from a single source of energy by cascading or recycling energy from one subsystem to the other so that an optimal system can be achieved. On the other hand, where the requirement of a single plant may not be adequate to establish the most economical size of cogeneration equipment internally in order to effect an overall savings in the economic operation of the plant and resource utilization from the national perspective, a central utility station can be developed so that the energy generated (heat and power) is shared by several individual plants.

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Based on the above observations, we can define the total energy concept of cogeneration, as follows: "In a system comprising an economic activity, the Total Energy Concept involves reducing the purchased energy input to a minimum such that the parallel demands for heat energy at different temperature levels are totally met through a single energy source by cascading or recycling energy from one subsystem to another." Naturally the methods of cascading of energy from one subsystem to another differ, depending upon the boundaries of the system. In other words the concept of total energy might dictate different approaches for different systems.

2. Cogeneration and Second Law Analysis

Combined cycles and total energy systems are both forms of combined heat and power generation. They differ from power-station condensing steam turbines in that their purpose is to produce both work and heat energy (heat and power) efficiently. The primary purpose of central power generation is to produce maximum electrical power efficiently. The maximum possible thermodynamic cycle efficiency is around 42 percent based on today's technology and available materials, but the average for most electrical utilities is 28-30 percent in our country.

The reason for the low efficiency is the thermodynamic limit on conversion of heat energy to mechanical or electrical energy, which brings us to the consideration of second law of thermodynamics.

The science of thermodynamics concerns itself essentially with the conversion of energy from one form to another. While the first law of thermodynamics is nothing but a restatement of the principle of conservation of energy, the second law of thermodynamics gives us a better insight into the process of conversion of heat into work. It is now well established that to convert heat energy into work, a high temperature source, a low temperature sink and a cycle of operations working between these two temperatures are necessary. The theoretical maximum production of work from heat is the Carnot efficiency, which is given by.

$$\text{Efficiency, Carnot} = \frac{T_1 - T_2}{T_1}$$

One of the corollaries of the second law is that even a small amount of heat at a high temperature is more useful for conversion into work than a larger amount of heat at a lower temperature. Evidently for conversion of heat into work the temperature of the heat source must be as high as possible. In engineering practice, highest possible temperatures limited by practical material considerations are employed to convert heat energy into work. For example, in a Rankine steam cycle for power generation the highest steam temperature employed at the inlet to the steam turbine is around 540°C, while in gas turbines the inlet temperature is even much higher at 1200-1400°C. Research and development efforts are continuing to increase inlet temperature to the gas turbine to a value of 1600°C by the use of ceramic blades in the first and second rows of the gas turbine.

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In a steam cycle for power generation, although the adiabatic flame temperature in the boiler is above 1400°C, the superheat steam temperature is only 540°C. This means that the temperature differential between flame and super-heated steam is utilised only to promote transfer of heat and not work, thereby introducing a substantial amount of irreversibility. In order to reduce this irreversibility a slightly modified energy system design has been proposed in the form of a combined gas turbine-steam turbine cycle. Since gas turbines are capable of converting heat energy into work at a much higher temperature than any other conversion device known to engineers so far (with the exception of magneto-hydrodynamic cycle), the use of gas turbines in conjunction with the conventional steam turbine cycle as a means of increasing the cycle efficiency is finding favor. In fact, looking at the future one could say that the conventional steam cycle consisting of direct fired steam boilers and steam turbine-electric generator system might give way to combined gas turbine-steam turbine cycle systems. One of the offshoots of this is the extension of this concept to the total energy system or cogeneration system in the industrial front. This takes the shape of a combined gas turbine steam turbine cycle with the exhaust gas being made use for meeting the requirement of process heat either in the form of hot gases or process steam.

3. Economic Factors

There are a number of factors which determine what potential a cogeneration system holds for energy conservation and how much such a project would cost. However, some of these factors have a first order effect on the cogeneration scheme and its economic viability. It is worthwhile, therefore, to briefly examine these factors.

The economic analysis of a topping cogeneration cycle is infinitely more complex than that of a bottoming cycle. That is because in the case of the latter, power production is through the process of recovery of waste energy which is a by-product. However, in the case of a topping cycle, where purchased fuel is an essential input, the first step to be considered is whether heat energy demand is essential or non-essential. If, for example, the demand for heat energy (at low temperature levels) is considered to be essential in a given situation, then the economics of electrical power generation are very favourable. If, on the other hand, the nature of the thermal load is non-essential and also of an unsteady nature, then the economics of cogeneration are rendered unattractive to a large extent.

In order to study the economics of cogeneration system careful consideration of a number of factors is necessary. These factors include:

- a) The system of meeting steam and power requirements;
- b) The utilisation of steam and electricity patterns on a 24-hour basis;
- c) The stability, reliability and control of steam and electricity demand in the existing system;

- d) Energy costs;
- e) The scope of substitutability of steam and power;
- f) The fuel-energy balance;
- g) The substitutability of fuels;
- h) Projections of fuel efficiency and possibilities of energy conservation;
- i) Projections of operational and maintenance problems;
- j) Projections of scheduled maintenance and probability of forced outages;
- k) Operational characteristics under different types of loads and load characteristics;
- l) Reserve capacity.

4. Potential for Cogeneration

Before describing some of the types of schemes used, it would be worthwhile to introduce the important ratio, X, which is defined as the ratio between electrical output and heat of the process:

$$X = \frac{\text{Electrical Output}}{\text{Heat Output}}$$

This ratio has characteristic values for the various types of power-producing equipment.

To illustrate the convenience of having such a ratio when defining loads for energy systems we can consider various categories of industries.

With regard to heat and power requirements, most industries will be found to fall into one of four categories depending upon the heat to power rate:

- a) Industries, such as foundries and mechanical workshops, in which there is little demand for heating (or processing) so that it is not economical to try to produce power from the steam required for heating.
- b) Industries in which the power demand is larger than the steam demand, i.e. the power produced by the steam used in processing is not sufficient to cover the demand. These industries might include textile mills with only spinning and weaving activity, iron and steel industries, mining industries, or power plants where steam is used for preheating the feed water etc.;
- c) Industries in which the power balances the steam demand, i.e. the amount of process steam required is considerable, thereby enabling or generating all or most of the required power by passing high pressure steam through a back pressure steam turbine. A large number of industries come into this category, including many composite textile mills, pharmaceuticals, paper and pulp mills;

- d) Industries in which the steam demand is larger than the power demand, i.e. the demand for process steam is so great that more power can be generated from it than the factory requires. These might include, for example, various types of chemical industries, sugar mills, breweries and laundries.

The hardware systems required for cogeneration for the above categories of industries will be different because of widely differing heat to power ratios. Today, with a number of prime movers available it would be possible to meet the heat and power demand of most of these categories of industry. The only limiting factor would be the inability of the prime mover to operate under a particular demand ratio.

The ratio X will seldom be fixed, even when we are considering the same type of application--seasonal changes, changes in production pattern, and other factors tend to change the value of the ratio.

5. Hardware for Cogeneration Systems

Until now, several types of prime movers have been applied successfully in total energy systems such as:

- a) Back pressure steam turbines;
- b) Passout cum condensing steam turbines;
- c) Controlled extraction back pressure steam turbines;
- d) Reciprocating gas engines;
- e) Diesel engines;
- f) Gas turbines of various configurations, either liquid fuel fired or gas fired.

As the prime movers listed above all have their characteristic X ratios, various combinations of them have been installed to obtain the required split between electrical and heat loads for particular installations.

Back pressure steam turbines for power and heat generation are well established in several types of industry. High pressure steam (normally superheated) is generated in a fired boiler and led into a simple steam turbine. The steam is then expanded through the turbine, which drives an electric generator. The exhaust pressure after expansion is dictated, among other factors, by the temperature level required by the process receiving heat. Normally the ratio X will be very low for such cycles; little electricity will be produced compared to the process heat available. The higher the back pressure, the less electric energy will be produced for a given steam output from the boiler.

While a very low ratio of electrical to heat output may be suitable for some processes, there may be a concurrent requirement for several different temperature/pressure levels of heat for other purposes. In this situation, steam extraction at different turbine stages could be a solution.

Altogether, a back pressure or an extraction/back pressure turbine could provide a very flexible solution for most smaller total energy systems. As the thermal load takes the place of the condenser in a conventional steam cycle, little heat is actually lost. Total efficiency is more a function of the boiler efficiency and the stack temperature.

If using a fired boiler, a wide variety of fuels such as coal, heavy--light oil, natural gas or industrial byproducts could be burned. This is an advantage of such installations.

Combining a back pressure system with an unfired exhaust heat recovery boiler for a gas turbine is a useful device to bring the X ratio to the value required, provided that the investment limitation allows for such a solution and that the plant does not become too complex.

Thermally, both the gas engine and the diesel engine are attractive. Efficiencies around 32-34 percent could be expected for the gas engine, while most diesels are capable of reaching 35-40 percent. High grade heat could be recovered from the exhaust gases, but even low grade heat is available from the jacket cooling, the lube oil cooler or even from the air intercoolers if such are used.

For some applications, it could be difficult to make proper use of low grade heat, as the temperature level is relatively low. Further, it is a question of investment cost per recovered heat unit. For power and heating schemes, however, even the low grade heat could be utilized. If a diesel engine is selected as prime mover in a case like this, an X ratio near unity could easily be achieved. For an optimum installation, the corresponding thermal efficiency could be around 80 percent.

When comparison is limited to prime movers only, gas turbines would appear to have the following advantages/disadvantages over reciprocating gas/diesel engines:

Advantages:

- Low specific weight (kg/kW)
- Low specific Volume (m^3/kW)
- Low specific first cost;
- Minimum requirements for external auxiliary systems;
- Environmental acceptability (emissions, thermal pollution etc.);
- Vibration free (only rotating parts);
- Extremely low lube oil consumption;
- Low installation cost, no heavy foundations necessary;
- Flexibility of installation because of low weight, small size and no vibrations;
- Easy to maintain due to extreme simplicity in design;
- Small number of parts;
- Suitable for various types of packaging.

Disadvantages:

- Higher fuel consumption (kcal/kwh);
- Sensitive to contamination in the fuel, particularly with respect to alkali metals and vanadium;
- Unfavorable part load characteristics, i.e. high fuel consumption.

It is important to realize the difference between gas turbines and reciprocating engines with respect to low grade heat rejection.

A large percentage of the fuel input to a diesel or a gas engine will be rejected via the jacket cooling water and the lube oil cooling system in the form of low grade heat. In a gas turbine, which has only a limited number of rotating parts generating very little friction heat, there will be a minimum of heat rejected through the lube oil cooler, and the amount is usually so small that recovery is not justified. For turbines having the rotor bearings located in the hotter section of the machine, the heat rejection will be larger.

Many of today's gas turbines in the output range of 500-2000kW were originally designed as standby machines. Simplicity both in operation and maintenance, low first cost, and installation flexibility were typical design criteria for turbines of this type, while efficiency was not a prime consideration.

Consequently the majority of such small turbines have a rather high heat rate. By fully utilizing the recoverable exhaust heat from these turbines, however, well applied and designed on site total energy systems easily show efficiencies well above 80 percent. This is a very high value considering that the thermal efficiency of large utility power station seldom exceeds 30 percent measured at the point of consumption. For a country where the bulk of the electric power is produced in central power stations, one advantage of on site energy systems would be a greatly reduced fuel consumption.

6. Potential for Cogeneration in India

The potential for non-utility power generation including cogeneration in India is quite high. There have been very few definitive studies on estimating this potential other than a 1976-77 study by the National Productivity Council which attempted to estimate the economic potential of cogeneration in Indian industry. The study estimated that almost 1,800 MW of additional power generation is possible through cogeneration in major industry sectors.

A study sponsored by USAID in late 1986 provided more current and relevant information. The study focussed on the states of Maharashtra and Gujarat. The preliminary analysis conducted in this study revealed that the financially attractive non-utility power generation potential in Gujarat and Maharashtra could exceed 2,600 MW during the 1986-96 period.

Industrial cogeneration accounts for the vast majority of this potential, perhaps exceeding 2,000 MW by itself. The industries with the highest potential are the fertiliser, basic chemicals, refinery and pharmaceutical industries. About one-third of the cogeneration potential lies in existing plants (retrofit or replacement of existing steam generating equipment), and almost all the potential comes from topping cycle cogeneration systems, where steam is used first for power generation and then for industrial processes. Over two-thirds of the potential of 2,000 MW lies in public-sector industries. The potential for bottoming cogeneration is estimated at about 50 MW, mainly in refineries, fertilizers and petro-chemical plants.

If the potential of 2000 MW for industrial cogeneration in just two states in the country is any indication, the overall economic potential for the country as a whole would be very high--perhaps in the neighborhood of 10,000 MW or so.

7. Summary of Key Technical, Economic/Financial, and Institutional Issues

As with many technologies, the development of a country's cogeneration potential is a strongly dependent on a large number of technical, financial, and institutional factors. In some developing countries these take the form of barriers or constraints which impede the technological penetration.

Technical Issues: The technical issues associated with the development of a cogeneration projects are not unlike those of other capital-intensive engineering projects. They involve implementation of the conventional project phases including project identification, feasibility studies, financing, design, procurement, and implementation. Although some new cogeneration technologies are emerging, there are a number of industries in which cogeneration has a well established history, e.g., many of the sugar mills, refineries, and some paper and pulp plants. However, in the past few years, with the changed economic environment and greatly increased interest in conservation, energy audit programs and market assessment efforts have begun to reveal a much larger cogeneration potential, including industries which have not previously been heavily involved. Within this wider circle, there is a lack of detailed knowledge and experience in cogeneration and power technology, thus inhibiting the process of project identification and design. A further technical issue relates to the technical interface between the cogenerator and the electricity supply company.

Equipment selection and procurement present an additional barrier to efficient development of cogeneration projects. Because some of the equipment would be imported, there may be difficulties in acquiring adequate information and in design and selection. However, some progress is occurring in this area as lending and donor institutions, technical assistance programs, and the public/private sector organizations themselves are becoming better informed, assisted by equipment vendors recognizing the large potential market. Recent developments in India are indicative of the growing prospects of joint ventures with established foreign manufacturers and suppliers in the design, development and engineering including indigenous manufacture of gas turbines in the higher (over 30 MW) and lower ranges (1-10 MW).

Economic/Financial Issues: Cogeneration has significant energy-saving potential. By generating electricity in conjunction with the production of steam for industrial processes, less energy is used than when steam and electricity are produced separately. However, energy savings from cogeneration do not in themselves necessarily imply economic savings. Cogeneration will be an economical investment for a firm only if the value of the electricity produced is greater than the incremental capital and operating costs incurred by the cogeneration firm. This electricity

includes that which the firm would normally purchase from an electric utility, as well as excess electricity it produced (if any) which could be sold to the utility or to other industrial customers. A second economic benefit may result if the cogenerator can produce electricity more "reliably" than the electric utility supplying it, thus increasing the security of supply and reducing economic losses from supply disruptions. Another economic issue for many industries is the ready availability of a low-cost waste fuel, e.g. biomass in a form well-suited for cogeneration. Among the major factors affecting the financial attractiveness of a cogeneration investment are:

- * Investment costs
- * Capacity utilization factor
- * Current and future fuel prices
- * Price of electricity purchased by the cogenerator
- * Price of electricity sold by the cogenerator ("buyback rate")
- * Operation and maintenance costs
- * Financing costs

Uncertainties in many of the above factors have been and remain a barrier to the penetration of cogeneration.

Institutional Issues: Institutional issues are responsible for the most complex and pervasive barriers which must be addressed if cogeneration is to become significant in developing countries like India. Although much of the technology has been available for many years, its implementation by the private sector requires significant institutional development and regulatory changes to create an environment where the technology can prosper. Key among these issues are the following:

- Relationships and interactions between the cogenerator and electric utilities. Even if a utility's monopoly power of generation is revised, mechanisms must be developed to ensure that it and potential cogenerators have adequate and fair incentives to interact in project development. Particular attention must be given to addressing the utility's concern about losing customers and control of its system and market.

- Pricing and long-term contracts. One of the most important aspects for the cogenerator in financing and implementing a cogeneration project is the long-term price which he would receive for sale of excess electricity, as well as the price it would pay for standby (backup) capacity and for purchased electricity. There is very little experience in India in developing the policies and administrative procedures within which fair purchase contracts could be developed.

- Project financing. Because of the potential larger investments, as well as, strong financing sensitivity to fuel and electricity prices, cogeneration financing is generally more complex than for other types of conservation projects.

8. Recommendations

Based on the findings of several studies, several general measures are recommended to increase participation of non-utility entities in power generation in India. Some of these are:

1. It is necessary to define and publicize a clear policy on non-utility power generation, covering cogeneration and power-only systems. The primary policy issues are:
 - a) Permission for independent generators to operate in parallel with, and sell electricity to the grid
 - b) The establishment of a straightforward procedure for licensing independent generation
 - c) Definition of the terms of interaction between the SEBs and non-utility generators
 - d) Definition of a price that utilities will pay to independent power generators for electricity and the cost of backup power.

In defining this policy, the following should be taken into account:

- a) The impact of power shortages on the country's economic growth and prosperity, especially in the industrial sector
 - b) The inability of the SEBs to satisfy the growing demand for electricity
 - c) The positive impact of cogeneration on the efficiency of fuel use.
2. An important issue for cogeneration and independent power producers is the purchase price that the SEBs pay for power. Guidelines should be established for defining this price. A price policy based on the avoided costs of the SEBs offers a fair value for non-utility generated power and has proven to be an effective incentive for the development of cogeneration in other countries, such as the U.S. In defining a fair purchase price, the following should be considered:
 - a) The SEB's relatively high generation costs that will result from future plants
 - b) The high T&D losses of the grid
 - c) The increased value of power to SEBs based on the season, time of day and region
 - d) The cost of providing power to remote areas and associated premises that might be considered for power generation in these areas.

9. Conclusion

Under appropriate technical and economic conditions, cogeneration can be an attractive economic investment from the perspective of the investing firm as well as from the national perspective. However, in order to realise the cogeneration potential in India there is an urgent need to enunciate appropriate policies and programs. The paper, while describing cogeneration, also focusses on its potential in Indian industry and discusses some of the key issues and constraints in the implementation of cogeneration in India.

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FINANCIAL ANALYSIS

1. Introduction

Actions in energy efficiency by the Indian corporate industrial sector have largely centered in areas that can be characterized as being low risk, low-cost conservation options. Furthermore, the percolation of these universally tested energy efficiency measures across the industrial sector has been slow with low levels of investment growth. Corporate attitudes, investment plans and decisions are largely driven by the reliability, price and quality of delivered energy. The response to unreliable electric power is standby captive diesel-fuelled systems that afford a measure of reliability that industry needs to sustain production. The high price of petroleum fuels has led to conservation efforts by industry in general, which have been quite intensely pursued by numerous largely private oil-intensive consumers. The poor quality of mined coal (low calorific value, high ash content) has led to the growing interest in alternative combustion systems such as the Fluidized Bed Boiler. Taken as a whole the collective response of industry can be termed as progressive but neither broad based nor intense enough to address the vast potential that exists.

2. Attitudes to and Risk and Nature of Energy Efficiency Investments

2.1 Investment attitudes towards energy efficiency project vary considerably across industry. Low capital, low risk projects generally termed as house-keeping measures are generally accepted, and where accepted, are funded and implemented. Table 1 provides a list of common house-keeping measures in industry, the average investment levels, and the returns on investments obtained. These measures generally account for 3 to 15% energy savings with investments ranging from negligible to \$10,000 with a pay-off of 3 to 12 months. Opportunities for such measures continue to exist in small and medium-sized firms where management control is either weak or information is lacking.

2.2 Medium-term efficiency measures require investments upwards of \$20-50,000 with moderate risks. They generally account for 5-20% energy savings and have payback periods on investment that range from 6-18 months. The measures require retrofitting (waste heat recovery or capacitor banks for power-factor improvements for instance), minor process modifications and modest equipment replacements, and involve on the whole minimal technological uncertainties. In the Indian context the risks are quite distinct and different and may be associated with the quality of supplied equipment (well calibrated and accurate metering equipment for instance), turnkey contracts undertaken (poor choice and

improper application of thermal insulation for example) and the degree of conformity of projected costs and financial performance (a reflection of stipulated energy savings) with actual field experience. Table 2 provides an illustrative list of the medium-term measures in industry, the average investment levels and the expected pay offs.

