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PRIVATE POWER DATABASE

COUNTRY PROFILE:

INDIA

A Report of:

Private Sector Energy Development Program
Office of Energy
Bureau for Science and Technology
United States Agency for International Development

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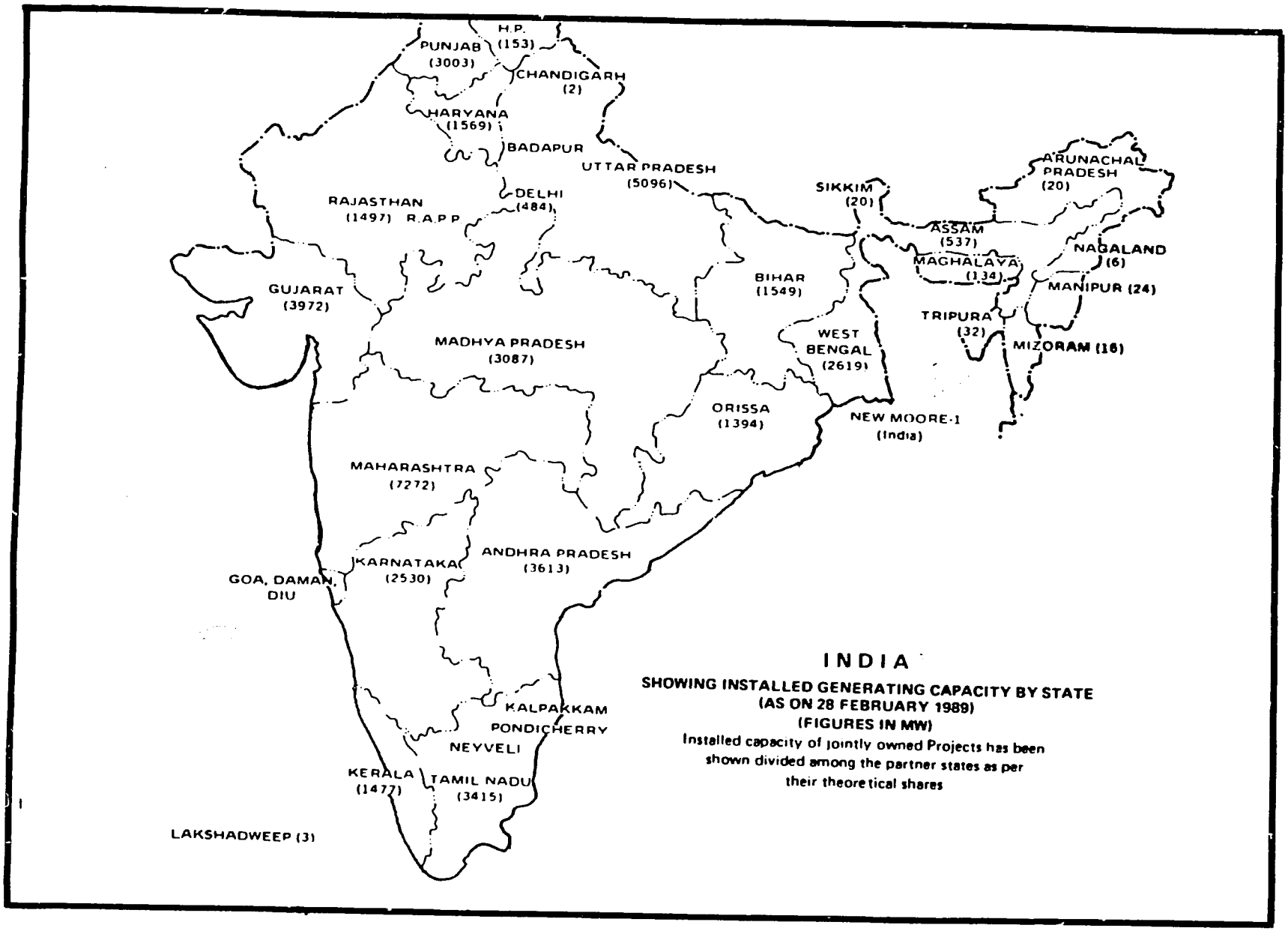

Source: Asian Development Bank

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INTRODUCTION

This country profile is one of a series of reports generated from the Private Power Database of the Agency for International Development (A.I.D.). Database country profiles are also available for the Dominican Republic, Pakistan, and the Philippines. The Private Power Database contains information on power sector developments in A.I.D.-assisted and other countries with private sector involvement or offer opportunity for private sector project development. The database covers government policies, cogeneration projects and opportunities, private power projects and opportunities, government contacts, equipment vendors, and program activities of international development organizations. It also contains a bibliography of private power publications. RCG/Hagler, Bailly, Inc. maintains the database under the A.I.D. Office of Energy's, Private Sector Energy Development Program.

Private Power Database Country Profile: India is divided into two parts. Part 1 provides a brief overview of the power sector in India and the status of private sector participation. Part 2, which begins with a glossary of terms to explain the terminology used in the printouts, contains the private power database printouts for India. It is divided into sections and contains database entries for India.

The information contained in this report is the product of research and data collection, principally from secondary sources. Limited access to data on private sector developments and the dynamic nature of these developments mean that the information contained in this report may not always reflect the most current private power developments. Therefore, readers are encouraged to contact individuals listed in the project profile or private power contacts listing for updates. The Agency for International Development and RCG/Hagler, Bailly make no claims as to the accuracy of the information.

For more information on private power developments, contact:

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PART 1: OVERVIEW OF THE POWER SECTOR

The following is a brief description of the power sector in India. It is intended to provide the reader with information on the current status and expected developments in the country, including electricity demand and supply, energy resources, and the status of private power.

BACKGROUND

India is the second largest country in Asia, next to China, in terms of both geographical area and population (870 million people in 1987). The official languages are Hindi and English. Development of the energy sector has been the most crucial element in the process of India's economic development, receiving high priority in the country's development plans since 1951. Per capita GDP was $290 in 1987. The per capita electricity generation was 215 kWh. The national currency is the Rupee. The average market exchange rate with the U.S. dollar over the period 1987 to 1989 is given in Exhibit 1.

Exhibit 1:

Rupee to U.S. Dollar Exchange Rate
(1987-1989)

	Rupee		U.S. Dollar
June 1987	Rs. 12.8	=	$1
June 1988	Rs. 13.4	=	$1
June 1989	Rs. 16.1	=	$1

Source: International Monetary Fund

Though the power sector receives 20-25% of total public investment, electricity supply has not kept pace with demand, and shortages have been prevalent throughout the country. Over the next decade, the power sector in India will require an investment of approximately $200 billion, of which the local component will be about 75%. The World Bank estimates that total investment in generation will be $117 billion; transmission, $19 billion; distribution, $51 billion; and general expenditures, $18 billion.

POWER SECTOR INSTITUTIONS

The power sector in India is a complex amalgam of federal, regional, and state authorities, as well as private interests, working together and individually to cure the chronic shortages of power supply. The principal institutions and their respective responsibilities are listed below.

- **Central Electricity Authority (CEA)**, which reports to the Department of Power within the Ministry of Energy, is jointly responsible (with the Planning Commission) for clearing all power project proposals. CEA is responsible for developing the national power policy and coordinating the various power sector agencies. CEA was created in 1950.

- **State Electricity Boards (SEBs)** were established following the 1948 Electricity Supply Act as financially autonomous corporations. They are responsible for all aspects of electricity supply, including regulation of private electricity licenses in their service areas. In states not yet serviced by an SEB, electricity supply is the responsibility of the Government Electricity Departments. There are 18 State Electricity Boards, 13 state/Union Territory Electricity Departments and one Municipal Corporation in the 25 states and 7 union territories of India.

- **Regional Electricity Boards (REBs)** are associations of SEBs and other power utilities in the respective regions and are responsible for creating and coordinating power pools in the respective regions. There are five REBs: Northern, Southern, Eastern, Western and North-Eastern Regional Board.

- **National Thermal Power Corporation (NTPC)** was created in the 1970s to achieve economies of scale through central generation and bulk sales to the SEBs for distribution. NTPC reports to the Department of Power.