2.3 Finally, the high capital investment areas or measures are those where the anticipated benefits as well as the risks are high. A good example is cogeneration, where costs and the risks associated with non-traditional and innovative systems can be high (such as waste heat power generation in a glass or cement industry). In such instances, management is reluctant to invest unless financial incentives and the regulatory environment (sale of excess power at fair and profitable rates) are in place. Such investments are generally preferred at the time of inception or during an expansion/modernization phase where a major revamping of the unit's facilities is already planned or underway. The incremental investment associated with an efficient and modern industrial utility facility over a traditional energy facility can, at such junctures, be more easily justified on financial grounds.

2.4 Likewise, retirement of old and obsolete energy equipment is not always a preferred alternative -- witness the continual presence of shell tube boilers such as Lancashire boilers, a legacy of the British times, in textile units. Again it is not surprising to find quite a few instances where rather modern industrial factories (dairy and pharmaceutical plants) possess inefficient and antiquated energy generation facilities. This lends powerful support and credence to the view that Indian managements prefer investments on production apparatus rather than on off-site energy systems.

2.5 Investment decisions almost always favor first cost over life cycle costing

This is partly a reflection of the tight capital situation and also the averseness of managements to deal with the risks and uncertainties inherent in the adoption of new products, processes and technologies. This is precisely why energy efficient technologies such as heat pipes, energy wheels, absorption refrigeration and micro-processor based energy management systems, to name a few, have yet to be widely used.

3. The FICCI/NPC Surveys on Industrial Energy Savings Potential and Investment Trends

3.1 The results of a 1988 survey conducted by the Federation of Indian Chambers of Commerce and Industry (FICCI) in 371 industrial units on the status of energy efficiency gains is revealing. The study found that over 75% of the units reported implementation of house-keeping measures; 50% to 60% reported initiation of energy efficient retrofits and minor process modifications including installation of process control instrumentation and, the high capital and high risk long-term measures were virtually unreported.

3.2 The energy savings achieved quite accurately reflected the nature of the energy efficiency actions implemented. Almost 40% of the firms experienced up to 5% savings; 30% reported gains between 5 and 15%, and only 13% achieved over 15% energy savings. Tables 3 through 7 provide salient FICCI survey findings.

3.3 An important finding of the FICCI survey is that as many as 80% of the respondents said that it is not the low cost of energy that stood in the way of industry adopting energy efficiency measures. In fact, only 25% of the surveyed units indicated that the financial return on energy efficiency investments was not sufficiently attractive.

3.4 A significant point is that many of the constraints faced by industry are technical, such as lack of information, requisite equipment and consultancy back-up as well as dearth of trained manpower. Financial constraints are largely faced by units which are anxious to modernize plant and machinery. An overwhelming number of this category of units desired more incentives and concessional loans to replace old machinery or undertake process modifications.

3.5 The FICCI survey corroborates the earlier studies conducted by the National Productivity Council (NPC) in 1982 in over 200 industrial units concerning the savings potential of energy conservation. Per the NPC survey 25% savings is possible through house-keeping and low risk conservation options. The NPC study did not sufficiently analyse the opportunities and possibilities for major end-use efficiency gains through capital-intensive modernization, and a 1985 follow-up survey in 178 of the 200 units earlier surveyed indicated that 40% of the units have successfully implemented measures and have actually achieved more than 10-15% savings (Table 8). The FICCI survey conducted three years later in 1988 validates this rather closely and clearly indicates that the number of units that have achieved up to 15% savings has increased dramatically to around 70% from the earlier level of 40% or thereabouts reported by NPC in 1985.

3.6 There is therefore sufficient and compelling proof to conclude that Indian industry has achieved modest efficiency benefits and gains, up to 15%, rather exclusively through low capital-low risk conservation options

The savings of 15% to 30-40% constitutes a rubicon line into uncharted and risky territory, but gains of this magnitude are clearly technically feasible as the experience in industrialized nations such as the USA, Japan and in Western Europe would indicate. In all probability it would be relatively more easily achieved in India and perhaps greater considering the levels of technologies deployed domestically. This is largely because Indian industry imported technology from the west when energy was cheap. The hallmark of these technologies were their relative low energy efficiencies. While the developed nations have restructured

their industrial economies sufficiently to reflect higher efficiencies, a similar shift has been slow to take place in India.

3.7 What has been the experience from a financial viewpoint of progressive firms that have attempted to cross the 15% energy savings barrier through major investments in equipment and technology? The answer could help determine both the levels and bankable investment opportunities in energy efficiency in Indian industry. Case studies abound and the IDBI experience in a few units that are contemplating such investments is particularly revealing. Pre-feasibility studies conducted in eight private sector units under IDBI's Equipment Financing for Energy Conservation Scheme suggest energy savings in excess of 20% (in one case it was 33%) with a payback period of two years for five of the eight units. Project funding ranged from \$0.4 to \$10 million and involved process modernization, energy equipment replacements and more significantly, cogeneration. Four of the eight were cogeneration projects, with payback periods of two to five years.

3.8 The IDBI experience on the pre-tax return on investments (ROI) expressed as a payback period for energy efficiency projects has been validated by other studies. According to a detailed energy audit study in 1989 by FICCI in 29 industrial units, the percentage energy savings potential in 20 firms was over 15%; 14 firms postulated a savings potential of 25% and greater. In four units the potential was a staggering 50%. The payback period varied from as low as three months to a high of 36 months with an average of 16 months.

4. Incentives for Energy Efficiency

4.1 Germane to any discussion of the financial viability of energy efficiency measures in industry are the following two issues:

- 1) The nature and adequacy of the current financial incentives in place, and
- 2) The extent to which energy management structures have been integrated in organizations.

4.2 The current financial and fiscal incentives cover a fairly wide spectrum that include:

- Fiscal incentives given by the GOI in respect of income tax (a 100% depreciation allowance on written down value is allowed on a wide variety of energy saving devices and systems including cogeneration).
- Permission to import several categories of equipment under Open General License; customs duty drawbacks for select imported equipment.

4.3 Evidence indicates that these incentives have had only a marginal impact

The 100% accelerated depreciation facility requires that it is charged in the book of accounts. This in turn means a substantial erosion in the profitability of a firm and in many cases a further aggravation of losses, a situation clearly unacceptable to managements keen to report profits. Thus the incentive encourages only highly profitable firms to avail the facility. It is therefore hardly a surprise that in a study conducted by the National Council of Applied Economic Research on energy efficiency, only about 25% of the 196 industries surveyed had availed the 100% write-off facility.

4.4 Likewise, the concessional import duty is felt to be restrictive and, as a matter of fact, covers only 15 items. Policy contradictions are common place. For example, absorption refrigeration systems are listed under the 100% depreciation schedule as an energy savings device. The system concurrently attracts an import duty of 250% making it financially unattractive.

4.5 However, under the 8th 5-Year Plan the government is planning a much broader rollback on import duties. Also, one of the conditions to effectiveness of a credit line under the World Bank's proposed Industrial Energy Efficiency Project is duty rollbacks on an expanded list of energy efficiency items. These measures would be a major positive step in promoting investments in energy efficiency.

4.6 The following facilities for funding energy efficiency projects are available to industry:

- Concessional loans for modernization from the DFI's;
- Financing for boiler replacement under a scheme operated by Petroleum Conservation Research Association;
- IDBI sponsored Equipment Finance for Energy Conservation Scheme (EFEC); and
- Subsidies for Energy Audits (IDBI)

4.7 Problems exist with each of these facilities and the number of takers are few. The IDBI modernization scheme with an interest rate of 11% is preferred over the EFEC scheme which posts a higher interest of 14%. Furthermore, apparent contradictions in the modernization scheme permit lending only to firms which are either very healthy or those which are deep in the red. Thus the middle ground of units which urgently need to take energy efficiency steps are left in the lurch. These schemes need to be improved, and their outreach expanded.

5. Energy Management (EM) Structures in Indian Industry

5.1 The EMCAT project, with its goal of promoting end-use energy efficiency among industrial firms, will work to sensitize corporate leaders to the needs and benefits of institutionalization of EM structures. The slow acceptance of the energy management concept, other than in a few progressive companies and among intensive energy users such as steel, refineries and fertilizer plants, is proving to be major barrier to the implementation of energy efficiency measures in industrial practice in India.

5.2 Experience in industrialized nations indicates that the integration of the EM function in the corporate organization ensures the staff commitment and line responsibility that are essential prerequisites to success. The EM function in industry has a distinct charter that involves investigating and identifying energy conservation opportunities, budgeting resources, performing strategic and tactical planning, and implementing a phased implementation program in coordination with production, maintenance and other corporate functions. The EM function varies from the very sophisticated in energy-intensive continuous process plants to simple ad-hoc staff committees among small and medium-sized firms. The advent of micro-processor-based on-line data measurement and control systems has provided powerful diagnostic and investigative tools to EM staff. Decision-making by corporate bodies in energy efficiency is greatly facilitated by the presence of EM structures. Case studies on successful energy conservation efforts in industry have found, in almost all cases, that these were driven by enlightened and committed top managements working through specially created units that are adequately staffed and financed, and provided the necessary degree of autonomy and authority.

5.3 The majority of Indian firms are either ignorant of or not sufficiently motivated to introduce EM structures. The situation is in a sense similar to what prevailed in the mid-sixties in India when the industrial engineering function, with its emphasis on shop floor productivity techniques, was viewed as something 'not workable' by managements. Today the turnaround is startling with almost universal acceptance of the industrial engineering techniques and tools in virtually all areas of management functioning.

ECONOMIC ANALYSIS OF IMPROVED ELECTRICITY EFFICIENCY IN THE INDIAN INDUSTRIAL SECTOR

INTRODUCTION

India will experience major national economic benefits if an effective program of industrial electricity and fuel efficiency is implemented and sustained over the coming several decades. An illustrative economic analysis has been conducted to show the implications of such a program over the coming 15 years. The analysis indicates that the aggregate direct economic savings in power plant fuel use alone could easily exceed the equivalent of \$10 billion (fixed 1990 \$) in domestic currency and foreign exchange over this period. If EMCAT is responsible for catalyzing the actions resulting in just five percent of these savings, it will have repaid its investment fifty times over.

In addition to the substantial direct economic benefits of a successful EMCAT program, there will be significant indirect economic benefits of industrial energy and power conservation and efficiency measures. These were not explicitly calculated in the analysis but clearly include the following:

- Industrial energy efficiency does not require fuel.
- Industrial energy efficiency and conservation is non-polluting at the "source" (of displaced power generation) and potentially reduces pollution at the point of use.
- The investment in industrial plant equipment and the subsequent savings in power plant investments and in fuel will save foreign exchange (or the foreign exchange opportunity costs) associated with imported fuels and equipment.
- Most investments in industrial energy efficiency will have lower capital requirements per kWe saved than new supply. In principle this frees scarce capital for other productive uses, both within and outside the industrial and power sectors.

OVERVIEW OF ELECTRICITY CONSUMPTION IN INDUSTRY

Figure 1 shows the consumption (purchases) of electricity and associated generating capacity in industry in India from 1970 through 1985, together with other projections from 1986 through 2005. The three projections are (1) a base case in which electricity consumption is assumed to continue to grow at the average rate (5.6%/year) for the period 1970-1985; (2) an Expected Case

in which overall efficiency increases by 25% in the long term; and (3) an Optimistic Case in which the overall long-term efficiency increase for industry is 40%.

(The electricity consumption data for the period 1970 - 1985 were provided by the International Energy Studies Program of the Lawrence Berkeley Laboratory, University of California. While a few additional years of data could be added to the analysis to make it more current, this would not change the results of the analysis significantly.)

Industrial purchases of electricity have grown from 34.4 TWhe/year in 1970 to 80.9 TWhe/year in 1985. This is a factor of 2.35 in fifteen years, or an average annual compound growth rate of about 5.6%. Continued growth at this rate would lead to projected electricity purchases of 232 TWhe/year in the year 2005. Table 1 summarizes the industrial electricity purchases from 1970 through 1985, with the base case projected purchases from 1986 through the year 2005.

As shown below, two plausible scenarios for improved energy efficiency in the industrial sector lead to projected electricity purchases in the year 2005 of 179 TWhe/year in the conservative scenario and 146 TWhe/year for the optimistic scenario. Both of the increased-efficiency scenarios assume that industrial productivity will increase at 5.6%/year while the rate of growth in electricity consumption gradually declines.

Historical and Projected Industrial Electricity Consumption in India (Alternative Efficiency Scenarios)

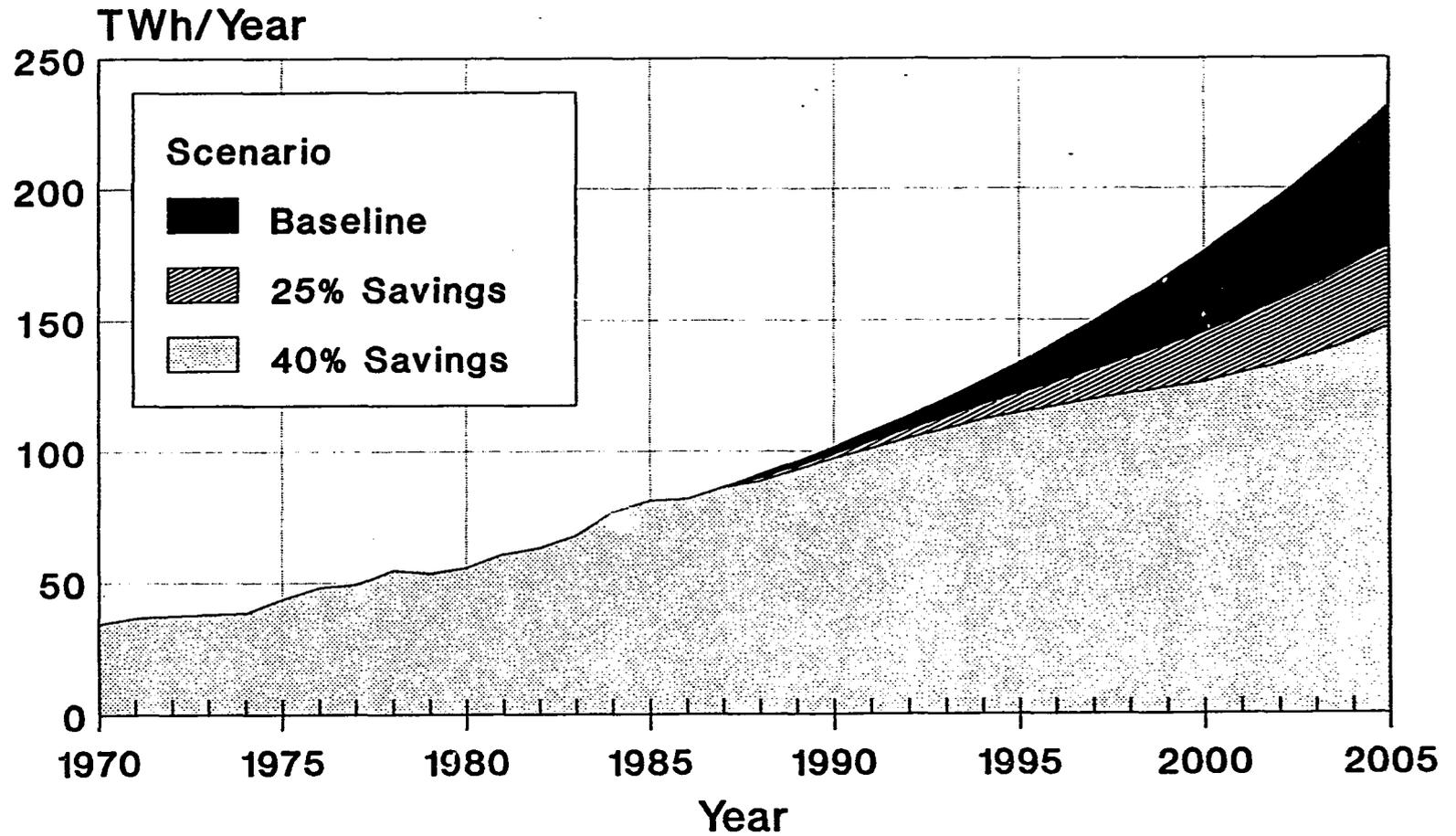


Figure 1

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Table 1: INDUSTRIAL ELECTRICITY PURCHASES AND REQUIRED
INSTALLED GENERATING CAPACITY

(10-90% penetration = 15 years, 50% penetration in 1997)

Year	f(t)	Electricity Sales (TWh/Year)			Required Capacity (GWe)		
		No EC*	25% EC	40% EC	25% EC	40% EC	No EC
1970	0	34,350	34,350	34,350	9.2	9.2	9.2
1971	0	36,460	36,460	36,460	9.8	9.8	9.8
1972	0	37,540	37,540	37,540	10.1	10.1	10.1
1973	0	37,910	37,910	37,910	10.2	10.2	10.2
1974	0	38,420	38,420	38,420	10.3	10.3	10.3
1975	0	43,460	43,460	43,460	11.7	11.7	11.7
1976	0	47,980	47,980	47,980	12.9	12.9	12.9
1977	0	49,290	49,290	49,290	13.2	13.2	13.2
1978	0	54,440	54,440	54,440	14.6	14.6	14.6
1979	0	53,200	53,200	53,200	14.3	14.3	14.3
1980	0	55,350	55,350	55,350	14.9	14.9	14.9
1981	0	60,850	60,850	60,850	16.3	16.3	16.3
1982	0	62,953	62,953	62,953	16.9	16.9	16.9
1983	0	67,633	67,633	67,633	18.2	18.2	18.2
1984	0	76,700	76,700	76,700	20.6	20.6	20.6
1985	0	80,939	80,939	80,939	21.7	21.7	21.7

1986	0	81,560	81,560	81,560	21.9	21.9	21.9
1987	0	86,166	86,166	86,166	23.1	23.1	23.1
1988	0.07	91,032	89,439	88,483	24.0	23.8	24.5
1989	0.09	96,173	94,009	92,711	25.3	24.9	25.8
1990	0.11	101,604	98,810	97,133	26.5	26.1	27.3
1991	0.15	107,342	103,317	100,901	27.8	27.1	28.8
1992	0.19	113,404	108,017	104,785	29.0	28.1	30.5
1993	0.24	119,808	112,620	108,306	30.2	29.1	32.2
1994	0.29	126,574	117,397	111,891	31.5	30.1	34.0
1995	0.36	133,722	121,687	114,466	32.7	30.7	35.9
1996	0.43	141,274	126,087	116,975	33.9	31.4	37.9
1997	0.5	149,252	130,596	119,402	35.1	32.1	40.1
1998	0.57	157,681	135,211	121,730	36.3	32.7	42.4
1999	0.64	166,585	139,931	123,939	37.6	33.3	44.7
2000	0.71	175,993	144,754	126,011	38.9	33.8	47.3
2001	0.76	185,932	150,605	129,409	40.5	34.8	49.9
2002	0.81	196,432	156,655	132,788	42.1	35.7	52.8
2003	0.85	207,525	163,426	136,967	43.9	36.8	55.7
2004	0.89	219,245	170,463	141,194	45.8	37.9	58.9
2005	0.91	231,626	178,931	147,314	48.1	39.6	62.2

Note: Average T&D Losses for Industry = 0.15, Average Plant Capacity (CF) = 0.5. *Projection from 1986 on based on exponential least-squares fit to historical data. Growth rate = 5.6%/year.

Source: Lawrence Berkeley Laboratory (1987), Report LBL 23439 for purchases, 1970-1985.

BY

ILLUSTRATIVE ECONOMIC ANALYSIS

Introduction

A preliminary macro-economic analysis was conducted to assess the direct economic costs and benefits of achieving increased end-use electricity efficiency in India's industrial sector. The analysis was conducted using a model which is transparent to the small number of driving assumptions. The results of the model are presented in terms of the savings in required new power generation facilities and in power plant fuel.

The model assumes that the present level of industrial productivity could be supported at some ultimate level of electricity consumption that is X% less than at present. For this analysis, we assumed an asymptotic potential savings of $X = 25\%$ (conservative scenario) and $X = 40\%$ (optimistic scenario) relative to present practices.

The energy efficiency measures required to achieve these long-term savings were assumed to diffuse gradually into the industrial sector, with 10% penetration in the year 1992 and 90% penetration by the year 2012. The rate of diffusion or market penetration is described by the logistic diffusion curve shown in Figure 2.

In reality the growth of the economy is likely to be constrained in part by the supply of electricity. A key assumption behind the analysis is that the economic output of industry will remain the same with gradually decreasing energy use per unit of value added. Consequently we can either calculate the decreased rate of growth in required power generation capacity and associated power plant fuels, or the increased productivity of the industrial sector under fixed growth in power and electric energy requirements.