- **National Hydro Power Corporation (NHPC)**, like NTPC, was created to construct large hydroelectric projects and reports to the Department of Power. NHPC has been far less successful in embarking on a large-scale construction program than NTPC.

- **Rural Electric Corporation (REC)** was established in 1969 and reports to the Department of Power and is responsible for rural electrification. REC has financed over 75% of all rural electrification projects.

- There are a number of other government entities involved in the various aspects of research, planning, policy development, financing and regulation. These include the Department of Power, Power Finance Corporation, Planning Commission, and Department of Non-Conventional Energy Sources.

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ELECTRICITY DEMAND

Over the past two decades, the consumption of electricity has grown approximately twice as fast as total commercial energy consumption and now accounts for more than 30% of the latter. Total electricity consumption in India, as measured by electricity sales, in 1987 was 136,081 gigawatt-hours (GWh). This does not account for consumption of industries that meet all or some of their own needs through self-generation. In 1986, self-generation, for industries with installed capacity of over 100 kilowatts (kW) was about 13,000 GWh.

Consumption has grown at an average annual rate of 8% over the last 20 years, although the increasing severity of shortages has shown that potential demand has grown even more rapidly. The Central Electricity Authority has forecast demand growth to be in the range of 9-10% per year between 1988 and 2000.

The principal sectoral shares of electricity consumption are: industrial (57%), agriculture (18%), and households (13%). The principal electricity consuming industries, in descending order, are textiles, iron and steel, fertilizers, aluminum, chemicals, and to a lesser extent, cement and paper. Agriculture's share has grown steadily due to increased use of electric irrigation pumping systems, which has been made possible by rural electrification and has been encouraged through heavy subsidies.

National averages for the country as a whole conceal wide regional differences in the size of annual and peak demand, in the proportions of industrial and agricultural demand, and per capita electricity usage. Variations are due to differences in economic growth and the location of electricity-intensive industries.

ELECTRICITY SUPPLY

The power sector has experienced rapid expansion during the past four decades. The installed capacity which stood at 1,360 MW, when the country gained independence in 1947, is now nearly 60,000 MW, sustaining a growth rate of 8.8% per year. Installed generation capacity is expected to reach nearly 160,000 MW by 1999, indicating an anticipated continuation of historical trends.

Roughly 95% of India's electricity supply capacity is publicly-owned. The bulk of this comes under State Electricity Boards (SEBs) serving the 22 states and Union Territories. The SEBs control 81% of total generation capacity. Of the remaining 14% of total capacity which is publicly-owned, 5-6% is owned jointly by SEBs and the central government, namely the National Thermal Power Corporation, National Hydro Power Corporation and the Department of Atomic Energy. The remaining 5% of total installed capacity is accounted for by three licensed private utilities serving Calcutta,

Bombay, and Ahmedabad, respectively, and a number of small municipal utilities which have survived successive organization changes since the 1948 Electricity Supply Act.

The composition of India installed generation capacity reflects its substantial hydro and coal resources. The existing power capacity is 30% hydro and 64% coal steam with some nuclear, gas combustion turbines and diesel units. The power expansion is based largely on hydro and coal, with increasing use of gas-fired combined-cycle units and sizeable expansion of nuclear capacity (see Exhibit 2).

Exhibit 2:

Installed Generation Capacity
1989 and 1999
(Megawatts)

	1989	1999	Increase (MW)	Increase (%)
Hydroelectric	18,000	55,200	37,200	207
Geothermal	0	0	0	0
Nuclear	1,800	9,330	7,530	418
Oil				
Steam	0	0	0	0
Combustion turbine	0	0	0	0
Combined cycle	0	0	0	0
Diesel	168	315	147	88
Natural Gas				
Steam	0	315	315	n.a.
Combustion turbine	1,181	1,306	125	11
Combined cycle	0	1,900	1,900	n.a.
Coal/lignite	38,000	90,400	52,400	168
Total Capacity	**59,149**	**158,766**	**99,617**	**168**

Source: World Bank

Self-generation provides a significant contribution to the total electricity supply in India. The total capacity in industry in 1986 was 5,419 MW, or about 11.6% of total utility capacity in that year. This does not include the contribution from small diesel generator sets of below 100 kW.