The analysis calculates the decrease in connected load and associated electricity savings over the period 1990 - 2005. This can be translated into savings in capital equipment and in fuel at the power plant.

Costs and benefits can be compared on an annual basis using this model. This provides a national economic impact framework, although it does not consider shadow prices or opportunity costs of domestic and foreign exchange. Ultimately it might be necessary to conduct an input/output (I/O) analysis for the country to capture the full economic consequences of specific changes in specific electricity consumption and connected loads for each consuming sector of the Indian economy.

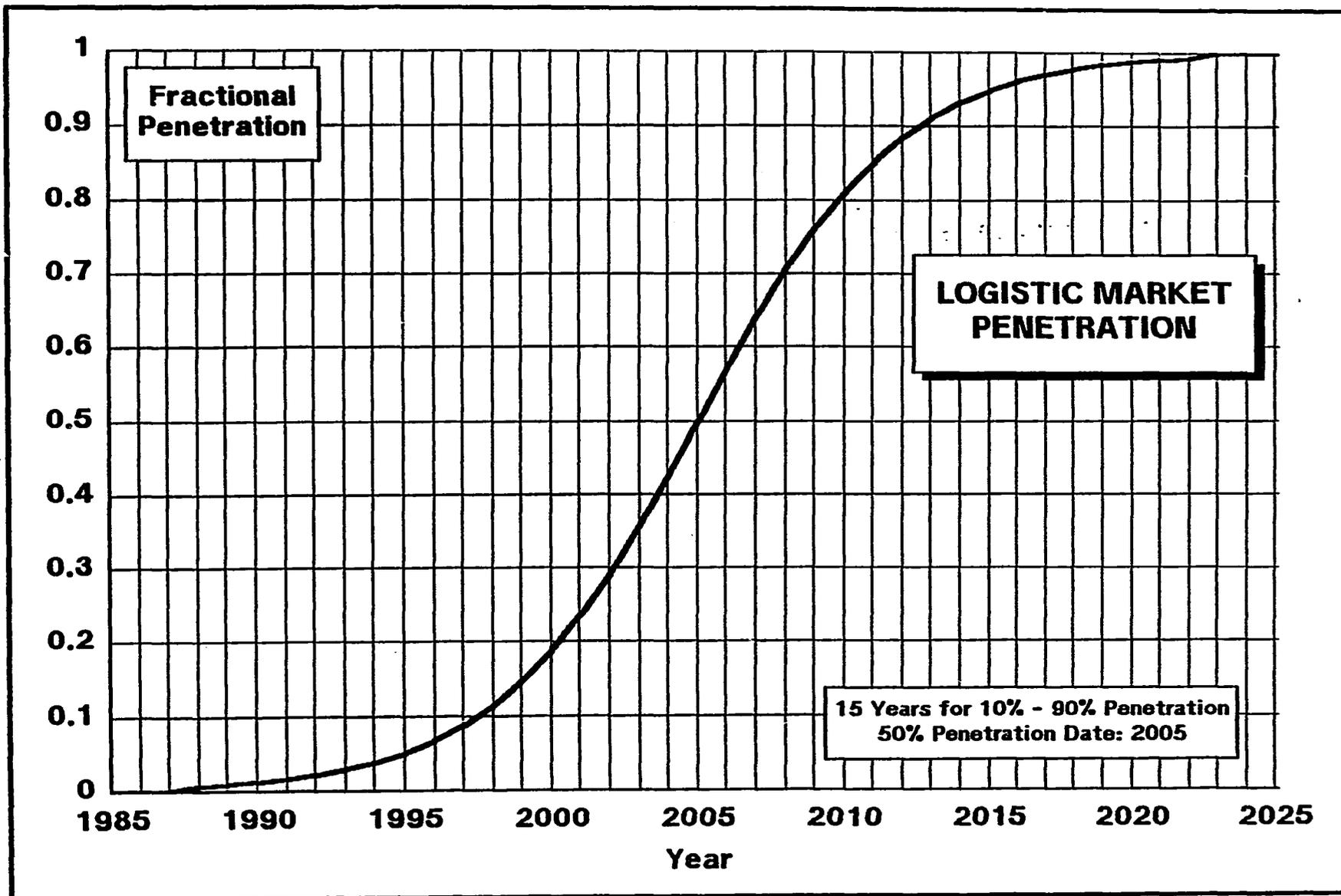


Figure 2

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The economic analysis assumes improved industrial end-use electric energy and power efficiency. These result from unspecified policy and incentive measures and actions. While the role of enlightened policy is to bring the national economic interests into phase with individual corporate financial interests, no attempt was made to develop a model which links macro-economic policy measures and projected financial investment decisions at the enterprise level. Such an undertaking is well beyond the scope of effort associated with this project paper.

Detailed Approach

The detailed analysis proceeded as follows:

- Annual time series data for electricity purchases by industry were used for the period 1970 - 1985. (See Table 1)
- An exponential least-squares fit was made to the data (resulting in an average growth rate of 5.6% in electricity purchases from 1970 through 1985).
- A Base Case Scenario was constructed assuming that future industrial electricity purchases will grow at 5.6%/year over the period 1985 - 2005.
- Two modified (energy-efficiency) cases were developed. These are characterized by:
 - Assumed technical potential for increased efficiency: (25% for the Expected scenario and 40% for the Optimistic scenario);
 - Assumed logistic penetration (see Figure 2) of Indian industry of efficiency measures:

$$f(t)/[1-f(t)] = \exp A(t-T)$$

where

$f(t)$ = market penetration of energy efficiency measures in the year t

T = year in which $f(t=T) = 0.5$

A = a rate constant

Note: $A = 0.293$ for a 15-year diffusion period from $f(t = T-7.5) = 10\%$ to $f(t = T+7.5) = 90\%$

- Specified halfway year (2005) and time (15 years) for 10% - 90% penetration.
- Electricity supply costs were computed as follows:
 - Power plant capital cost = \$1,000/kWe
 - Associated T&D costs (\$200/kWe - incremental)
 - Fuel costs \$10/boe and \$15/boe, average power plant heat rate assumed to be 11,000 Btu/kWe. (At present, Indian coal prices are about \$7/boe for power generation, but may rise with increasingly stringent environmental control policies.)
 - Actual required power generation capacity = industrial capacity requirements/[1-(T&D loss factor)]
 - Average T&D loss factor associated with industrial electricity purchases assumed = 15% (rather than the 22% national average)
- Costs of efficiency measures assumed to average \$400/kWe of avoided generating capacity.

By using the real costs of fuel, the economic analysis bypasses the issues of subsidized power.

Results of the Analysis

Figure 1 and Table 1 show the projected consumption of electricity in India for the base case and for the two increased-efficiency scenarios. The required installed generating capacity (Figure 3) in the year 2005 is:

<u>SCENARIO</u>	<u>CAPACITY</u>
Base Case	62.2 GWe
Conservative	48.1 GWe
Optimistic	39.6 GWe

Figure 4 shows the savings in installed generating capacity relative to the base case. The savings in required annual capacity additions are shown in Figure 5.

Figure 6 shows the annual fuel costs for power generation under the three scenarios, assuming a heat rate of \$11,000 Btu/kWe generated and a price to the electric utilities of \$10/boe. (At the time this PP was prepared the spot price

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Installed Generating Capacity Required for Indian Industry With and Without Energy Conservation

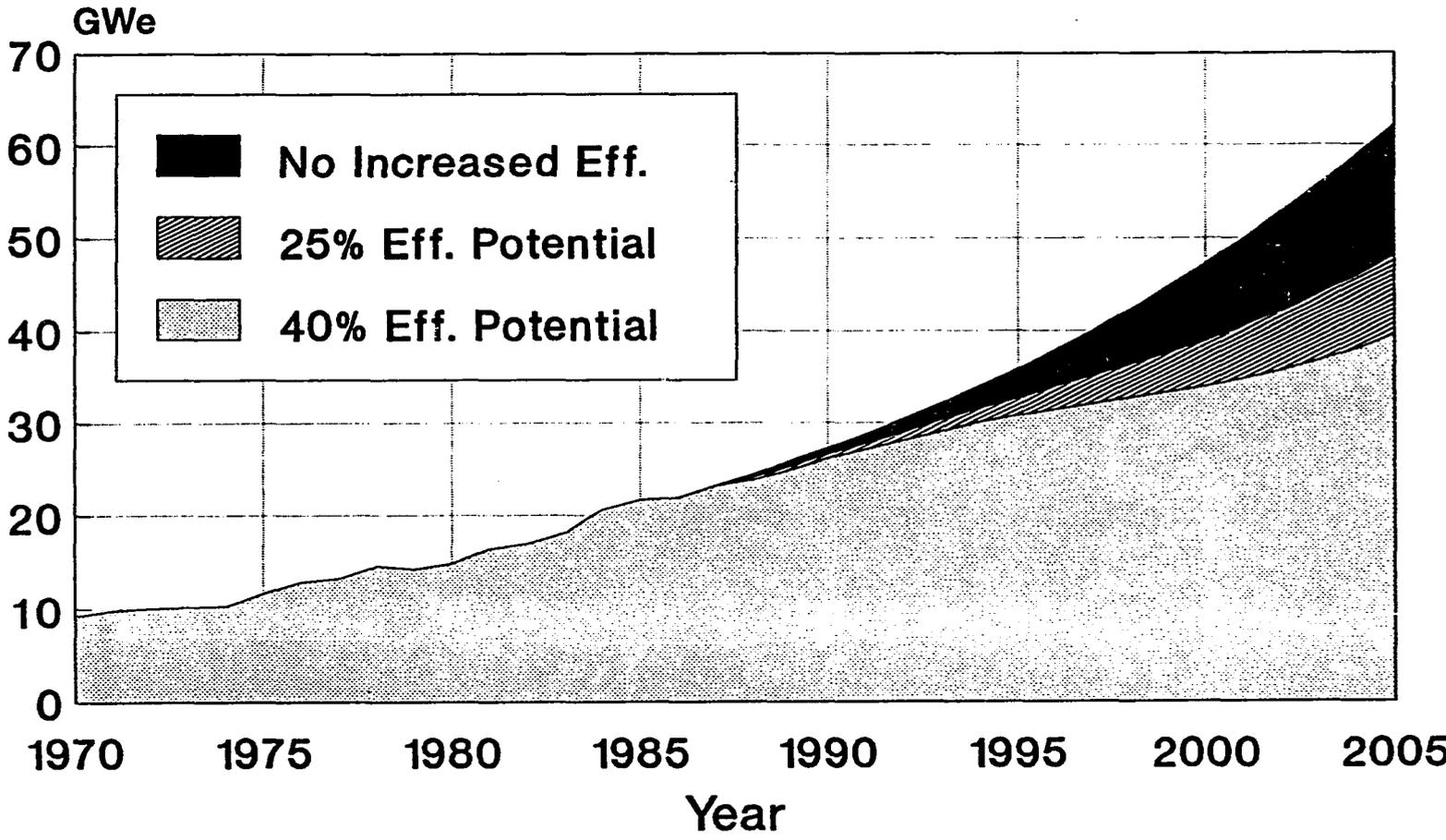


Figure 3

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Projected Generating Capacity Saved by Energy Efficiency Measures in the Indian Industrial Sector

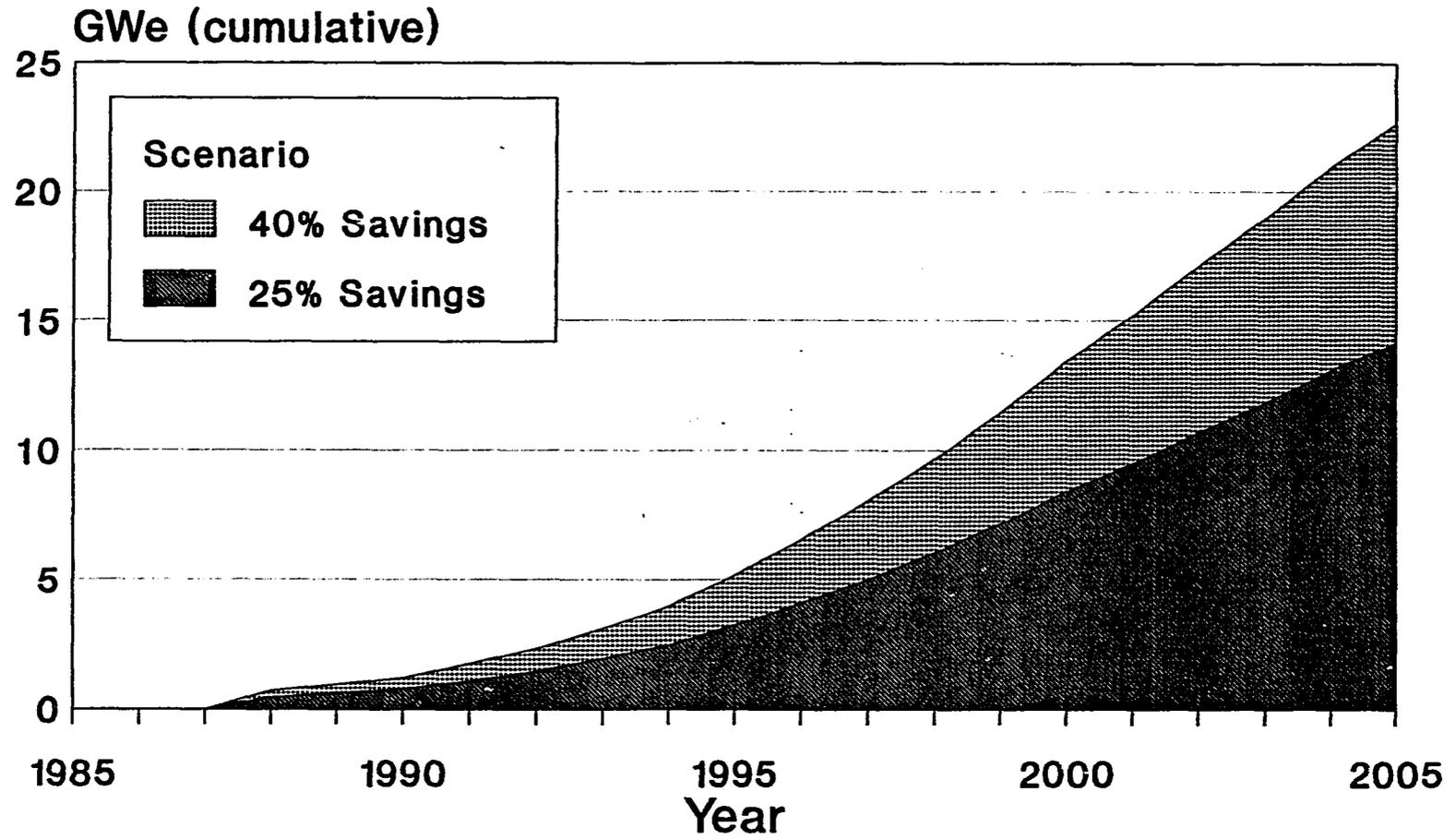


Figure 4

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Annual Savings in Required New Generation Capacity in the Indian Industrial Sector

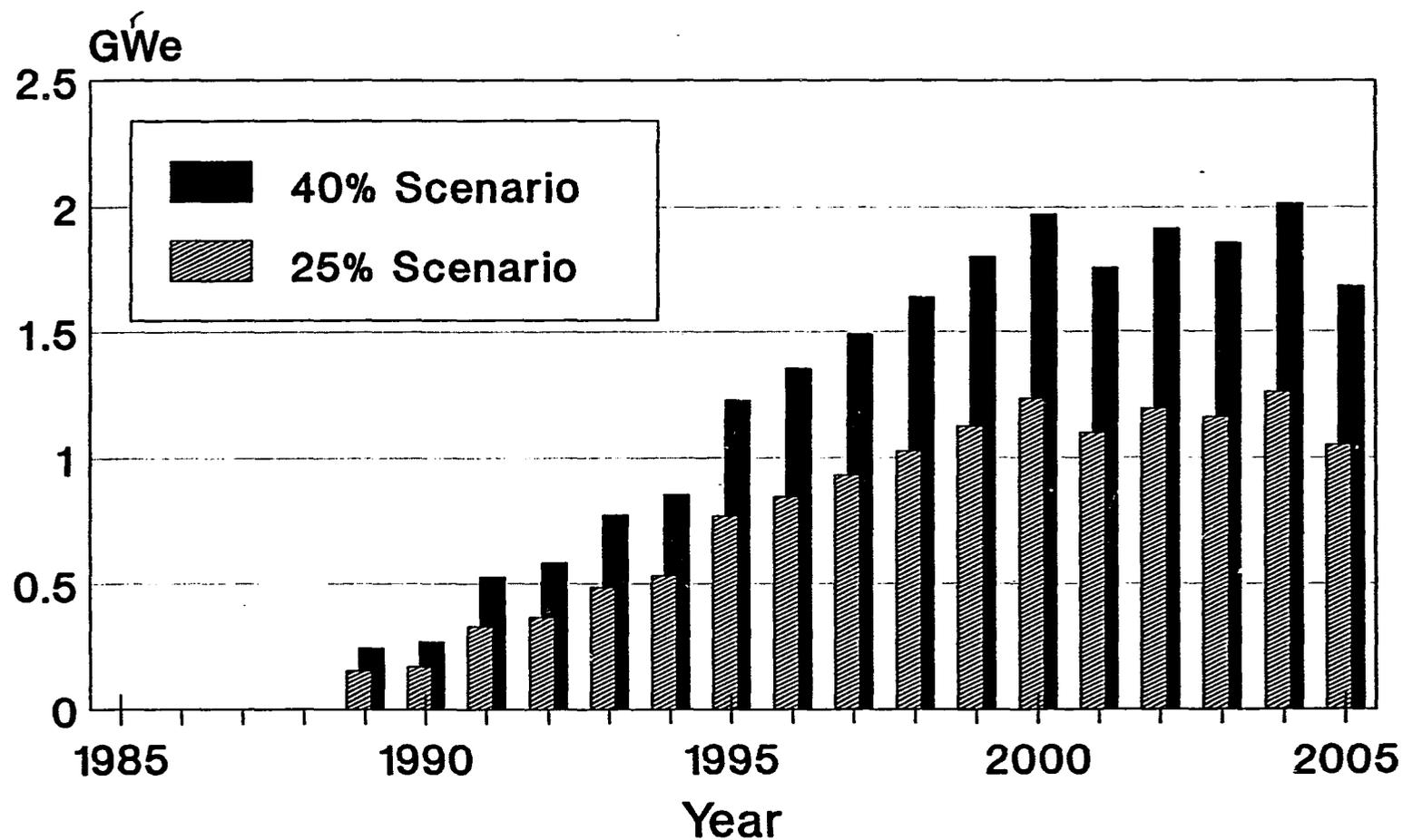


Figure 5

Annual Fuel Costs for Power Generation for Indian Industry Under three Energy Efficiency Scenarios

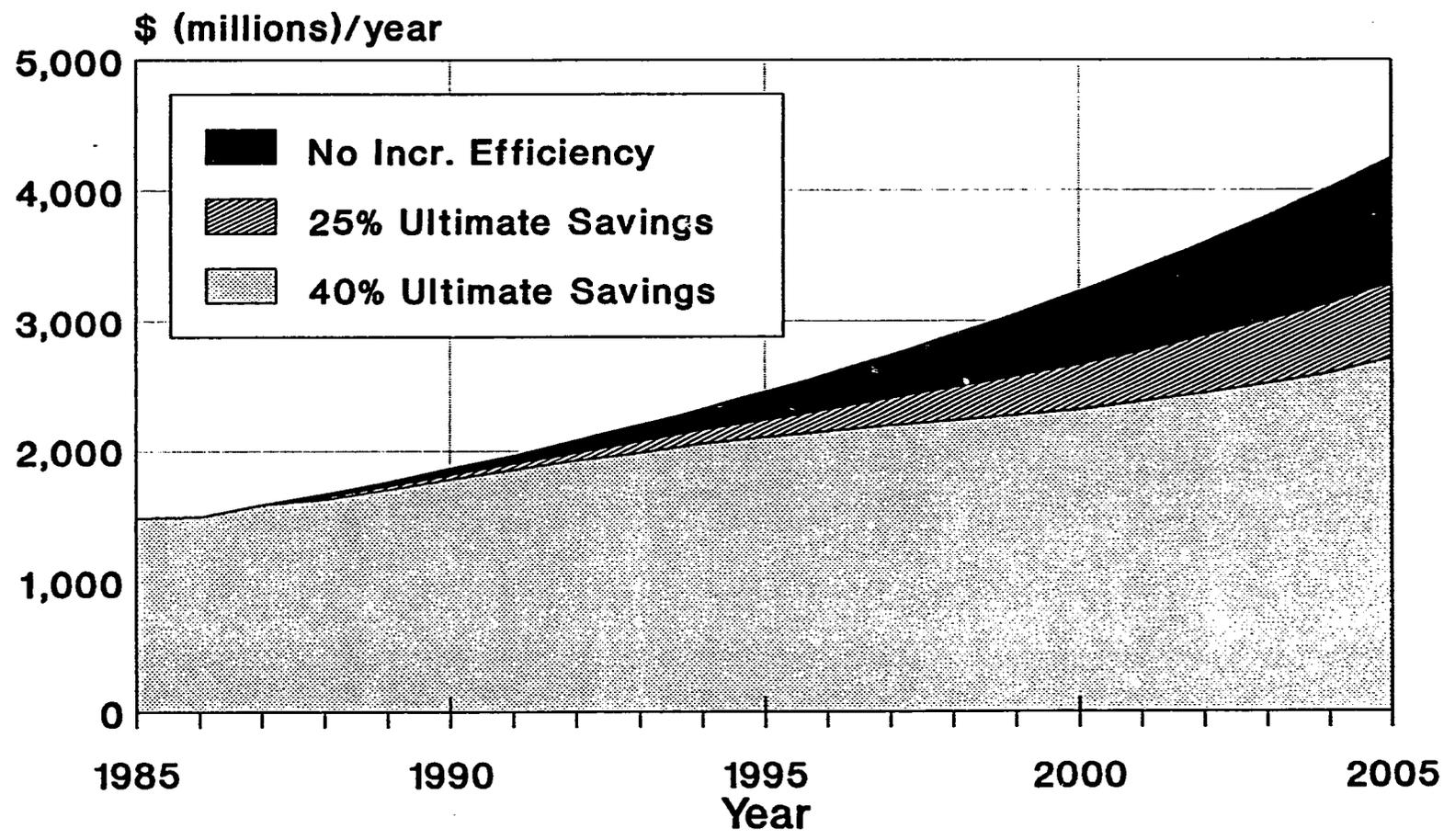


Figure 6

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for North Sea crude was \$17/bbl). Figure 7 shows the annual fuel cost savings for the two scenarios relative to the Base Case (business as usual).

In the conservative scenario, the annual fuel savings alone are roughly a billion dollars (1990\$). Figure 8 shows the cumulative fuel cost savings in fixed-year 1990 dollars for the period 1990 - 2005. In the most conservative scenario (25% efficiency potential, \$10/boe fuel price) the cumulative savings are on the order of \$8 billion. For the optimistic efficiency scenario with a fuel price of \$15/boe, the cumulative fuel savings are closer to \$25 billion over this time period.

The additional savings in new power plant construction are approximately \$22 billion. By contrast, the total accumulated cost to industry will be about \$9 billion over the same 15-year period, assuming an average cost of \$400/kWe(saved) to install energy efficiency measures in existing and new industrial facilities.

Supply curves of conserved electricity

A supply curve for conserved energy is a diagram that indicates the amount of energy (or connected load) that can be conserved for a specific cost. The easiest and least expensive conservation measures will save some initial fraction of the technical potential for conservation. Once the least expensive measures are exhausted, more expensive measures must be implemented to save an additional fraction. At some point, the incremental costs of further energy or power savings are greater than the incremental price of the energy or power. At this point, further investments in efficiency measures are not financially sensible.

A supply curve of conserved energy can be developed for individual industrial facilities, and, in principle, can be aggregated into a "grand supply curve" for an entire industrial sector or for industry as a whole. An example of such a supply curve is shown in Figure 9.

Estimating Investments in Industrial Energy Efficiency

Figure 10 shows the potential (illustrative) for industrial energy conservation as a function of payback time T for all measures with payback times of less than ten years. The figure shows, in a schematic fashion, the fraction of the potential that can be achieved with measures that have payback times that are equal to or less than T.

Annual Fuel Cost Savings Associated with Industrial Electricity Efficiency Measures in India

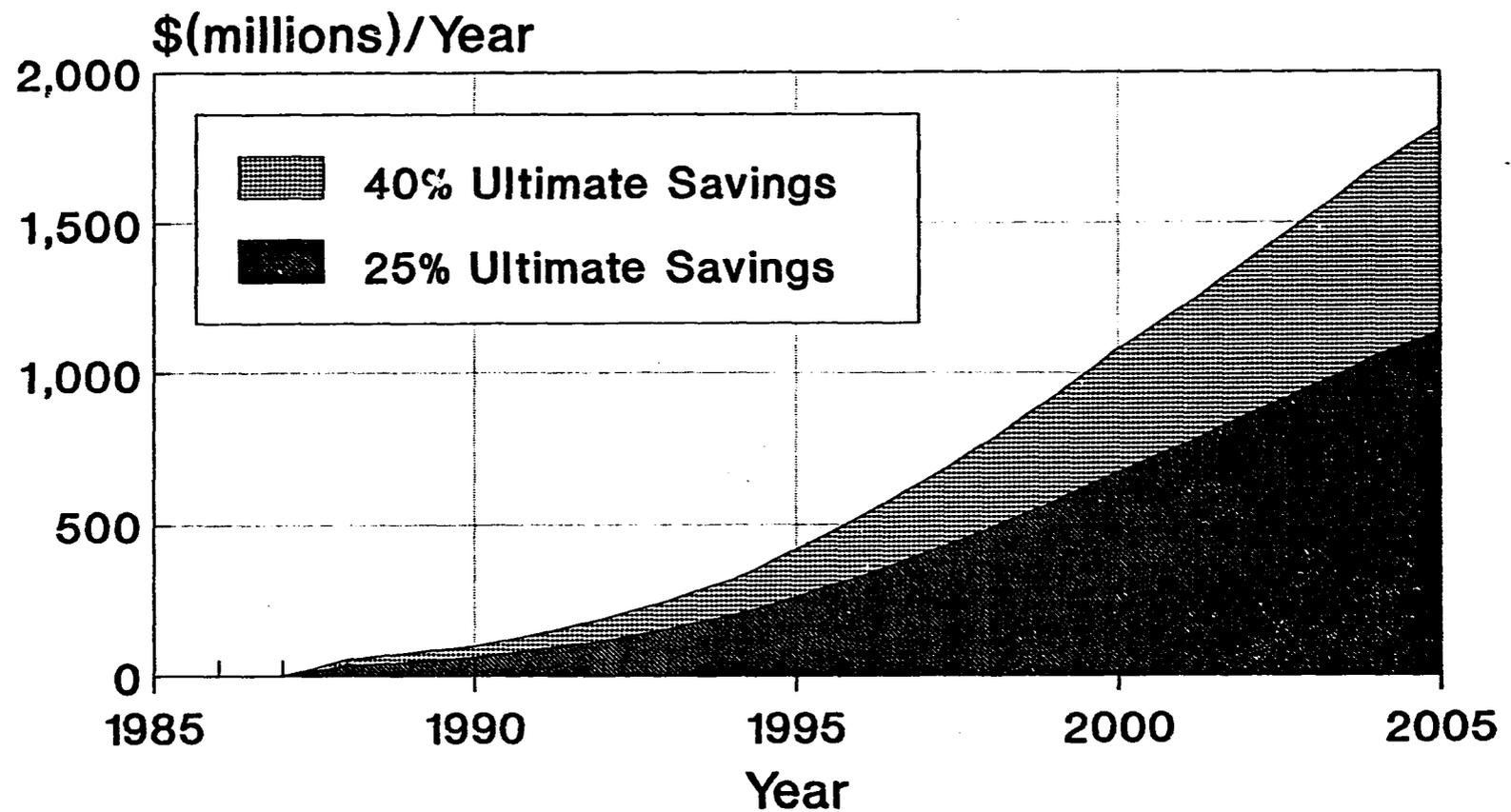


Figure 7a

Industrial T&D Losses = 0.15

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Annual Fuel Cost Savings Associated with Industrial Electricity Efficiency Measures in India

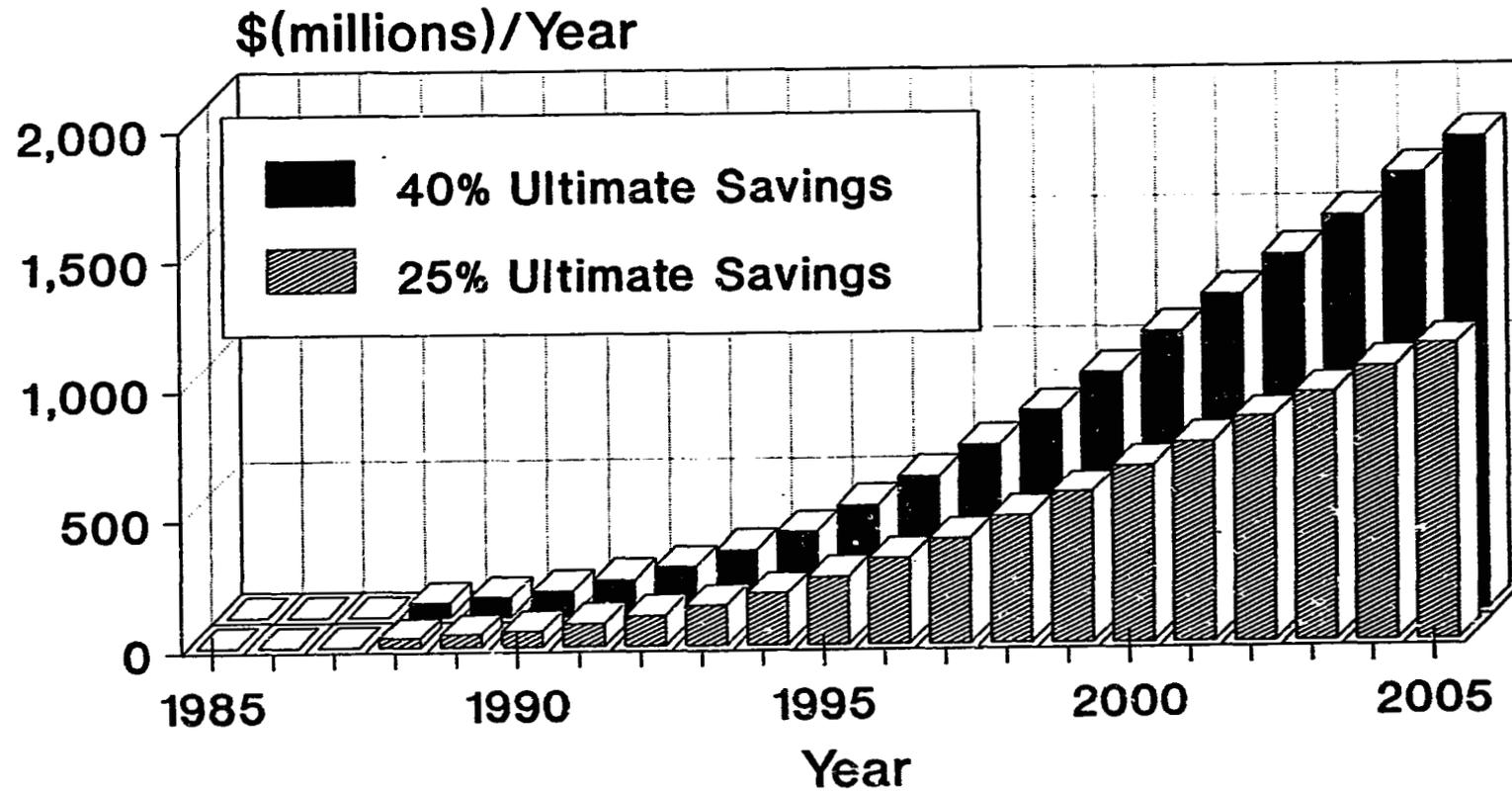


Figure 7b

Industrial T&D Losses = 0.15
 Fuel Price = \$10/boe

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Cumulative Fuel Cost Savings Associated with Industrial Electricity Efficiency Measures in India (1990 \$)

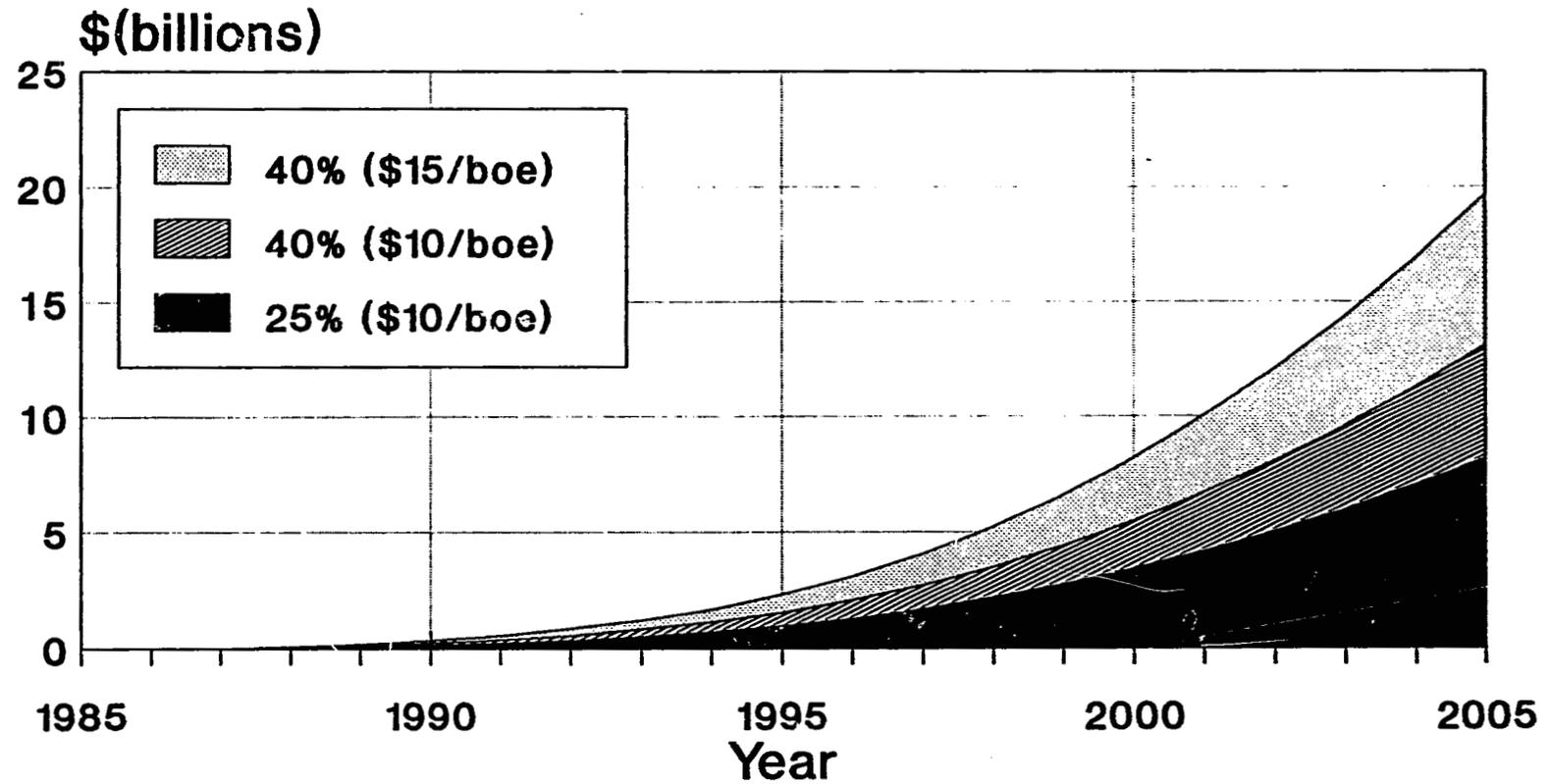


Figure 8a

Industrial T&D Losses = 0.15
 Fuel Price = \$10/boe and \$15/boe

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Cumulative Fuel Cost Savings Associated with Industrial Electricity Efficiency Measures in India

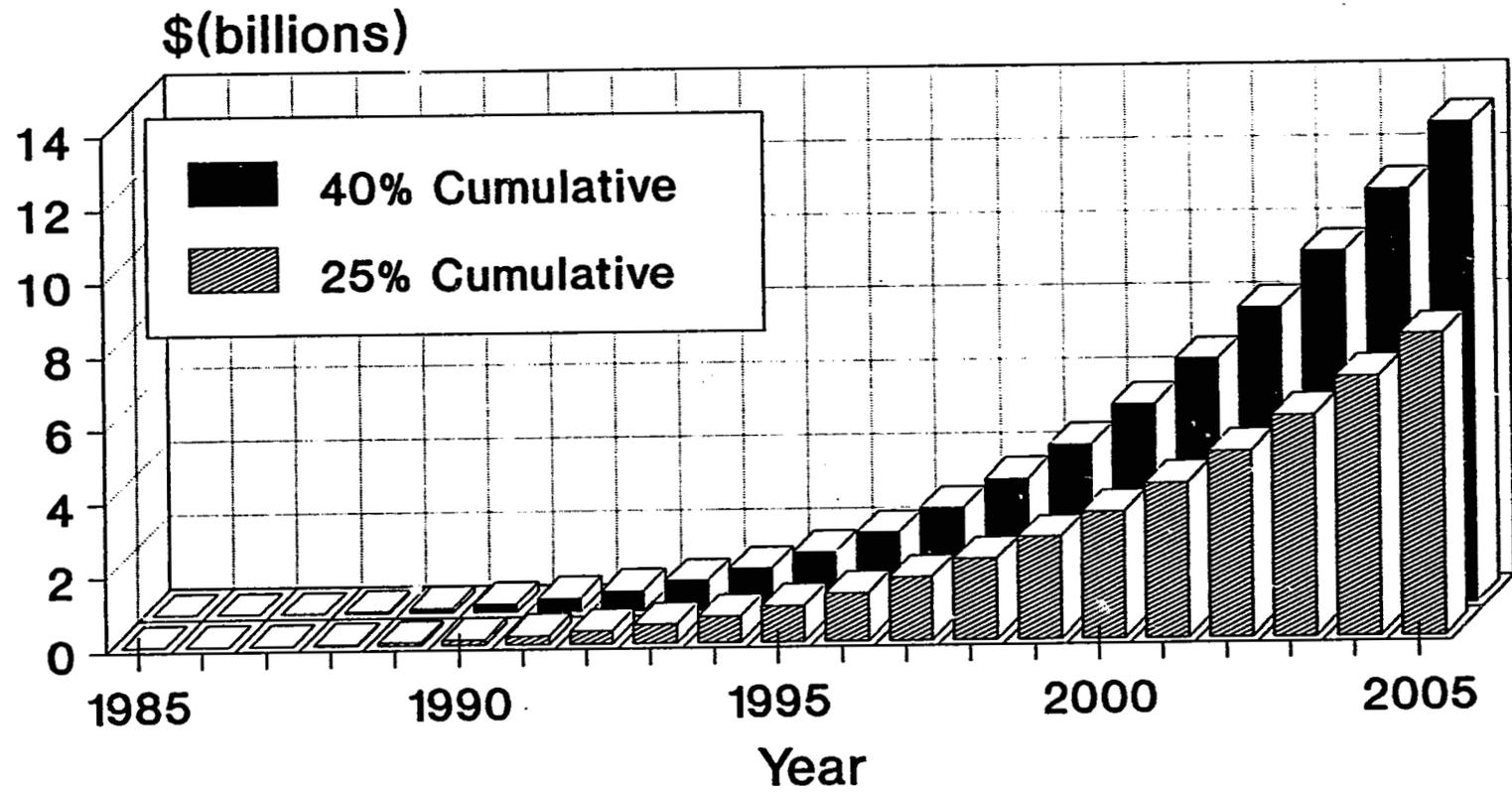


Figure 8b

Industrial T&D Losses = 0.15
 Fuel Price = \$10/boe

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Figure 9

ILLUSTRATIVE SUPPLY CURVE OF CONSERVED
ELECTRICITY IN THE INDIAN INDUSTRIAL SECTOR

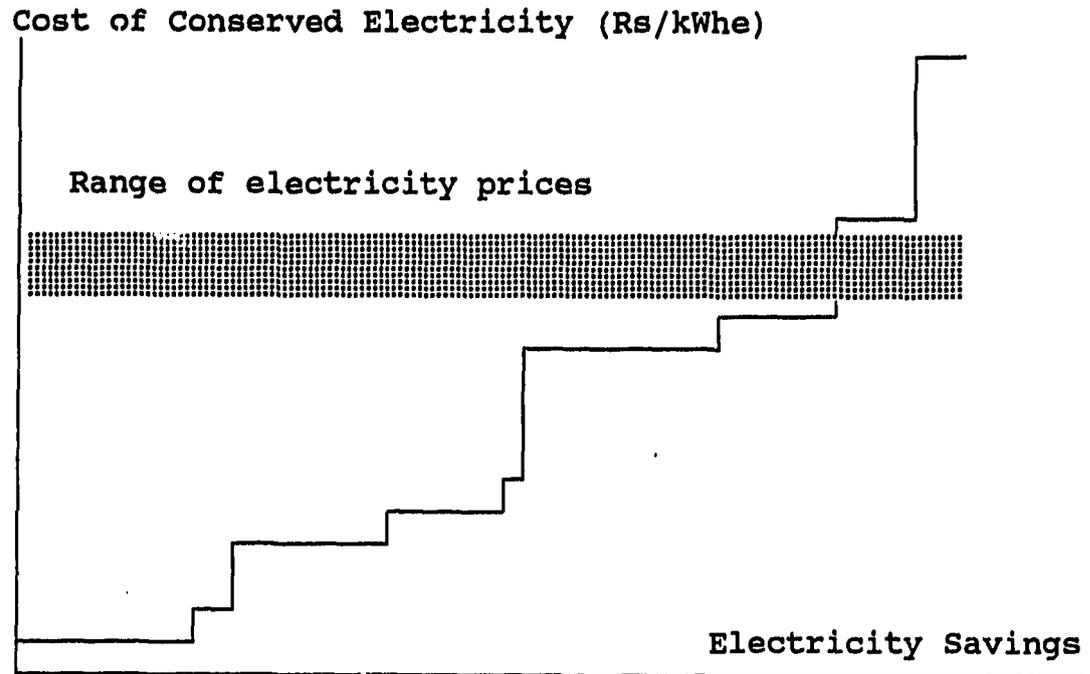


Figure 10 also shows the hypothetical probability of adoption of specific conservation measures as a function of the payback time. The assumption is that maximum adoption will occur with measures that have payback times of less than one year, and that some fraction F of industries (in terms of total energy consumption or total connected load) will adopt these measures. That is, we assume that some industries will not adopt even highly profitable measures, due to lack of investment capital, lack of awareness or know-how, disincentives such as the threat of reduced energy allocations in the future, and so forth.