ENERGY RESOURCES

India's principal commercial energy resources consist of coal, oil, gas, hydro and nuclear energy. Of the non-renewable energy sources, coal, largely bituminous, is the most

abundant. Reserves of thermal coal are estimated at slightly more than 150 billion tons, of which 34 billion are proven. Although reserves are ample, the coal produced is generally of poor and deteriorating quality. The high ash content (up to 50%) increases the capital and operating costs of power stations and has exasperated problems of coal transport.

Proven and probable petroleum reserves consist of approximately 410 million tons of oil and 390 million tons of natural gas. Despite recent increases in domestic production, India still imports about one-third of its oil requirements. With domestic oil production likely to start declining towards the end of the decade, petroleum imports are expected to increase substantially in the late 1990s.

The Department of Atomic Energy has estimated uranium resources in India to be about 70,000 tons, the thermal reactor equivalent of about 1.9 billion tons of coal.

India's hydroelectric potential is equivalent to about 100,000 MW, or the annual equivalent of 472,000 GWh. At present 18,000 MW have been developed and another 23,000 MW are being studied for future development. However, development has been slow due to lack of financial resources in states with the greatest hydro potential, the time required to resolve water rights and environmental issues, and the limited technical resources available for the simultaneous preparation of a large number of hydro schemes.

India also has solar, wind and biomass resources which remain largely undeveloped. The Department of Non-Conventional Energy Sources (DNES) has demonstrated numerous renewable energy schemes including some systems that have been interconnected with the grid. Wind and biomass are seen as having the greatest near term potential.

STATUS OF PRIVATE POWER

Prior to 1947, the supply of power was a predominantly commercial venture undertaken by privately-owned utilities located in and around urban areas. The Indian Electricity Act of 1910 regulated the industry and protected consumer interests. Though modified over the years, the Act is still enforced. The Electricity Supply Act of 1948, following independence, was introduced providing for the creation of the State Electricity Boards and the Central Electricity Authority. Under the law, SEBs may enter into purchase agreements with private power producers. The rates are set by the SEB, although the Central government must still clear the project. In other cases, SEBs have allowed private utilities to be established for power supply and distribution (e.g., Ahmedabad).

The Industry Policy Resolution Act of 1956 is very clear in permitting special industries to install captive power plants to meet their own needs. In fact, by the end of the Eighth Development Plan (1995), energy-intensive industries such as aluminum, steel,

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refineries and fertilizers are expected to generation about 40% of the power they use through captive sources. All captive power schemes must be cleared by CEA.

Faced with power shortages and the growing need for capital investment in the power sector, the Central government began in 1988 to develop new policy guidelines encouraging private sector power generation. In July 1990, the Central Government introduced legislation that increases the attractiveness of private investment. During the Eighth Development Plan (1990-1995), the private sector is expected to install 5,000 MW of generation capacity in the country. While these policies are being finalized, a number of private or joint (public/private) sector schemes are moving forward.

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PART 2: PRIVATE POWER DATABASE PROFILES

The profiles contained in this section are printed directly from the U.S. Agency for International Development Office of Energy's Private Power Database. A *Glossary of Terms* is provided as a key to the terminology used in the database reports. The *Government Policies* section recounts policy developments relevant to private sector interests in the power sector and provides the legal and regulatory framework for private sector involvement. They cover power generation, power sales to the local utility, interaction with the grid, power purchase pricing, fuel use and price, foreign investment, importation of equipment, and environmental and/or safety standards. The *Private Power Projects* and *Cogeneration Projects* sections contain information on projects that have progressed to some stage of development, such as completion of a feasibility study, application for government clearance, the granting of a letter of intent, or the negotiation of a power purchase agreement with the utility. For both cogeneration and private power projects, an indication of the status of the project is given, i.e., inactive, active or operating. Depending upon a project's status, these sections identify markets for equipment vendors, engineering firms, financiers, and other project development services.