We also assume that for measures with payback times greater than one year, the likelihood of their adoption will decrease rapidly with increasing payback time. A simple model assumes that $P(T) = F$ for $T < 1$ year and that

$$P(T) = F \exp -A(T-1) \text{ for } T > 1$$

If we assume that the probability of adoption will decrease by half for each additional year of payback time, we have

$$\exp -A(2-1) = 0.5 \text{ or}$$

$$\exp A = 2$$

$$A = \ln 2 = 0.2$$

The total conserved energy or connected load could be calculated as the product $F(T)*E(T)$ and $F(T)*P(T)$ where $E(T)$ is the energy conserved as a function of maximum payback time T and $P(T)$ is the power conserved as a function of maximum payback time T.

This illustrative model shows how the total industrial energy and power conservation could be calculated if the supply curves for conserved energy and power were known and if the investment behavior of private industrial firms were known with regard to payback times for investments in efficiency.

Adoption of Industrial Energy Efficiency Measures in India

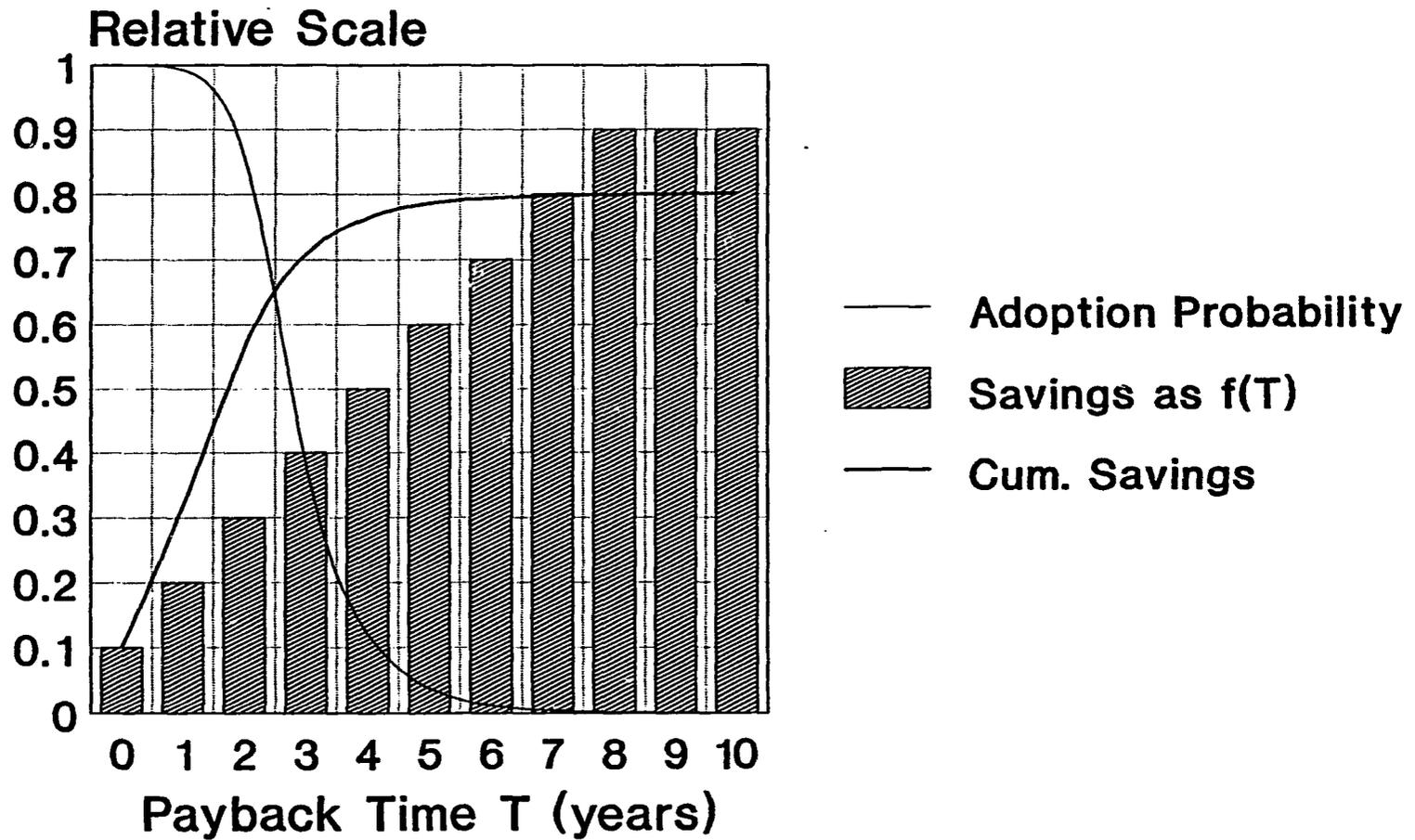


Figure 10

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POLICY ISSUES AND RECOMMENDATIONS

Introduction

Policy issues include the following:

- Connected load and kWh allocation policies; load management and energy conservation by industry may result in penalizing these industries through reduction of subsequent allocations.
- Power purchase contract structure and terms; long-term vs. short-term payment contracts for capacity and energy; includes time-of-day pricing;
- Present and potential specific economic and financial incentives for both electricity suppliers and end users;
- Power reliability and power quality are central considerations for private industry investment decisions. The loss of productivity due to unplanned outages is much higher than the loss due to (relatively) inefficient energy end-use equipment and practises. Similarly, poor power quality can result in the degradation and early demise of expensive equipment.

Labor Costs Associated with Improving SEB Performance

Many of the projected improvements in SEB performance may result from an infusion of new managerial and technical staff. An extreme and admittedly somewhat cynical view of the costs of transforming the staff would assume that virtually all senior and middle level technical and managerial staff would be retired, with ten years of full pay as compensation for early retirement. If we assume that a professional man-year costs \$3,000, we can calculate the value of one day of improved power plant performance in terms of the number of professional man-years of salary the associated revenue would pay for.

For example, if the annual capacity factor of a 1,000 MWe plant is improved from 0.4 to 0.7 and the revenues per kWh produced = \$0.05, the daily value of the increased output is equivalent to 120 man-years at \$3,000/MY. This means that every ten days the increased output would pay to retire 120 senior individuals with a ten-year full salary pension.

In reality, effective improvements in management and operation of SEBs will more likely arise from replacement of a few key technical and managerial personnel, the retraining

of others, and motivation of all personnel through performance bonuses and other incentives. These measures would cost far less than the extreme measures used as a baseline. The purpose of this exercise is not to suggest that there should be wholesale replacement of technical and managerial staff, but that the costs of even such a Draconian measure would be a very small fraction of the economic and financial value of achievable improvements in SEB technical performance.

Impact of Policy Measures on the Economics of Industrial Energy Efficiency

The relationship between implementation of specific policy initiatives and subsequent investment by private industry in measures that reduce specific energy consumption (kWhe/Rp output) or specific power requirements is difficult to quantify. The role of policy is to bring the economic interests of the country into coincidence with the financial interests of industry.

Policy making is an empirical art. Determination of which policies or combinations of policies are likely to bring the national economic interest and the individual financial interests of industry together will require some policy experiments. These experiments must be conducted on a scale that is large enough to demonstrate the effectiveness (or lack thereof) of specific measures, but small enough that unexpected negative results will be contained.

The empirical approach will be to identify, on a case-by-case basis, in discussions with the CEOs and CFOs of private industrial enterprises, the present obstacles to investment in energy-efficiency and power-efficiency measures. This will provide an ongoing basis for policy dialog.

Policy Measures to Accelerate Efficiency Investments

There are several types of policy measures that can be implemented to maximize the extent of energy and power savings by industrial end users. These include the following, which are aimed at removal of obstacles to investments and establishment of incentives for investment:

- Removal of obstacles to investment, such as:
 - Removal of the threat of reduced energy and power allocations subsequent to efficiency investments,

- eased access to foreign exchange for critical components,
- reduction or removal of duty for essential energy efficiency technologies, etc.;
- Investment incentives such as:
 - Establishment of institutions to make available technical expertise and information on successful investments in energy efficiency in industry,
 - Establishment of loans, perhaps at concessional rates, and financing facilities for such investments,
 - Establishment of Energy Service Corporations (ESCOs) through an array of separate incentives, etc.

Unfortunately, we do not have adequate data on how various industries are likely to respond to specific policy measures or ensembles of policy measures. The following specific policy and institutional initiatives have been suggested and in some cases implemented in India in recent years:

- "Industrial units could be given loans for energy conservation at attractive interest. To be more realistic, I would also suggest that any finance made available to industrial units for energy conservation be kept outside the credit limits and other normal norms and conditions such as debt/equity ratio and promoters contribution". [1]
- The Tamil Nadu Electricity Board (TNEB) has introduced a scheme for providing additional power to industrial consumers during night-time hours, above and beyond their normal entitlement. Both additional power and additional energy are provided under this scheme. The additional energy is billed at the full tariff rate but the additional power is billed at 1/3 the normal rate. Of 1,100 consumers subjected to power cuts, 478 had opted to participate in this scheme as of March 1990.[2]
- Deo [2] has also suggested the following:
 - Concessional finance for industrial cogeneration systems

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- Exemption of excise duty and sales tax on cogeneration equipment
- Exception of cogenerated power from electricity duty
- Provision of accelerated depreciation to all subsystems of a cogeneration system
- Cofunding prefeasibility and feasibility studies for industrial cogeneration

PROPOSED INITIATIVES UNDER EMCAT

Collaborative U.S./Indian Electric Utility Programs

During the 1970s, the U.S. electric power utility industry was essentially forced to develop and implement energy end-use energy efficiency and load management programs. The pressure generally came from the regulatory agencies (e.g. public utility commissions) in response to public and political pressure for both enhanced environmental and energy efficiency. While the utilities generally resisted this pressure in the beginning, many of them ended up as pioneers and major innovators, developing effective programs to increase both load factors (through load management programs) and end-use energy efficiency.

The 15-year experience of many U.S. electric utility companies in designing and implementing effective energy efficiency and management programs can be shared on a systematic basis with selected Indian private electric utilities and SEBs. While the institutional and financial environment of the Indian electric utility industry differs from that found in the U.S., the diversity of approaches and solutions developed by U.S. electric utilities can provide Indian decision makers in the utility industry with additional insights and concrete models for successful programs. Moreover the U.S. electric utility industry itself operates in a multiplicity of regulatory, institutional, and financial environments; some of the U.S. utility experience may be directly relevant to the needs of a specific Indian utility company.

Several major U.S. electric utilities have expressed interest in working with their Indian counterparts to share the U.S. utility experience in fostering industrial energy efficiency programs. It is expected that at least one such cooperative arrangement will be established under EMCAT.

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1. Theme address of Shri Kantikumar R. Podar, Chairman, FICCI Energy Subcommittee at the Third National Conference on Energy Conservation (March 27, 1990)
2. Pramod Deo (1990), "Electric Load Management", paper presented at the 3rd National Conference on Energy Conservation, 27-28 March, 1990 (New Delhi)

ADMINISTRATIVE ANALYSIS

1. The two primary institutions through which EMCAT will function are the Industrial Development Bank of India (IDBI) and the Power Finance Corporation (PFC). Through the IDBI EMCAT will assist private industry and other sectors to improve their efficiency in using energy; and through the PFC, EMCAT will assist the State Electricity Boards to supply electric power on a more reliable and sustainable basis. The organization and functioning of IDBI AND PFC are set forth below.

2. Industrial Development Bank of India

2.1 Legal status: The Industrial Development Bank of India was set up through a Bill in the Parliament in the year 1964. IDBI was originally constituted as a wholly-owned subsidiary of the Reserve Bank of India (RBI) which is the Central Bank of the country. During the first decade of its existence it was decided that IDBI could function more effectively as an autonomous institution to discharge its role as an apex financial institution of the country. Accordingly, the Government of India enacted, in 1975, legislation for de-linking RBI and IDBI, and for making IDBI the "principal financial institution for co-ordinating, in conformity with national priorities, the working of institutions engaged in financing, promoting or developing industries, for assisting the development of such institutions and for providing credit and other facilities for the development of industries and for matters connected herewith". The ownership of IDBI was transferred from the RBI to the Government of India and all responsibilities that were previously vested with the RBI were vested in the IDBI. This came into effect on February 16, 1976.

2.2 Financial status: The major sources of funds for IDBI are: i) share capital and reserves; ii) borrowings from the Government of India; iii) market borrowings by way of bonds; iv) foreign currency borrowings from multinational institutions such as the World Bank and the ADB; v) deposits and borrowings; and vi) repayment of past assistance by borrowers.

2.3 The total resources available to the IDBI in Fiscal Year 1989-1990 were Rs.94 billion (\$5.4 billion). IDBI is India's premier development finance institution, and provides the largest proportion of term finance to industry. (The Indian Stock Exchanges are the second largest source of capital and ICICI is the third).

2.4 Objectives: The Government of India has assigned a set of specific functions to IDBI: " i) planning, promoting and developing industries to fill the gaps in the industrial structure in India; ii) coordinating the working of institutions engaged in financing, promoting or developing

industries and assisting in the development of such institutions; iii) providing technical and administrative assistance for promotion, management or expansion of industry; iv) undertaking market and investment research and surveys as also techno-economic studies in connection with development of industry; and v) promoting, forming or conducting of or associating in the promotion, formation or conduct of companies, subsidiaries, societies, trusts or such other associations of persons". The operation of the Bank is flexible as provided in the charter.

2.5 The Bank finances all types of industries, irrespective of the form of organization or the size of the unit. There are no restrictions on the nature and type of security and quantum of assistance that the Bank can provide. However, the scrutiny of the proposal for financial assistance is rigorous and feasibility of the project plays a predominant role in the financing/decision.

2.6 Operations: All affairs relating to the management and governance of IDBI rest with the Board of Directors of the Bank. This Board consists of the Chairman and Managing Director (both of these positions are generally held by the same person) and 20 other Directors, who are representatives from the Government of India, Financial Institutions, Public Sector Banks, State Financial Corporations and professionals from the banking field. All these Directors are nominated to the Board of IDBI by the Central Government. The Board in turn has constituted an Executive Committee which consists of 10 Directors including the Chairman and Managing Director. This Executive Committee is empowered to sanction financial assistance and exercise other powers as designated by the Board.

2.7 The day-to-day functioning of the Bank is carried out under the direct supervision of the Chairman and Managing Director who is assisted by the Executive Directors. As per the Annual Report for the fiscal year 1988-1989, IDBI has a total staff strength of 2802 out of which 1257 were of officer rank. IDBI has a strong professional staff base and in-house expertise in both technical and financial matters. The Head Office of the IDBI is located in Bombay and it has five regional and 21 branch offices which cover almost the entire country.

2.8 Energy Programs: IDBI is already working in the area of energy efficiency, and it has two programs in operation. These are the Energy Audit Scheme and the Equipment Finance for Energy Conservation Scheme. These schemes are expected to expand as are new efforts in energy conservation introduced by IDBI as a result of EMCAT and the World Bank's Industrial Energy Efficiency Project (IEEP -- under appraisal). EMCAT and IEEP have been designed in close coordination, and in fact EMCAT will account for a small portion of the IEEP technical assistance program (\$1-2 million of \$28 million total planned). EMCAT will also directly support the much larger IEEP credit of \$250 million to IDBI and ICICI. In addition, EMCAT will introduce programs that are new to IDBI such as the ESCO and grant programs with business associations.

2.9 IDBI staffing for EMCAT: The end-use efficiency component of the EMCAT project will be managed by the Technology Department of IDBI. This Department is responsible for IDBI energy schemes and also the venture capital funds of the institution. The Executive Director (Technical) who oversees the functioning of the technology department and his General Manager will have overall charge of the EMCAT activities. The day-to-day management of the project will be carried out by the officer incharge who would be at the level of Deputy General Manager. The secretariat for the management of the project would consist of the officer incharge and such additional personnel as are necessary. From time to time, this secretariat would draw upon the expertise and skills of the other technical divisions of the Bank. IDBI is a strong, well-staffed DFI and will require minimal EMCAT resources to support IDBI staff capabilities for managing the project. Exceptions would include limited assistance for project implementation planning and perhaps for conceptualizing the details of some new energy initiatives supported by EMCAT, otherwise, project inputs are to be supplied by IDBI to its clients (e.g. training).

2.10 Project Review Committee: To build up a mechanism for oversight of EMCAT activities which would not be confined to the decision-making processes of IDBI, it has been decided to utilize the services of a committee of competent professionals. This Committee would have a membership of eight people and would provide overall guidance and approve all activities. This Committee would be headed by the Executive Director (Technical). The other members of this Committee would be:

- The General Manager - Technology Department of IDBI
- Representative from the Power Finance Corporation (PFC)
- Representative from the Industrial Credit and Investment Corporation of India (ICICI)
- Representative from the Energy Management Centre (EMC) of India
- Representative from the Indian Institute of Technology (IIT), Bombay
- Representative from USAID/I
- Representative from private industry.

2.11 The Deputy General Manager would be the overall incharge for carrying out the staff functions of the Committee and, with the help of the secretariat, would prepare all documentation required for presentation to the Committee. The secretariat will scrutinize all proposals and place them for approval of the Committee.

2.12 The PRC has been established with the objective of involving financial institutions, research organizations, policy planners and private industry for the efficient and smooth operation of the project. It is expected that this blend of people on the Committee would look at issues related to energy management from a national perspective. Since the Energy Management Centre has been established by the GOI as the nodal agency for providing policy guidelines, it is useful to include a representative from it on the Committee. Also, since the EMC has been

designated as the agency for implementing the World Bank-aided Industrial Energy Efficiency Project and EMCAT is supporting some components of that project, it has become necessary to work in close collaboration with the EMC. Thus, the PRC is an important means of involving the EMC in the project. ICICI is the implementing agency for two very innovative and successful projects viz., the Program for the Advancement of Commercial Technology (PACT) and the Program for the Acceleration of Commercial Energy Research (PACER). ICICI, therefore, is in a position to contribute to the management of the project in the PRC. The representative of the Indian Institute of Technology, Bombay would be an expert in the area of energy management.