The *Private Power Opportunities* and *Cogeneration Opportunities* sections provide leads on prospective project development opportunities. Cogeneration and private power opportunities are potential projects for which little or no development has occurred. In many cases, there is only limited information available on the location, size and type of power system, since no commitment has been made to the project. The *Government Contacts* list provides names and addresses of key people in India to contact on private power issues and opportunities. The last section, the *Bibliography* contains an annotated list of relevant publications for additional reading on the subject of private power in developing countries.

The following terms are used in one or more of the private power database profiles. For each term, a brief definition is given and, where appropriate, an explanation of the various abbreviations used.

CAPACITY: Nameplate generating capacity of installation in megawatts (MW).

COMPANY: The name of the company sponsoring a cogeneration project.

CONNECTED TO THE GRID: Whether a project is currently or is expected to interconnect with the existing utility transmission system. "Y" - yes; "N" - no; and a blank indicates no interconnection information.

CONSULTANT: The consulting engineering company responsible for conducting the cogeneration or private power project feasibility study.

CONTACT: A point of contact for more information on a cogeneration or private power project.

DATE OF POLICY: The date a given private power policy was issued.

DATE UPDATED: The last date for which information was input into the private power database.

DESCRIPTION: Any information on the project technical details, the project sponsors, the project status, or any other pertinent details.

DESIGN DATE: The date on which the engineering design of a cogeneration or private power project was completed.

ELECTRICITY USAGE: The use of the electricity generated by a private power project (e.g., sell to the grid, self-use).

ENGINEERING FIRM: The company responsible for preparing the engineering design of a cogeneration or private power project.

EQUIPMENT TYPE: The specific power generating equipment which a vendor (see SUPPLIER) supplied to a cogeneration or private power project.

EXPECTED COMMISSIONING DATE: The date, past or expected, on which a cogeneration or private power project begins operations.

EXCHANGE RATE: The currency exchange rate between U.S. dollars and the local currency, including the year in which the exchange rate is given. The rate is based on the average market rate that year as published by the International Monetary Fund.

EXPORT EXCESS ELECTRICITY: Whether or not the project is designed to sell excess power to the grid. "Y" - yes ; "N" - no; and a blank space means no information.

FEASIBILITY STUDY DATE: The date of completion for a cogeneration or private power project feasibility study.

FUEL: The fuel(s) used in the power generating system (i.e., coal, oil, natural gas, diesel, wood, agricultural waste, solid waste, bio-methane, other biomass, waste heat, solar, wind, water, geothermal, ocean energy).

FUEL SUPPLY SOURCES: The source of fuel for the project if known. A blank indicates unknown source of fuel supply.

GOVERNMENT/UTILITY CLEARANCE: Any indication whether the local utility has given a private power project clearance to interconnect with the grid.

INTERCONNECTION ISSUES: Any details pertaining to the interconnection of the installation with the existing grid. A blank indicates no information is available.

LOCATION: The geographic location of the project, including distance to major cities.

MAIN FEATURES: The main provisions of a given private power policy.

NEW INSTALLATION/RETROFIT: "N" - New; "R" - Retrofit.

OWNERSHIP: Information on the rights to develop the site of a specific private power or cogeneration opportunity. This information is incorporated in the "description" of the database reports.

PROJECT COST: The installed cost of a cogeneration or private power project, including the currency and the year in which the cost is given. Costs are given in exponential terms (e.g., 5000 = 5E3), and are divided into foreign exchange and local currency components.

PROJECT FINANCING: Any details pertaining to the financing of the project, including cost estimates.

STATUS: Current status of a cogeneration or private power project. "INACTIVE", "ACTIVE" or "OPERATING" indicate inactive or discontinued development, active development, or operating, respectively.

SUPPLIER: The company responsible for supplying all or part of the power generating equipment used in a project (see EQUIPMENT TYPE).

TITLE: The title of a government policy (in English).

TYPE OF POLICY: The areas covered in a specific government policy. Options include power generation, power sales, interaction with the grid, power purchase pricing, fuel use/price, environment/safety, foreign investment and equipment import. "X" denotes the specific provisions covered under the policy; "-" indicates not covered.

TYPE OF PLANT: The type of industry and commercial operation at the site of the installation in a cogeneration project (e.g., oil refinery, sugar mill).