2.13 Private business associations: In view of the fact that the private sector has, over the years, developed as a major contributor to the economy, private sector associations have emerged as a forceful forum for policy dialogue and intervention with the GOI. This phenomenon, in keeping with the trend of the liberalization process, is expected to develop further. Because energy is a critical input for industry and other sectors in the economy (e.g. agriculture and commerce), the associations will be taking a lead role in bringing about policy changes in the energy sector, such as in terms of energy pricing, involvement of private sector in the generation of energy, the use of avoided cost formulae for power purchase, etc. There are over one hundred industry associations in India; however, there are not more than a dozen that have the capabilities and the staff strength to approach the problems of the industry from a background of rigorous research and in the framework of national priorities and concerns. The leaders among these associations are the Federation of Indian Chambers of Commerce and Industry (FICCI), and Associated Chambers of Commerce (ASSOCHAM), and the Confederation of Engineering Industry (CEI). All these associations have well-defined energy programs and a couple are already working on UNDP and EEC energy programs.

2.14 There are some associations that have a sectoral membership (e.g., the sugar manufacturers association, the air conditioner manufacturers' association, the cable manufacturers' association). Although these associations do not have well-defined energy programs they are concerned about the various economic aspects of the conservation and management of energy. These associations are seen as a major potential force for bringing about a change in the attitudes of entrepreneurs towards energy management at the medium-scale industry level.

2.15 EMCAT will provide support to the associations in an effort to assist them to become more effective in promoting better policies in the energy sector, including strengthening the role of the private sector in energy supply and demand management.

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2.16 Implementation planning and coordination: The services of a US consultant will be contracted to assist IDBI in developing a detailed implementation plan for the energy efficiency component of the project. This will be done immediately after the project becomes operational and this will help in the structured implementation of the project.

2.17 As a result of other bilateral donors associating with the training and TA component of the World Bank's IEEP, it has become necessary to have proper coordination with these agencies in respect of the activities that these agencies are to support. The Energy Management Center--the agency designated for the coordination of the IEEP--will play the key coordination role in this.

3. Power Finance Corporation

3.1 Legal status: The Power Finance Corporation (PFC) was incorporated in July 1986 under the Indian Companies Act of 1956. PFC is wholly-owned by the Government of India, and it started its operations in the year 1988. The Memorandum of Association of the Company spells out that PFC will undertake a broad spectrum of financial activities aimed at supporting the development of the power sector in India which would include: addition of new capacity; renovation and modernization of power plants; system improvement; energy conservation; maintenance and repair of fixed assets; investment activities; and research and consultancy services.

3.2 PFC is governed by a Board of Directors which is headed by the Chairman and Managing Director. The other Directors of the Board include two full-time Directors (the Finance and Technical Directors) and four Directors who represent the Department of Power, the Central Electricity Authority, the Planning Commission and the Ministry of Finance. There is provision for another Director (Operations), but at present the position is vacant. Action has been initiated to fill in the slot.

3.3 Financial status: PFC generates funds from equity and market borrowings. The total resources available with PFC in the year 1989-1990 was of the order of Rs. 6.75 billion (about \$4 billion) and in the Eighth plan period, it is expected that PFC will be financing 20% of the total investment in the power sector in the states, amounting to Rs. 125 billion (about \$7.3 billion).

3.4 Objectives: The performance of the power generation sector has been a major concern for the Government of India for many years. Because electric power is a "state subject" under the Indian Constitution, it is difficult for the central budgetary authority to enforce discipline on the SEBs. To overcome this problem, the Government of India set up centrally-owned power generating and transmitting corporations, such as the National Thermal Power Corporation, the National Hydro Electric Power Corporation and the National Power Transmission Corporation. Although these Corporations are doing a commendable job, the SEBs continue to play a dominant role in the power sector. 75% of the total power generating capacity and the responsibility of distributing power to the final consumer is with the SEBs.

3.5 The performance of the electric power sector, for which the SEBs are primarily responsible, has been dismal. The reliability and quality of power is low; load shedding and power cuts are frequent and distribution frequency is not constant, which has resulted in substantial losses to industry and other consumers. Fundamental problems in India's production of power include:

- Thermal plant availability is 10-15% lower than norms elsewhere in Asia;
- Power transmission and distribution losses average a high 19% (versus 10% in Thailand and 6% on South Korea).

3.6 The poor performance of SEBs is largely due to inefficient management and poor planning practices, as well as old and obsolete machinery and equipment. It is also due to the politically-motivated fixing of consumer prices for power at often subsidized levels by state officials, which reduces the SEBs' ability to avoid financial losses. The organizational morale of the SEBs is low because increased sales do not bring higher profits but rather greater losses. In 1988, all but two SEBs suffered financial losses. These losses make it more difficult for SEBs to properly maintain and rehabilitate equipment, much less invest in new technology.

3.7 To address the problem of SEB financial indiscipline, the Government of India has designed a system that would ensure the non-budget funding that goes to the SEBs (about 25 - 35% of their total financing requirements) is linked to performance. It is for this objective that PFC was created. PFC works as a specialized financial institution which has a sectoral focus on power and whose primary objective is to improve the system efficiency of the Indian power sector. To achieve this objective, PFC has established a set of priorities for working with the SEBs which include: a) renovation and modernization of generating plants; b) system improvement; c) expansion of transmission and distribution systems; and d) completion of on-going generation projects.

3.8 Operations: The PFC has its Corporate Office in New Delhi. In a short span of two years PFC has managed to attract a group of 60 well-qualified professionals. In addition, PFC has retained a small group of consultants with substantial experience in different aspects of the operation and management of the power sector. Also, a number of PFC staff have been brought in on deputation from various Government agencies, and it is planned to retain these people in the Corporation. PFC is confident of further building up its own cadre in the near future.

3.9 The functioning of the PFC is divided into three groups: technical, financial and operations. Each of these groups is headed by a Director. A proposal is reviewed and appraised by the technical group. The financial group, in addition to maintaining the financial operations of the Corporation, provides inputs to the technical group for the appraisal process. Finally, the operations group provides support for developing the Operational and Financial Action Plans (OFAPs) and for the subsequent monitoring of their implementation.

3.10 PFC has created a small division specializing in the preparation and supervision of OFAPs. A key objective of the technical assistance and training to be provided through EMCAT is to strengthen the PFC's ability to conduct a highly professional review of OFAPs and also to assist SEBs in preparing good OFAPs. It is also important that EMCAT provide assistance for SEB preparation of investment plans and proposals that underly the OFAPs. OFAPs will be reviewed for approval by PFC on the basis of a number of criteria, including technical, financial, operational, environmental and private sector aspects. Use of the OFAPs is critical for the PFC establishing and enforcing conditionality in its lending, which is essential for the PFC to help improve the power sector's (SEBs') performance. It is encouraging that PFC has decided to stop lending to SEBS without approved OFAPs after 1991, and likewise that the World Bank and ADB will lend only to SEBs with approved OFAPs. When EMCAT provides assistance and training for preparation of investment plans and OFAPs, it should be with a view to examining a wide range of investment options in the power sector, including for example, not just SEB's expression of generating capacity but also private sector expression and cogeneration.

3.11 Current programs: PFC has been set up to promote a balanced growth of all segments of the power sector, ensure adequacy and reliability of power supply, and improve the sector's operational and financial performance. The objectives of the Corporation as indicated at the time of incorporation are to:

- i) finance power projects, in particular, thermal and hydroelectric;
- ii) finance power transmission and distribution works;
- iii) finance renovation and modernization of power plants aimed at improving the availability and performance of such plants;
- iv) finance system improvement and energy conservation schemes;
- v) finance survey investigation of power projects;
- vi) finance maintenance and repair of capital equipment, including facilities for repair of such equipment, training of engineers and operating and other personnel employed in generation, transmission and distribution of power;
- vii) finance studies and research activities associated with various aspects of technology in power development and supply;
- viii) finance promotion and development of other energy sources, including alternate and renewable energy sources; and
- ix) promote, organize or carry on consultancy services in the related activities of the Corporation.

3.12 Activities recently undertaken or planned soon by PFC are summarised below:

i) Renovation and modernization of power stations:

Thermal: PFC has taken the responsibility for funding a part of the central government loan assistance for rehabilitation of thermal power plants. The Corporation has begun to identify power stations which can be renovated and modernized during the Eighth Plan period.

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Hydel: The PFC has, in consultation with Central Electricity Authority (CEA), taken up the identification of activities that could be carried out for uprating and renovating of 49 selected SEB-managed hydro-electric power stations. The SEBs are preparing the detailed project reports for clearance by the CEA.

ii) Transmission and distribution:

In the past low priority has been given to the evacuation of power. This has resulted in a big gap between power generation and T&D capacity. The following programs are being considered by the Corporation on a priority basis:

- Transmission lines and associated sub-stations required for major load centres;
- Works required for system improvement; and
- Installation of capacitor banks.

iii) Urban distribution:

PFC recognizes the need for more efficient urban power distribution through planning and the strengthening of the existing networks. The Corporation plans to play an important role in improving urban distribution systems and also helping the SEBs in improving their skills in urban supply. PFC is adopting a two-pronged strategy in this area. The activities that are critical and need immediate remedies for financial assistance will be taken up immediately by PFC and implemented in the next one or two years. In addition, a long-term implementation program would be drawn up for comprehensive improvement of urban distribution systems.

iv) Generation projects:

There are several thermal and hydro generation projects that can yield immediate benefits (during the first two years of the Eighth Five Year Plan) but their progress has slowed down because of paucity of funds. PFC has taken up the funding of these projects to expedite their commissioning.

3.13 EMCAT Project Review Committee: The PRC functions and operations will be similar to those of the IDBI component. The Committee will have eight members and will be chaired by the Director (Operations) of the PFC. The other members of the Committee will include:

- a Manager from PFC responsible for EMCAT management
- representative from the Industrial Development Bank of India
- representative from the Central Electricity Authority
- representative from the Indian Institute of Technology, Delhi
- representative from two SEBs and
- representative of USAID/I

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3.14 The Manager from the PFC would have responsibility for the staff functions of the Committee and will be responsible for all the documentation necessary for review and scrutiny of proposals for EMCAT financial support.

3.15 IDBI has been included in the PRC to promote linkages between the power supply and energy end-use efficiency components of the project, and to bring the energy demand perspective to the committee.

3.16 Since CEA is the agency that carries out the power planning for the country and also is the technical agency of the Government of India for review and appraisal of power projects, it can make a significant contribution to the PRC Committee. SEB inclusion on the Committee is primarily so the Committee can get a better understanding of the strategies planned and problems encountered at the borrower's level.

3.17 The representation of the Indian Institute of Technology, Delhi on the PRC Committee is expected to provide inputs in terms of the latest R&D advances and feasibility of technologies in the Indian context.

3.18 The PRC will meet every three months. The Project Secretariat of the PFC would provide the support to the PRC to review and scrutinize the proposals and in the development of action plans.

4. USAID

4.1 The EMCAT project will be managed by the Technology Development and Enterprise Office of USAID/India. The Senior Energy Specialist in the office will be the Manager for the Project and will be working under the direct supervision of the Director of the Office. Since the Manager-designate is already handling two energy projects, it is likely that he will need support in the management of the EMCAT project. It is anticipated that after about six months of the start of the project the vacant position of energy analyst will need to be reviewed for recruitment.

4.2 Other parts of the Mission are well staffed to support EMCAT implementation. These include the Program Development and Project Support Office which will designate a backstop officer for providing implementation support to the project; the Controller's Office, which will designate a financial analyst for the project; RCO; RLA; and Executive Office if necessary.

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SOCIAL SOUNDNESS ANALYSIS**1. Introduction**

1.1. In attempting to analyze the social implications of the Project, it must be kept in mind that the interventions planned are at the policy cum institutional development level and are, therefore, less readily attributable to individuals, other than direct beneficiaries, or even specific groups in the Indian economy or society. Moreover, although the value of project interventions even standing alone would be considerable, their greatest importance lies in their catalytic effect upon the far larger investments of the IBRD and ADB, not to mention the immense capital input of the GOI itself and the private sector of India. While it is clear that benefits from the development of the Indian power sector, on both the supply and demand sides, will accrue in some manner to all segments of the economy, not all of them will benefit in the same way or within the same time frame.

2. Beneficiaries

2.1. The immediate beneficiaries of EMCAT will be the management and employees of the private sector energy consulting organizations as well as of the PFCs and SEBs assisted by Technical Assistance, Training and other Project activities. Another important group of direct beneficiaries will be the owners, managers and employees of private enterprises which are able to reduce their energy consumption and improve their energy efficiency through the application of techniques promoted by Project activities. EMCAT will help increase these beneficiaries' productivity and income by providing assistance through the IDBI to private consulting firms and ESCOs to better design, finance, and manage their energy efficiency/conservation investments and to business associations and management and technical personnel of enterprises.

2.2. A wide spectrum of primarily private sector electric power consumers (agricultural, industrial, commercial and residential users) will be the long-term beneficiaries of EMCAT as they receive a greater and more reliable supply of electric power from generating plants and transmission/distribution facilities assisted by the Project. They will also benefit from goods and services being supplied at lower cost to the extent that the Project helps reduce the cost of energy inputs for production of those goods and services. EMCAT will support the work of business associations, which represent large groups of industrial and other end-users, with the objective of assisting these associations to become more effective policy reform agents on behalf of their constituencies. Urban populations, in particular, will benefit from less environmental pollution as the Project contributes to lower combustion of coal as it helps SEBs and end-users to produce and consume electric power more efficiently. Agricultural consumers will be major beneficiaries of (and, in terms of improved efficiency, contributors to) EMCAT. In most of India, farmers must wait for years to obtain grid-connected supply for

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their pumpsets, and rural electrification with its attendant social benefits is hostage to the availability of electric power. Simultaneously, significant potential exists for energy savings from the introduction and spread of more efficient irrigation pumpsets. A final group of beneficiaries will be women, who will have improved energy supply for lighting and household use.

3. Gender Considerations

3.1. Fair employment, training and advancement opportunities for women within the IDBI and PFC will be addressed in EMCAT. At Project inception, a data profile will be established, analyzing the rates of hiring, promotion, and areas of substantive responsibility and decision-making authority, as well as the actual numbers of professional and clerical female employees in PFC and IDBI. This data will be broken out by individual institution in comparison with male employees. The Annual Reviews of the Project will include investigation into changes from the baseline data. This will determine if progress is being made to reduce the significant gender differentials which are anticipated at Project inception.

3.2. An encouraging sign of potential for development of female employment and even female-owned enterprise in the Energy Sector was set out in the initial issue of the Indian Renewable Energy Development Agency publication 'IREDA NEWS', which covered the Workshop on Women Entrepreneurs in New Technology, held in September, 1989. The strength of the women's section of the National Alliance of Young Entrepreneurs appeared substantial.

4. Attitudinal Constraints

4.1. A potential source of difficulty for implementation of any economically rational program involves certain political/economic attitudes. Opposition to economic rationalization, in particular acceptance of private enterprise and economic pricing of power both purchased from cogenerators and sold to end consumers, will arise from several groups. Some of this opposition will arise from civil servants, State or Center, who believe that the Government should maintain its exclusive control over the power sector, or who believe subsidized electric rates are good, for either growth (to induce industrial, commercial or agricultural investment) or equity reasons. Other opposition will arise inside the SEBs, where there are widespread views that they have a 'social responsibility' to price power according to 'ability to pay' and should not consider energy producers' financial viability as a primary objective of management. The reforms will clearly disturb the bureaucratic approach, with its concomitant hostility towards purchase or 'wheeling' of privately produced power, that characterizes SEB management today and, hopefully, will replace it with a profit-oriented style; this will cause considerable disruption within SEB staffs. One can also expect opposition from employee organizations to requiring successful completion of training as a condition of promotion, as well as to the reduction of excessively high staffing levels.

4.2. Because of the critical importance of this issue, one of the key items in the Scopes of Work for the Consultant Consortia will be that of demonstrated skill in being able to work successfully with situations of labor sensitivity in an LDC context, preferably in South Asia. Moreover, this issue will continue to be examined and studied during Project implementation. The legitimate concerns of the Power Sector entities' staffs - and even, to a degree, their more selfish desires - must and will be taken into consideration.

4.3. Another potential problem involving the feasibility of the ESCO concept is the frequent reluctance of Indian entrepreneurs to admit outsiders into the inner working of their businesses. Since the essence of ESCO operation, at least in the United States, is the sharing of both the risks and the benefits of the newly introduced energy conservation measures through financial investment and reward, the ESCO patently requires full access to the company's records, both historical and operational; absent such access, the ESCO would be unable to evaluate the results of its interventions and the fairness of the positive or negative return on investment as alleged by the host company's management. This matter will be of prime importance in the ESCO feasibility study.

5. Nature of the Energy Consulting Business in India

5.1. Energy consulting firms in the power sector have developed rather slowly in India, partly due to inertia of the utilities, industrial and commercial organisations, financial institutions and government agencies. Industries and commercial establishments usually engage consultants in the inception stage for conceiving the project and for scrutiny at the installation stage. However, as energy cost is frequently minor relative to the total manufacturing or service cost, energy saving programs are often not taken very seriously. In fact, the typical industry faces a more serious issue, namely coping with frequent outages and poor quality power when supplied. This is why the overall improvement in the reliability and quality of electricity supply is a necessary precursor, or at least concomitant, to more serious business attention to energy efficiency investments.

5.2. Nevertheless, the onslaught of oil crises, coupled with intensive work by agencies such as NPC, PCRA, and several other organisations in the field have created an awareness of the vast untapped energy conservation potential existing in Indian industry and commerce. In the area of supply management, most utilities have been performing activities such as planning, and preparation of feasibility reports for new generation, transmission and distribution, load despatch, evaluation of non-utility power generation projects etc., and have been gradually building their own expertise. On complex activities, they are provided with technical guidance including support for design engineering by the Central Electricity Authority. NTPC and NHPC also have developed their

in-house design capabilities and seem to be self-sufficient on vital projects. However, utilities do sub-contract a few jobs to outside specialist organizations. Prominent among these are:

- Central Electricity Authority
- Tata Consultancy Engineers
- Dessein India Limited
- Development Consultants Ltd.

5.3. Except for CEA, these firms are in the private sector and their operations cover the entire country. Working primarily on the supply side, these are large business organisations and constitute more than 90% of the consulting business in the energy sector. A major chunk of business (about 40%) goes to the Tata group of companies.

5.4. These firms provide basic engineering as well as detailed job engineering, preparation of feasibility reports, turnkey assistance for specific jobs at the erection, commissioning and operational stage, contract maintenance during capital overhauls, environmental engineering modernisation and renovation programs, load assessment, materials handling, etc. These services encounter major challenges in the emerging field of power engineering and management, involving multidisciplinary skills by blending operating and design engineering experiences. The major consultancy organisations are generally able to meet the expectation of the clients. Often Indian firms such as NTPC and progressive SEBs have attained self-sufficiency in the traditional areas and they are able to consolidate their expertise based on the operating experience. They often interact with international counterparts in the formative stages of technology absorption and review of basic engineering documents; they would prefer to opt for renowned international consultants from the developed countries due to obvious advantage of much longer experience in the high tech areas and professional skills.

5.5. In the field of rural transmission and distribution systems, there are over 50 minor organisations, mostly undertaking erection projects. Most of these consulting firms are organised on a regional basis, though they would not normally hesitate to venture into neighboring states in search of more business prospects.

5.6. On the demand management side, there has been a mushroom growth of consulting organisations - their number is expected to be of the order 100; though about 30 of them are affiliated to central government administrative ministries and financial institutions. Most of them undertake activities on a regional basis, but would be open to take national or inter-regional assignments to expand their business interests.

5.7. In the demand management field, institutionalised as well as individual consultants mostly provide services to identify relevant energy conservation measures. There are several agencies offering detailed design engineering support and turnkey assistance during the

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implementation phase; these services, though useful, have not become popular with industries mainly due to the high cost involved. There is demand for these services in both public and private sector. In recent years, there has been a spurt in these activities in the public sector, with the public sector engaging private consultants.

5.8. Barring a few (five to six) consulting groups, most consultants do not represent any foreign interests and owe their strength to Indian job experience. Most consultants are not affiliated to any association of industries and trade, with the notable exception of the private energy supply organisations, which are affiliated with associations such as Association of Consulting Engineers, Confederation of Indian Engineering Industry etc. Most business associations provide very few interactions with users and government agencies regarding business interests of energy consulting firms. Most small energy consulting firms are not interested in the activities of these fora.

5.9. In summary, energy consulting is a growing business with the participation of various interests, and encompasses engineers, economists and administrators. While some of these personnel are technically qualified and experienced, many need more technical skills and experience. A major non-technical training need is in marketing skills. An additional need of many consulting firms is portable diagnostic instruments for energy audit. Financial institutions and concerned government agencies can be convinced by the recommendations of reputed consultancy firms if these are supported by an objective analysis of the problem. However, there is no formal association catering to their business interests, providing financial and technical assistance and establishing dialogue with national and international agencies, and there are very few policy or financial incentives encouraging development of consulting firms. Direct governmental spending on the consultancy activities is meagre. Absent some external intervention, such as EMCAT, very little change would be expected in the scenario in the near future.

5.10. However, given the expectation of EMCAT assistance, CEI or other fora may be expected to take the lead in promoting a society or confederation of consulting firms which would facilitate networking of energy consultancy firms and improving quality and content of energy management services, besides liaising with various national and international agencies. USAID can assist in this process by supporting innovative technical assistance programs, especially market-driven activities, subsidising innovative assignments involving high risks, sponsoring study missions, and by networking dialogues with national and international agencies on issues concerning energy consulting firms etc. This would foster rapid growth of the market for the energy consulting firms.

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**IMPACT ANALYSIS OF ENERGY EFFICIENCY
STRATEGIES ON REDUCING
CARBON EMISSIONS IN INDIA**

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May 31, 1990

EXECUTIVE SUMMARY

One of the major environmental problems facing mankind today is global climate change as a consequence of the greenhouse effect. The largest contribution to global warming, caused by the large amounts of greenhouse gases being released into the atmosphere, is from carbon dioxide emissions arising mainly from the combustion of fossil or hydrocarbon fuels. Improved energy efficiency can enable substantial reductions in the overall consumption of energy and of fossil fuels in particular, and can thus have a large and immediate impact on carbon emissions and global warming.

India is one of the largest energy consuming countries among the developing nations. Its economy relies primarily on hydrocarbon fuels and future energy requirements are expected to increase rapidly. USAID is in the midst of designing a project, Energy Management Consultation and Training (EMCAT), that seeks to promote policy dialogue and reform in the rapidly expanding Indian energy sector, with the goal of changing the orientation of Indian energy policy from excessive reliance on new generating capacity, mostly thermal, to a balanced policy giving weight to conservation and efficiency. Through this project, USAID hopes to address the issue of global warming and climate change. This study was undertaken in support of the design of this project.

The objective of this study was to develop analytical and quantitative indicators of the impact of energy efficiency strategies on fossil fuels' use and concomitant carbon emissions in thermal power generation and in the industrial sector. These sectors consume the major share of fossil fuels in India.

The approach adopted in the study comprised of the following elements:

- estimate current energy consumption pattern in thermal power generation and major energy consuming industries
- estimate current carbon emissions based on the energy consumption pattern
- project energy consumption over a 15 year time horizon, i.e. in 2004/05
- project likely energy efficiency levels and the scope for inter-fuel substitution, and their impact on energy consumption in 2004/05
- analyse the impact of energy efficiency scenarios on carbon emissions in 2004/05

Based on an examination of energy consumption in different industries comprising the industrial sector, eight industries were selected for analysis in this study. These are steel, cement, brick, fertilizer, petroleum refining, chemical, textile and paper industries. Together with thermal power generation, these eight industries accounted for over 85% of the total consumption of fossil fuels in the power generation and industrial sectors.

1984/85 was taken as the base year as it was the latest year for which the data that was available from various sources was complete and consistent for all industries covered in this study. The consumption of fuels in 1984/85 was estimated. The carbon emissions rates or emission factors for different hydrocarbon fuels were determined and carbon emissions from each industry in 1984/85 obtained by multiplying the consumption of different energy sources by the respective emission factor.

Projections of energy consumption in 2004/05 were developed by estimating the future production level in each industry, including the effect of structural and major process/technology changes, and the likely energy intensity, i.e. energy consumption per unit production.

To analyse the impacts of likely energy efficiency levels and inter-fuel substitution, projections for 2004/05 were made for three scenarios. In Scenario I, which was considered as the base case scenario for 2004/05, energy intensities were taken to be the same as those prevailing in 1984/85. Scenario II was envisaged as one wherein reasonable or moderate levels of energy savings would be achieved by 2004/05. Scenario III was defined as one wherein optimistic or high levels of energy savings would be achieved by 2004/05. The likely levels of energy efficiency were determined based on estimates from earlier studies as well as the literature. The estimates varied for the different industries considered depending on their technological status, the energy efficiency of existing manufacturing processes and equipment, current operating practices, etc. The scope for inter-fuel substitution was also estimated from available studies and the literature. The energy consumption and carbon emissions under the three scenarios were then determined.

The total carbon emissions from the thermal power and industrial sectors were determined to be 0.271 billion tonnes in 1984/85. The share of carbon emissions of different industries were observed to be a function of not only the share of total energy consumption but also of the mix of fuels, the use of energy sources as feedstock, and the presence of other sources of emissions such as calcining in the cement industry.

In 2004/05, assuming no improvements in energy efficiency over 1984/85 levels, the emissions were projected to increase by 3.8 times to 1.036 billion tonnes. Under a scenario of implementation of energy conservation measures corresponding to a moderate improvement in the level of energy efficiency, carbon emissions in 2004/05 could be reduced by 157 million tonnes, a 15% decrease over the base case scenario. In a scenario wherein an optimistic or high level of energy conservation is achieved, the reduction could be 240 million tonnes or 23% over the base case.

Thermal power generation shows the largest increase in carbon emissions between 1984/85 and 2004/05 in absolute terms. In the base case, emissions would increase from 109 million tonnes in 1984/85 to 501 million tonnes in 2004/05, or by a factor of 4.6. The emissions could be reduced by 9% and 19% in Scenarios II and III respectively through greater energy efficiency and fuel substitution.

Within the industrial sector, the steel, chemical, refining, brick and paper industries could achieve major reductions in energy consumption and carbon emissions. In the steel industry, carbon emissions would increase in the base case by a factor of 3.3 from 39 million tonnes in 1984/85 to 129 million tonnes in 2004/05. A 36% reduction would be expected in Scenario II, as a result of the steel industry's planned programme for modernisation and more intensive energy conservation efforts could reduce emissions by 43%.

In the brick industry, emissions would increase from 16 to 41 million

tonnes in the base case, i.e. by a factor of 2.6. Reductions of 15% and 20% respectively could be achieved under the moderate and high energy conservation scenarios. In the petroleum refining industry, an increase of 3.9 times would result due to a rise in emissions from 8 million tonnes in 1984/85 to 31 million tonnes in 2004/05. Reductions of 19% and 29% respectively could be achieved under the two energy conservation scenarios.

Emissions from the chemical industry would increase in the base case by a factor of 6.3 from 5 million tonnes in 1984/85 to 38 million tonnes in 2004/05 due to the high projected growth rate. These emissions could decrease by 26% and 32% through moderate and high levels of energy conservation respectively. In the paper industry, emissions would increase by 2.4 times from 7 million tonnes in 1984/85 to 17 million tonnes in 2004/05 in the base case. Under the moderate and high energy conservation scenarios, reductions of 29% and 47% could be achieved respectively.

The relative contribution of various sources to the total carbon dioxide emissions from thermal power generation and the eight industries covered in this study also changes under these scenarios. The share of coal decreases from 78% in 1984/85 to 67% in 2004/05 in the high energy conservation scenario case, while the share of oil declines from 12% to 7%, and the share of gas increases from 1% to 11%. This is due to the effect of fuel substitution, primarily the substitution of coal by gas in thermal power generation and the increased use of gas in fertilizer production, and also changes in the overall mix of fuels due to varying growth rates and energy conservation possibilities in different industries.

The analysis carried out in this study shows that energy efficiency can indeed have a large impact on carbon emissions and hence on global warming. These results point to the necessity of a strong emphasis on energy conservation strategies and programmes in India's energy strategy for the future. Existing policies relating to energy efficiency in the industrial sector are mainly in the form of fiscal incentives, and these have been ineffective or inadequate for a variety of reasons. A re-appraisal of the effectiveness of existing policies, and an assessment of other policy measures that could yield better results needs to be carried out. The existing institutional structure would also need to be strengthened or perhaps even overhauled. Without a visible and result-oriented energy conservation programme, it may not be possible to even achieve the 15% reduction in emissions possible in the moderate energy efficiency scenario.

The thermal power sector is and will remain the largest carbon emitter and hence should be specially targeted for energy efficiency improvement and carbon emissions reduction. Within the industrial sector, the steel, chemical, refining, brick and paper industries could achieve major reductions in energy consumption and carbon emissions.

This study was of a quick effort nature, and hence the results should be considered as merely indicative and not definitive. However, given the importance of the role of energy efficiency strategies towards reducing carbon emissions, as revealed by the results of the study, more detailed analyses of the options and mechanisms for achieving these reductions need to be carried out.

ADB/IBRD/AID MEMORANDUM OF UNDERSTANDING (MOU)

- SUPPORT FOR THE INDIA POWER FINANCE CORPORATION:
- ADB -- Power Sector Efficiency Improvement Project.
- IBRD -- Power Utilities Efficiency Improvement Project.
- USAID -- Energy Management Consultation & Training Project.

1. During the March-May 1990 period, discussions were held between the Asian Development Bank (ADB), International Bank for Reconstruction and Development (IBRD), and the United States Agency for International Development (USAID) at IBRD offices in Washington, D.C. and USAID offices in New Delhi to examine possibilities for coordinating their projects to provide support to the India Power Finance Corporation (PFC, sometimes referred to herein as the Borrower/Grantee). This Memorandum summarizes the main understandings reached between ADB, IBRD, and USAID on their coordination arrangements.

I. The Projects:

2. ADB and IBRD projects will provide loan financing to PFC for on-lending to the State Electricity Boards (SEBs) for investments in electric power generation, transmission and distribution. The USAID project will provide grant financing to PFC for technical assistance, training, and other support for PFC, and through it, for the SEBs, for institutional strengthening. The projects are more fully described in Attachment B hereto.

3. It has been agreed that there shall be close coordination between ADB, IBRD, and USAID on all matters relating to the implementation, including supervision, of the said Projects and other matters of common interest to them under the said Projects in the manner set forth below.

4. USAID has agreed that a condition precedent to disbursement of its grant to PFC will be duly executed loan agreements between PFC, either/or ADB and IBRD, respectively.

II. Exchange of Information and Consultation:

5. In implementing its project, USAID is desirous of making maximum advantage of ADB's and IBRD's vast repository of technical expertise in the area of electric power generation, transmission and distribution. USAID is further interested in ensuring that its financing of technical assistance, training and other support for PFC is closely coordinated with the projects being financed by IBRD and ADB so that PFC obtains the maximum utility of the combined assistance. In this regard, USAID has made provisions for ADB and IBRD to provide input to USAID at critical junctures in the disbursement and implementation of the USAID grant.

6. ADB, IBRD, and USAID shall keep each other informed of the progress of the Projects, including the findings of any inspection by their representatives, and shall exchange views from time to time with respect thereto.

7. ADB, IBRD, and USAID shall keep each other informed about the status of their respective loan and grant agreements and shall notify each other when all conditions for the effectiveness of or disbursement of funds under their respective agreements have been fulfilled.

8. ADB, IBRD, and USAID shall promptly inform each other whenever one of them proposes:

- (i) to materially amend its agreement with the Borrower/Grantee;
- (ii) to suspend or terminate in whole or in part the right of the Borrower/Grantee to make withdrawals/disbursements under its agreement; and
- (iii) to declare the indebtedness of the Borrower/Grantee under its agreement to be due and payable in advance of the agreed maturity thereof.

In each such case ADB, IBRD and USAID shall offer each other a reasonable opportunity, in advance of taking the proposed action, to exchange views with respect thereto. ADB, IBRD, and USAID shall each retain, however, its respective right of decision and action under its loan/grant agreement with the Borrower/Grantee, including the right to permit continued disbursement under its agreement in case of suspension or cancellation of the loan/grant of the other party(s).

9. ADB, IBRD, and USAID shall promptly inform each other of:

- (i) any event likely to substantially interfere with the carrying out of their Projects; and
- (ii) any cancellation or repayment in advance of maturity by the Borrower/Grantee of any portion of ADB's loan, IBRD's loan, or USAID's grant.

III. Administration of the Loans and Grant:

10. ADB, IBRD and USAID will each separately finance goods and services under their respective projects and these goods and services will be procured in accordance with their respective procedures.

11. ADB, IBRD, and USAID will meet annually to review:

- (i) the progress of the projects; and

- (11) annual plans of PFC (and SEBs) for utilization of technical assistance, training, and other support provided under the USAID grant.

12. Attachment A. to this Memorandum provides detailed procedures on the implementation of the USAID Energy Management Consultation and Training Project.

IV. Miscellaneous:

13. Any relevant matter of which no provision is made in this Memorandum shall be determined in a manner mutually acceptable to ADB, IBRD, and USAID, and, in this regard, each party shall give a sympathetic consideration to any proposal advanced by the other party.

- For
Asian Development Bank
-

For
International Bank for
Reconstruction and Development

Name:
Title:
Date:

Name:
Title:
Date:

- For
- U.S. Agency for International Development

- Name:
- Title:
- Date:

Attachment A

**IMPLEMENTATION PROCEDURES for the ENERGY MANAGEMENT
CONSULTATION AND TRAINING PROJECT**

1. Annual Grant Utilization Plans:

USAID will require PFC to prepare annual plans for utilization of the USAID grant as a condition to disbursement of funds for the succeeding twelve months. USAID will assist PFC in preparing these plans. During the preparation of these plans and prior to their approval by USAID, USAID will request ADB and IBRD to provide recommendations and comments on the content of these plans.

2. Operational and Financial Actions Plans (OFAPs:)

ADB and IBRD will require that they approve each SEB's OFAP prior to that SEB being eligible for either ADB or IBRD capital financing. USAID will be provided an opportunity to comment on OFAPs prior to their approval.

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3. Policy and Planning Studies:

PFC plans to establish a unit which will undertake policy and planning studies in the power sector. PFC intends to utilize USAID funds to employ consultants to assist it in carrying out these studies. USAID will require that PFC obtain USAID's approval of the scopes of work/terms of reference prior to any solicitation of consultants to undertake them. In connection with providing its approval for the studies, USAID will solicit and give full consideration to the comments of ADB and IBRD. USAID will also request ADB and IBRD to review and comment on the interim and final reports resulting from these studies.

4. Training:

ADB and IBRD will assist PFC and USAID in identifying suitable courses for training of PFC and SEB personnel.

5. Consultants:

ADB and IBRD will assist PFC and USAID in identifying suitable consultants for PFC and the SEBs. USAID will request ADB and IBRD to review and comment on the proposed scopes of work for the consultants and on any reports prepared by the consultants.

6. Preparation of Manuals and Handbooks:

USAID will request ADB and IBRD to review and comment on any manuals and handbooks (such as would be used by PFC and the SEBs for project appraisal, preparation of OFAPs and project management) that are prepared for PFC or the SEBs with USAID financing.

7. Establishment of Training and Contracting Offices in PFC:

USAID will request ADB and IBRD to review and comment on the terms of reference for any specialists funded by USAID for the purpose of establishing training and contracting offices in PFC. A condition to USAID's disbursement of funds for these specialists will be the requirement that PFC have recruited personnel for the training and contracting offices on a full-time basis. USAID will also request ADB and IBRD to review and comment on any reports, proposals and recommendations made by these specialists concerning the establishment of these offices in PFC.

8. Mid-term Evaluation:

The mid-term evaluation of the USAID project will be a cooperative effort involving PFC, ADB, IBRD and USAID. This cooperative effort includes joint review of the terms of reference for the evaluation and providing comments for consideration by USAID prior to its approval of such terms; selection of members of the evaluation team; and joint review and discussion of the evaluation report.



SUMATI MEHTA
DEPUTY SECRETARY

RECEIVED
D.O.No. 2(22)-AID/90
1 FEB 1991
PROGRAM OFFICE

ANNEX L

Government of India
Ministry of Finance
Department of Economic Affairs

RECEIVED
1 FEB 1991
PROGRAM OFFICE

Dear Mr. Mahoney,

This is regarding the Project Agreement for the Energy Management Consultation and Training Project No.386-0517, two copies of which were forwarded to this Department on September 20, 1990 by Mr. Steve Fraundelich.

02/04/91
ACTION:

PDPS

INFO:

TDE

D

CHRON

RF-2

RCO

2. We have now decided that the Project Grant Agreement may be signed jointly by USAID and representatives of DEA, PFC and IDBI. We would be grateful if you could kindly process the proposal for signing of the Grant Agreement by Joint Secretary(TC) and IDBI/PFC.

With regards,

Yours sincerely,

(SUMATI MEHTA)

Mr. Tim Mahoney,
Director,
Programme Development and
Project Support, USAID,
American Embassy, New Delhi.

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**U.S. TRADE & INVESTMENT OPPORTUNITIES IN
ENERGY EFFICIENCY MARKETS IN INDIA** 1/

Aggressive support of energy conservation and cogeneration in India has the technical potential to add the equivalent of approximately 35,600 Mw of capacity.^{2/} This capacity could be acquired at a cost of about \$20 billion compared to approximately \$50 billion for the same capacity through traditional sources. This yields a net savings of \$30 billion or 11% of 1988/89 GDP.

These figures are derived based on estimates of consumption in five broad end-use categories as estimated by the Indian National Productivity Council. Aggregate energy efficiency potential by these end-uses were taken from studies conducted by the U.S. Electric Power Research Institute. These estimates were adjusted for differences in end-use efficiencies found in India, and then applied to electric consumption in the industrial and agricultural sectors. Costs were based on a 1990 survey by the Edison Electric Institute of U.S. electric utilities' costs for energy efficiency programs.

The promotion of energy efficiency in India will serve a multitude of purposes. Given its cost and environmental advantages, it is an essential part of a balanced strategy to meet new load growth. It is also a resource which will increase national economic competitiveness and help slow environmental degradation.

The U.S. has a pre-eminent role, worldwide, in the manufacture of energy efficient equipment and cogeneration equipment. Both means of achieving energy efficiency also have a large component of associated engineering and technical services. These services are necessary to assess the opportunity for efficiency and to design and instal the proper equipment. The U.S. has a competitive advantage in these latter areas of the market as well.

1/ This summary is based on the conclusions of th draft study titled "Assessment of U.S. Trade and Investment Opportunities in Energy Efficiency Markets in India."

2/ Technical potential refers to the application of engineering estimates of the most efficient equipment available today compared with the existing stock. If the entire existing stock were converted to the efficient equipment, the calculated savings would accrue. This does not take account, therefore, of economic and on-site considerations, or likely penetration rates of the new equipment.

Industry

Industrial electricity use still accounts for nearly 45% of Indian consumption but it is a declining fraction of use. As the largest energy consuming sector, it still has much energy efficiency potential. Industrial energy intensity in India is nearly twice that of the U.S. (1.02 kWh/\$GDP compared to 0.49 kWh/\$GDP). Much of this potential reduction can come through the introduction of highly efficient electrotechnologies, advanced process controls, lighting and motors. A few process-related examples of applicable technologies include:

- o Electrolytic Reduction
- o Electrogalvanization
- o Industrial Process Heat Pumps
- o Ultraviolet Curing
- o Induction Melting
- o Microwave Processing
- o Laser Processing
- o Electrolytic Separation and Electrochemical Synthesis.

The Indian National Productivity Council estimates the following percentage of use by end-use:

Pumps, Fans, etc.	50%
Electrolysis	15%
Process Drives	10%
Lighting	10%
Other	15%

Additional research on a more disaggregated end-use basis will enhance both overall efficient equipment market estimates and help further prioritize the type of efficient equipment which will likely have the highest impact.

Agriculture

Agricultural electricity consumption, in contrast to industrial, is growing rapidly. It now accounts for over 25% of consumption, and the rate of growth of this sector has more than doubled since 1985/86, from 10% to more than 25%. The introduction of efficient agricultural equipment therefore could provide significant short and long-term benefits since major amounts of new equipment are being installed today. Government efforts aimed at increasing agricultural irrigation with electric lift irrigation pumps have been largely successful. The number of pumpsets has increased 33% from 5.7 million in 1984/85 to 7.6 million in 1988/89. Energy efficient pumps should be part of a program to reduce this impact on electric utilities. Energy efficient pumps and motors can reduce electricity consumption by as much as 30%-40%.

Energy Efficiency Market Potential

Estimates were made for both the energy efficient equipment markets and the cogeneration equipment markets. For energy efficient equipment, end-use energy consumption estimates were used to convert current total consumption into end-use consumption estimates. In the absence of more detailed data, information from several case studies were used to compare estimated Indian efficiency levels with those found in the U.S. Macro-level conservation potential data from several studies conducted in the U.S. were used to develop median potential reduction percentages. These were then adjusted to reflect estimated Indian levels of efficiency. The resulting percentage estimated savings potential was then applied to estimated end-use consumption to derive energy savings. The value of equipment was then based on estimates from U.S. electric utilities' average cost of capacity from energy efficiency programs. It includes a comprehensive and representative mix of technologies and equipment. It should serve as a reasonable basis for estimates in India, assuming a wide variety of efficient equipment is available and installed.