TYPE OF POWER SYSTEM: The technology employed in the power generating system (i.e., boiler/steam turbine, combined cycle, combustion turbine, diesel generator, hydroelectric, non-conventional).

USE OF HEAT: The application in which the thermal energy output of a cogeneration system is used (e.g., food processing, space heating).

UTILITY/OWNER AGREEMENT: "Y" - indicates that a power purchase agreement exists; "N" indicates that no agreement exists; a blank space indicates that there is no information as to the existence of such an agreement. The year in which a power purchase agreement was signed is listed as the "DATE".

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TITLE: Proposed Incentives for Private Power DATE OF POLICY: July 1990

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	X	EQUIPMENT IMPORT:	-
INTERACTION WITH THE GRID:	X	POWER PURCHASE PRICE:	X
FUEL USE/PRICE:	-	FOREIGN INVESTMENT/OWNERSHIP:	X

RESPONSIBLE ORGANIZATION: Central Government

OBJECTIVE:
To stimulate private investment in commercial power projects and accelerate the development of the power sector.

MAIN FEATURES:
The Central Government introduced a series of incentives that increase the attractiveness of private sector investment in power projects. The main features include: 1) a debt to equity ration of 4:1; 2) incease in the prescribed rate of return from 2% to 5% above Reserve Bank of India (RBI) rate, which is currently 10%; 3) capitalization of interest during construction at the actural cost instead of the current 1% above RBI rate; 4) initial licence period extended from 20 to 30 years with subsequent extension of 20 years; 5) maximum of 40% of project funds can come from public financial institutions; 6) sponsors must provide a minimum of 11% of project funds; 7) sale of power to State Electricity Boards based on two-part tariff; and 8) higher rate of depreciation to be notified by the Central Government. A high powered board, including secretaries of concerned ministries and departments in central government and senior stff officials of state governments, will be set up for single point clearance of foreign investment proposals for the power sector. A special cell will also be set up for single point clearance of foreign investment proposals for the power sector. A special cell will also be created in the Department of Power in New Delhi to deal with proposals for private sector participation quickly. The government brought a bill before the parliament in July for necessary changes in the Electricity Supply Act to activate the private sector. It will also include an increase in threshold limit for required approval from Central Electricity Authority from Rs 50 million ($US 2.9 million) to Rs. 250 million ($US 14.5 million).

DATE UPDATED: 06/21/90

TITLE: Bihar State Government Policy Statement DATE OF POLICY: 11/17/80

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	-	EQUIPMENT IMPORT:	-
INTERACTION WITH THE GRID:	-	POWER PURCHASE PRICE:	-
FUEL USE/PRICE:	-	FOREIGN INVESTMENT/OWNERSHIP:	-

RESPONSIBLE ORGANIZATION: Bihar State Government

OBJECTIVE:
The Bihar Government stated its interest in stimulating private power activities in the industrial sector.

MAIN FEATURES:
The Government would like to pursue power generation projects in the private sector with industrial entities that have established "high performance in the sphere of power generation."

DATE UPDATED: 05/25/89

TITLE: Electricity Supply Act DATE OF POLICY: 1948

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	X	EQUIPMENT IMPORT:	X
INTERACTION WITH THE GRID:	X	POWER PURCHASE PRICE:	X
FUEL USE/PRICE:	X	FOREIGN INVESTMENT/OWNERSHIP:	-

RESPONSIBLE ORGANIZATION: Government of India

OBJECTIVE:
The law was designed to provide for the rationalization of the production and supply of electricity, and generally for taking measures conducive to electric power development in India.

MAIN FEATURES:
The law authorizes the State Electricity Boards (SEBs) to enter into arrangements for purchase or sale of electricity under certain conditions. The law also allows private entities to generate and distribute power in certain areas under contract to the SEBs. All private generation, transmission or distribution companies are required to have a license from the Central Electricity Authority.

DATE UPDATED: 01/15/88

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TITLE: Industry Policy Resolution Act

DATE OF POLICY: 1956

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	-	EQUIPMENT IMPORT:	-
INTERACTION WITH THE GRID:	-	POWER PURCHASE PRICE:	-
FUEL USE/PRICE:	-	FOREIGN INVESTMENT/OWNERSHIP:	-

RESPONSIBLE ORGANIZATION: Government of India

OBJECTIVE:
To permit industrial self-generation.

MAIN FEATURES:
The law allows certain energy-intensive industries to install captive power plants. Captive power generation is the production of electricity by a non-utility entity for its own use with no sales to the grid.

DATE UPDATED: 02/15/88

TITLE: Maharashtra State Government Policy Statement

DATE OF POLICY: 03/29/89

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	-	EQUIPMENT IMPORT:	-
INTERACTION WITH THE GRID:	-	POWER PURCHASE PRICE:	-
FUEL USE/PRICE:	-	FOREIGN INVESTMENT/OWNERSHIP:	-

RESPONSIBLE ORGANIZATION: Maharashtra State Government

OBJECTIVE:
The private sector is allowed to undertake public works projects such as construction of roads and bridges and setting up power projects.

MAIN FEATURES:
The private sector would be allowed to run and manage a project until the investment is recovered fully, at which point the ownership would be transfered to the State Government. The Maharashtra State Government has initially identified three power projects for private sector undertaking: a 500 MW plant at Chandrapur and two 210 MW units at Khapirkheda near Nagpur.

DATE UPDATED: 04/18/89

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TITLE: Memorandum of Understanding (MOU) DATE OF POLICY: 01/01/88

TYPE OF POLICY:

POWER GENERATION:	X	ENVIRONMENT/SAFETY:	-
POWER SALE:	-	EQUIPMENT IMPORT:	-
INTERACTION WITH THE GRID:	-	POWER PURCHASE PRICE:	-
FUEL USE/PRICE:	-	FOREIGN INVESTMENT/OWNERSHIP:	-

RESPONSIBLE ORGANIZATION: Government of India

OBJECTIVE:
The objective of the Memorandum of Understanding (MOU) is to enable the the Board of Directors of the National Thermal Power Corporation (NTPC) to approve power projects that had previously required the approval of the Public Investment Board (PIB).

MAIN FEATURES:
The MOU gives NTPC the authority to pursue power projects costing up to Rs. 50 crore (approximately $30 million) without government approval. Previously, all projects exceeding Rs. 20 crore required PIB clearance, subject to their being covered in the approved government budget.

DATE UPDATED: 02/24/88

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PROJECT NAME: Ahmedabad Electricity Co. Steam Plant

LOCATION: Sabarmati, Ahmedabad (Gujarat)
CONTACT: Udaya K. Sheth, General Manager, Ahmedabad Electricity Company
STATUS: OPERATING

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 110.	PROJECT COST (1988) IN Rs. : 1.4E12
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER: BHEL (India)
UTILITY: Ahmedabad Elect. Co.	

EXPECTED COMMISSIONING DATE: September 1988

DESCRIPTION:
This 110 MW coal-fired power project began operating in September 1988. Ahmedabad Electricity Co. (AEC) is a private utility operating under licence to serve Ahmedabad City. AEC's present installed capacity is 510 MW (including this 110 MW power plant).

DATE UPDATED: 03/27/90

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PROJECT NAME: Hindalco Project

LOCATION: Renukot, Uttar Pradesh
CONTACT: Bhupal Singh, U.P. Electricity Board, Lucknow (U.P.)
STATUS: OPERATING

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 405.	PROJECT COST (19) IN :
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (19): U.S. $1.00 =

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE: Boilers/turbines
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER: BHEL
UTILITY: Uttar Pradesh St. El. B	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
Hindalco is a private company set up to manufacture aluminum. The project has 5 units of 67.5 MW each operating, selling excess power to Uttar Pradesh State Electricity Board. A sixth unit is being proposed.

DATE UPDATED: 03/29/90

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PROJECT NAME: Indian Charge Chrome, Ltd. Plant

LOCATION: Chaudwar, Orissa
CONTACT: Mr. B. Panda, Indian Charge Chrome Ltd., Chardwar Orissa
STATUS: OPERATING

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 108.	PROJECT COST (1989) IN Rs. : 1.7E9
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (1989): U.S. $1.00 = 16.05

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE: Boiler and turbines
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER: Asea Brown Boveri
UTILITY: Orissa SEB	

EXPECTED COMMISSIONING DATE: February, 1989

DESCRIPTION:
The 108 MW (2 X 54 MW) plant is operated to meet the captive power needs of the Indian Charge Chrome, Ltd. (ICC). Surplus power is supplied to a INFA, an ICC affiliate, using the Orissa State Electricity Board (OSEB) grid. Wheeling charges are paid to OSEB.