Equipment valued at between \$17.3 and \$23.9 billion is estimated as being required to achieve the estimated savings. The energy conservation segment represents between \$3.1 billion and \$4.4 billion for 25,000 Mw of capacity. While these savings are based on aggregate end-use efficiency potential, a wide variety of equipment would be involved including:

Fans, Motors etc.

- o Efficient Heating Ventilation & Air-conditioning Equipment
- o Building Envelope Improvements
- o Efficient Motors
- o Thermal Storage
- o Solar Hot Water Heaters
- o Power Factor Correction

Electrolysis

- o Efficient Electrolysis

Process Drives

- o Efficient Motors
- o Variable Speed Drives

Lights

- o Efficient Lighting
- o Lighting Controls, Occupancy Sensors, Daylight Dimming

Other

- o Process Specific Applications and
- o Energy Management and Load Control Systems

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Cogeneration Market Potential

Cogeneration market potential was based on estimates of existing steam boiler capacity in the industrial sector. The thermal load of these boilers was assumed to be supplied through waste heat from a cogeneration system. The amount of waste heat required allows an estimate of installed electric capacity based on heat balancing equations. Cost estimates per installed kw of equipment were supplied by several U.S. sources for both coal fired and gas/diesel fired equipment. The cogeneration equipment market is thus estimated at between \$14.2 billion and \$19.5 billion for 10,781 Mw of identified cogeneration potential.

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**AN OVERVIEW OF
ENERGY CONSULTING FIRMS**

Under

**ENERGY MANAGEMENT CONSULTATION &
TRAINING PROJECT
(EMCAT)**

prepared by

**NATIONAL PRODUCTIVITY COUNCIL
NEW DELHI**

for

**UNITED STATES AGENCY FOR
INTERNATIONAL DEVELOPMENT
NEW DELHI.**

August 16, 1990

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EXECUTIVE SUMMARY

USAID sought NPC's assistance to facilitate designing energy management consultation and training project (EMCAT) aimed at strengthening the private sector consulting firms. The study provides an overview of energy consulting firms based on NPC's past experiences, a questionnaire survey which was responded by 40 organisations and interviewing ten eminent organisations inviting their views on the constraints being faced and positive suggestions for EMCAT.

In spite of the potential areas for business, growth in energy consulting firms in the supply sector is not commensurate with the developments in the power sector. Some private companies, NTPC and progressive SEBs have developed their own expertise. In demand management field, consulting firms have been playing a catalytic role in creating awareness, conceiving energy conservation schemes and networking with end users in demonstration of relevant programmes.

While supply management field is dominated by four leading organisations well versed in their areas of operation, in demand management area, there are over 100 organisations of which 70 are private organisations, 80 % of whom are individual based and the rest owned by reputed business groups. The other 30 organisations are affiliated to government ministries receiving grants to the tune of 10 to 40 percent. While most individual based organisations are confined to energy related areas, the energy consulting

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firms are usually in other areas with energy and allied activities constituting 10 to 40 % of the turnover. Quite a few agencies provide turnkey assistance to the end users at the implementation stage, 8 organisations responding to the study have affiliations with foreign agencies.

There are few incentives to encourage energy consulting firms in the supply sector. Deptt. of Power (DOP), ministry of Energy bears the cost of few national consultancy assignments including industrial energy audit and they have disbursed about Rs. 60 million to various consulting organisations in the demand management field in the past four years for consultancy, awareness, training and allied activities. Energy Management Centre, an autonomous organisation under DOP has recently launched energy bus programmes seeking UNDP and EEC collaboration with the objective of propogating and fine tuning energy audits in Indian industries. Petroleum Conservation Research Association, Industrial Development Bank of India, Maharashtra Energy Development Agency and a few other state level agencies offer financial incentives for energy audits to the user organisations. These schemes are not popular despite growing awareness on the need to enhance end use energy efficiencies through several sectoral studies and awareness programmes for the end users.

Dearth of experienced consultants, inadequacy of networking arrangements, shortage of funds, high custom duties and restrictions to import diagnostic instruments are some constraints impeding energy consulting firms. There are no

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constraints for empanelment of consultants. Very little incentives are provided to energy consulting firms and governmental spending on sponsored consulting activities is too meagre restricting the growth of the consulting firms.

The following suggestions have been made for conceptualising EMCAT.

1. It would be useful to channelise EMCAT through PFC and IDBI for power supply and demand consulting firms respectively keeping in view their linkages with utilities and end users who would be major beneficiaries of the consultancies.
2. Sponsored demonstrative novel studies in supply & demand management fields may be undertaken with short term experts from US and other developed countries who would transplant their past experiences to Indian counterparts.

The following themes are suggested for demonstrative studies :-

a. Supply Management:

Life extension & repowering programmes for old power stations, environmental impact assesment modelling, improving productivity of power stations, reduction in T&D losses in urban & rural distribution networks.

b. Demand Management:

Promoting cogeneration studies, model demonstration projects on power end use efficiencies, rational pricing of electricity, load demand management.

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3. The concept of energy services contracting well developed in North America & EEC countries need to be demonstrated by promoting at least four organisation to take up activities on energy audit & conservation & cogeneration right from the concept to commissioning & operationalising the projects.

4. Suitable short duration (4 Weeks) training programme for training the trainers (10 each in supply and demand management field) may be organised to strengthen training activities of the leading organisation - Power Engineers Training Society, National Thermal Power Corporation, Energy Management Centre, National Productivity Council, etc.

5. It is proposed to seek a few (2 to 3) short term experts from USA or other developed countries to develop & offer programmes on Aggressive marketing of consultancy on Demand Management and demonstrate the same through a few model consultancy assignments for the benefit of end users & sponsorers of energy consultancy assignments.

6. It is proposed to set up a pilot energy audit instrument bank to lend portable diagnostic instruments to overcome the difficulties encountered in procuring imported instruments.

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7. It is proposed to develop software packages on energy audit to facilitate standardised reports. The technical assistance would be needed for procuring relevant software packages from abroad & training Indian specialists.

8. It is suggested to establish a computerised information bank for the benefit of consulting firms & professionals to have an access to relevant technical information & case studies in power supply & demand management by networking national agencies with international counterparts. These services may be provided to the users at nominal charges.

9. It is proposed to support industry associations or other forums to launch a formal association of energy consulting firms.

10. Study missions of energy consulting firms may be arranged to assist in consultancy export to other developing countries.

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COMPONENT : I D B I

BREAK DOWN - PROJECT ELEMENT WISE (Figures in Dollars)

ELM#1	LOAN PORTFOLIO DESIGN (LPD)	A.I.D. COST		FX	LC	HCC
		S	S	S	S	S
1.	DPR-CO-GEN & Energy Conservation	1,230,783	450,000	780,783	762,783	
2.	Study- Barriers to COGEN schemes	101,330	84,810	15,520	10,000	
3.	Op/Mgmt Package for COGEN Demos	726,000	726,000		207,500	
4.	Info Dissem of COGENs	100,000	100,000		20,000	
6.	Industry specific 20 COGEN Workshops by IDBI	60,000		60,000	9,275	
7.	IDBI visit to observe COGENs in US	25,512	25,512		2,000	
		<u>\$ 2,243,625</u>	<u>1,386,322</u>	<u>857,303</u>	<u>1,011,558</u>	
ELM#2	Private Industry Consultation & Development					
1.	Training of EAs.					
	a) EA Trg& US Trainer	357,408		313,930	43,478	109,855
	b) Equipment	210,000	567,408	210,000		21,000
2.	Training of Industry people	85,040	85,040		5,200	
3.	Training of IDBI - ESCO Familiarization.	25,512	25,512		2,000	
4.	Study tours - Policy Makers	10,000	10,000		2,000	
	- B.I.S.	10,000	10,000		2,000	
5.	Feasibility study ESCO	110,780	90,360	20,420	5,000	
6.	Formation of 1 ESCO (Equip. & TA)	1,050,000	580,000	470,000	255,000	
7.	Monitoring of Conservation Measures	185,507		125,507	18,551	
		<u>\$ 2,044,248</u>	<u>1,324,642</u>	<u>719,406</u>	<u>420,606</u>	
ELM #3	INFORMATION DISSEMINATION (Approximately 10 Associations Rs.1 mill. each)					
	Activities to be funded under the project:					
1.	Outreach (Workshops/Seminars)					
2.	Energy Database					
3.	Policy Studies					
4.	Audio Visuals		541,980	100,000	441,980	240,000
5.	Publicity Material					
6.	Study Tour for establishing Linkages US Assns.					
		<u>\$ 541,980</u>	<u>100,000</u>	<u>441,980</u>	<u>240,000</u>	
ELM #4	ADMINISTRATION & EVALUATION					
1.	IDBI Info/Dissemination	100,000		100,000	20,000	
2.	Midterm & Final Evaluation	100,000	50,000	50,000	7,500	
3.	Honoraria for Comitee members	2,435		2,435	500	
4.	Travel cost for meeting:	31,031		31,031	1,000	
5.	Non-Federal Audit	7,000	7,000		1,000	
6.	Action Plan for Implementation	22,553	22,553		5,000	
7.	Technical Resources coordination	300,000	250,000	50,000	10,000	
8.	Project Administration	10,000		10,000	7,500	
		<u>\$ 573,012</u>	<u>329,553</u>	<u>243,466</u>	<u>52,500</u>	
	TOTAL AT CURRENT COST (\$)	5,402,870	3,140,717	2,262,154	1,724,664	
	ADD: CONTINGENCY	270,144	157,026	113,108	66,232	
	INFLATION	327,365	327,265	0	129,052	
	TOTAL PROJECT COST (\$)	<u>6,000,379</u>	<u>3,625,017</u>	<u>2,375,262</u>	<u>1,920,956</u>	

IDBI COMPONENT : ASSUMPTIONS AND BACKUP DETAILS

ELM #3 INFORMATION DISSEMINATION		AID COST		HCC
			Total	217,391
1. Outreach	Numbers	Rate		
- Workshop/Conf/Seminar	50	2350	117,492 Rs. Cost	
				22,609
2. Energy Database(\$20,000 per yr)			100,000 Rs. Cost	
3. Policy Studies	6 studies	20870	124,448 Rs. Cost	
4. Audio Visuals		Rs. Cost 50000 FX Cost 50000	100,000	
5. Publicity Material			15,000 Rs. Cost	
6. Study Tour for establishing Linkages US Assns.	10 persons	-P.diem 2,100 -Travel 3,000 -Prog cost 3,404	85,040	
			541,980	240,000
<u>ELM #4 : Detailed Project Reports(Included in LFDs)</u>				
1. US Consultant 12 reports @ \$25,000 FX			350,000	
2. Indian Consult.30 Reports @ \$10,000 LC			346,000	328000
			696,000 HCC:	(Same as LC)
<u>ELM #5 OTHERS</u>				
1. IDBI Information Dissemination			100,000	20,000
2. Midterm & Final Evaluation			100,000 (Total cost \$200,000)	7,500
3. Honoraria for Comitee members		50% for IDBI component Rs 700/person 20 Meetngs 3 eligible	2,435	500
4. Travel cost for meeting:		Rate/Person		1,000
- 4 Meets/yr for 5		Travel 232		
- 4 person travell 80		P.Diem 106		
		Incid 50	388	
			31.031	
5. Non Federal Audit			7,000	1,000
6. ActionPlan for Implementation			22,553	5,000
7. Tech Resource Coordination			300,000	10,000
8. Project Administration			10,000	7,500
				52,500
		TOTAL	573,019	

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IDBI COMPONENT : ASSUMPTIONS AND BACKUP DETAILS

	\$	
a) Cost of TO/Fro Air Fare -	3000	
b) Per Diem	140	
c) Rate of conversion	1\$ = 17.25	
d) Rate of contingency	0.05	
e) Other cost estimates	As given below	

Cost of US Training(per man)	\$
Prog fees(Specific course)	2750
Health Insurance	34
US Tax(20% of Per Diem)	24
Domestic Travel	300
Orientation(1 week)	325
Books & Shipment	120
Administration	240
Contingency	1000
Total \$	4793

Cost of Study tours(per man)	\$
Training Cost(Aver. for 15 days)	900
Health Insurance	34
Orientation	130
Domestic travel	1600
Administration	240
Contingency	500
Total \$	3404

Average tuition cost for 30 days is \$2100. Costing at \$2750 has been done since this will be a specific course on Energy audit

Cost of a 1 Day Workshop/seminar (Rupees) for 30 participants

HONORARIUM:4 guest speakers	4000
Travel of Guest speakers	15000
Study Material(@ Rs250)	7500
Rent of premises/Equipments	2000
Lunch/Tea etc (@ Rs.200)	7000
contingency	4500
	40000

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PFC COMPONENT : ASSUMPTIONS AND BACKUP DETAILS

	Total Participant	Duration (Weeks)	Unit Cost of Trng+FD (\$)	Total(\$)	HCC (\$)	Prj. Cost (\$)	Unit P/D (\$)	A I D	
								FX	LC
1. TECHNICAL & FINANCIAL TRAINING									
- Treasury Functions.-India	40	2	812	32,464	8,894	41,358	0		32,464
- U.S		3	7,493	299,720	133,341	433,061	2940	299,720	
- Fin.Oper. & Mgmt.- India	30	1	1,159	34,783	3,335	38,118	0		34,783
- U.S		3	4,099	122,983	100,006	222,989	2940	122,983	
- Financial Reports - India	30	2	812	24,348	6,671	31,018	0		24,348
- U.S		0	0	0	90,000	90,000	0	0	
- Prep of OFAFs - India	36	3	1,159	41,739	12,007	53,746	0		41,739
- U.S		3	9,343	336,348	120,007	456,355	2940	336,348	
- Plant Modernizatr - India	30	1	406	12,174	3,335	15,509	0		12,174
- U.S		3	9,343	280,290	100,006	380,296	2940	280,290	
- Plant life Extens - India	20	1	406	8,116	2,224	10,339	0		8,116
- U.S		3	9,343	186,860	66,671	253,531	2940	186,860	
- Loss Reduction - India	30	1	406	12,174	3,335	15,509	0		12,174
- U.S		3	9,343	280,290	100,006	380,296	2940	280,290	
- Systems Improvermt-India	16	1	406	6,493	1,779	8,272	0		6,493
- U.S		3	9,343	149,488	53,337	202,825	2940	149,488	
- Telecommunication -India	10	1	406	4,058	1,112	5,170	0		4,058
- U.S		3	9,343	93,430	33,335	126,765	2940	93,430	
- EnvironmentIssues -India	20	1	406	8,116	2,224	10,339	0		8,116
- U.S		3	9,343	186,860	66,671	253,531	2940	186,860	
- Simulator based trg -India	20	1	406	8,116	2,224	10,339	0		8,116
- U.S		3	9,343	186,860	66,671	253,531	2940	186,860	
- Economic Load Desp-India	15	1	406	6,087	1,668	7,755	0		6,087
- U.S		3	9,343	140,145	50,003	190,148	2940	140,145	
SUB TOTAL	161		102,868	2,461,940	1,028,860	3,490,800		2,263,274	198,667
2. Capital Improvement									
- Tech AppraisTechniq-India	60	1	1,386	83,148	6,671	89,818	980		83,148
- U.S		3	9,343	560,580	200,012	760,592	2940	560,580	
SUB TOTAL	60		10,729	643,728	206,683	850,410		560,580	83,148
3. Management Improvement									
- Project Preparation-India	30	1	406	12,174	3,335	15,509	0		12,174
- U.S		3	9,343	280,290	100,006	380,296	2940	280,290	
- Project Management-India	30	1	406	12,174	3,335	15,509	0		12,174
- U.S		3	9,343	280,290	100,006	380,296	2940	260,290	
- Project Monitoring-India	30	1	406	12,174	3,335	15,509	0		12,174
- U.S		3	9,343	280,290	100,006	380,296	2940	290,290	
- Corporate Planning-India	40	1	406	16,232	4,447	20,679	0		16,232
- U.S		2	8,363	334,520	128,894	463,414	1960	334,520	
- Other PFC Specific- India	30	1	406	12,174	3,335	15,509	0		12,174
a) Mgmt Training. - U.S		3	9,343	280,290	100,006	380,296	2940	280,290	
b) Training Advisory Services			0	185,000	301,449	486,449	0	185,000	0
c) Contracting Advisory Services			0	145,000	75,362	220,362	0	145,000	0
- Legal -India	5	2	812	4,058	1,112	5,170	0		4,058
SUB TOTAL	165		48,576	1,654,666	924,630	2,779,295		1,785,680	68,966

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FPC COMPONENT : ASSUMPTIONS AND BACKUP DETAILS

4. CELL FOR POWER STUDIES	Total Participant (Weeks) of Trng+PD	Hardware & Software	250,000	10,000	250,000	27,500	25,000	225,000	25,000	A I D	FX	LC	Total Unit Cost				
													Duration	Unit Cost	Total (\$)		
Information Dissemination/ Audio Visuals aid													800,000	446,377	1,246,377	400,000	400,000
5. TECHNICAL ASSISTANCE													1,075,000	458,877	1,533,877	650,000	425,000
SUB TOTAL													2,255,000	225,500	2,480,500	865,000	1,390,000
6. PRE INVESTMENT STUDIES													2,000,000	500,000	2,500,000	2,000,000	0
- TA for Survey & Investigation																	
- Small equipments to aid in surveys																	
- Training of Surveyors of SBBS																	
7. Demo Proj for Life Extn- Equipments													550,000	50,000	600,000	500,000	50,000
- Tech Assist.																	
SUB TOTAL													2,750,000	600,000	3,350,000	2,700,000	50,000
8. Formulation of Action Plan													33,500	0	33,500	33,500	0
(US TA for 8 weeks to assist FPC)																	
9. ADMINISTRATION													100,000	1,000	101,000	100,000	0
- Project Evaluation																	
- Honoraria of FPC Members																	
- Travel cost of FPC members																	
- Non Federal Audit																	
- Resource Co-ordinator																	
- Project Impl. Consortia																	
- FPC specific activities																	
- Project Administration													50,000	0	50,000	50,000	0
SUB TOTAL													1,344,935	474,449	1,819,384	1,189,000	155,935
TOTAL PROJECT COST													12,418,769	3,918,998	16,337,767	9,822,034	2,596,735
ADD: CONTINGENCY (5%)													620,938	195,950	816,888	491,102	129,837
: INFLATION													957,842	510,285	1,468,129	557,842	0
ADJUSTED PROJECT COST													13,997,550	4,625,234	18,622,784	11,270,978	2,726,572

PFC COMPONENT : ASSUMPTIONS AND BACKUP DETAILS

a) Cost of To/Fro Air fare	3000
b) Per Diem	140
c) Rate of conversion	17.25
d) Rate of Contingency	0.05
e) Estimates of consulting services are as per L&L report	
f) Estimates of the training as per discussion and estimates of PFC	
g) Estimates of Cell for Power Studies are as per L&L report	
h) Avg manday cost of PFC/SEB employee (Rs.75,000 pa/365 days)	16
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i)HCC for Power Cell: Salary of 10 men for 5 yrs	289,855
-----Off space @ 45/sqft for 5 yrs	156,522
Total (\$)	446,377

i)HCC for Prj IMPLIM. a) TRAINING DIV	
-----Salary of 5 men	144,928
- Off space @ 45/sqft for 5 yrs	156,522
	301,449

i)HCC for Prj ADMINISTb) PRJ MGMT TEAM .	
-----Salary of 5 men	144,928
- Off space @ 45/sqft for 5 yrs	156,522
	301,449

Cost of 30 day US Training (per man)\$		Cost of Training in India(Residential)	
		Rs	\$
Prog fees(Specific course)	2500	Prog fee for 7 day	7000
Health Insurance	34	Prog Fee for 14 days	14000
US Tax(20% of Per Diem)	24	Prog Fee for 21 days	20000
Domestic Travel	300		
Orientation(1 week)	325	RATIO OF TRG SCHEDULE 1990-91	0.00
Books & Shipment	120	-----1991-92	0.10
Administration	250	1992-93	0.30
Contingency	1000	1993-94	0.30
		1994-95	0.25
Total \$	4553	1995-96	0.05
			1.00
Prog Fee for Spec course (Incl site visits)	4350		
Add: as above	2053		
	6403		

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