DATE UPDATED: 03/01/89

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PROJECT NAME: Mandavi Wind Farm

LOCATION: Mandavi, Distt. Katch, Gujarat
CONTACT: J.S. Aiyar, Gujarat State Electricity Board
STATUS: OPERATING

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 1.1	PROJECT COST (1985) IN Rs. : 3.E6
TYPE OF POWER PLANT: Non-conventional	FOREIGN EXCHANGE COST:
FUEL: Wind	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (1985): U.S. $1.00 = 12.8

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM: Micon (Denmark)
CONSULTANT:	EQUIPMENT TYPE: Horizontal axis (50 kW)
UTILITY/OWNER AGREEMENT: (Y) DATE: 1985	SUPPLIER: Micon
UTILITY: Gujarat SEB	

EXPECTED COMMISSIONING DATE: 1985

DESCRIPTION:
The 1.1 MW project consists of 22 X 50 kW wind turbines. This wind farm has been under operation since late 1985. Gujarat State Elelctricity Board purchases the power at a rate equivalent to 10 cents/kWh. Gujarat Wind Farm Ltd. (GWF), a joint sector company of Western India Industries Ltd. (private), the GSEB and the Gujarat Industrial Investment Corporation Ltd., is the sponsor of this project.

DATE UPDATED: 07/19/88

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PROJECT NAME: Gujarat Solar Power Project

LOCATION: Gujarat Province
CONTACT: Mr. L.M. Thapar, Ballarpur Industries, Ltd., Chandigarth
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 30.	PROJECT COST (1988) IN Rs. : 1.E9
TYPE OF POWER PLANT: Non-conventional	FOREIGN EXCHANGE COST: 7.E8
FUEL: Solar/coal	DOMESTIC CURRENCY COST: 3.E8
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE: 1988	ENGINEERING FIRM:
CONSULTANT: LUZ Internat. (USA)	EQUIPMENT TYPE: Solar collectors
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER: LUZ Internat. (USA)
UTILITY: Gujarat St. Elect. Bd.	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
LUZ International (USA), in conjunction with Ballapur Industries, Ltd. (India), has proposed to build and operate a 30 MW solar thermal power station. The system will rely on parabolic trough collectors during the day and a coal-fired boiler during the night to supply steam to a turbine. The Gujarat Non-Conventional Energy Development Agency and the Department of Non-Conventional Energy Sources (DNES) may provide financial assistance. The proposal is awaiting clearance from the Central Electricity Authority. Two other similar projects have been proposed for Punjab and Rajasthan.

DATE UPDATED: 07/01/89

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PROJECT NAME: Punjab Solar Power Project

LOCATION: Punjab Province
CONTACT: Mr. L.M. Thapar, Ballarpur Industries, Ltd., Chandigarth
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 30.	PROJECT COST (1988) IN Rs. : 1.E9
TYPE OF POWER PLANT: Non-conventional	FOREIGN EXCHANGE COST: 7.E8
FUEL: Solar/coal	DOMESTIC CURRENCY COST: 3.E8
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE: 1988	ENGINEERING FIRM:
CONSULTANT: LUZ Internat. (USA)	EQUIPMENT TYPE: Solar collectors
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER: LUZ Internat. (USA)
UTILITY: Punjab St. Elect. Bd.	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
LUZ International (USA), in conjunction with Ballapur Industries, Ltd. (India), has proposed to build and operate a 30 MW solar thermal power station. The system will rely on parabolic trough collectors during the day and a coal-fired boiler during the night to supply steam to a turbine. Punjab Agro Industries Corporation is considering providing equity to the project. The Department of Non-Conventional Energy Sources (DNES) may provide financial assistance. The proposal is awaiting clearance from the Central Electricity Authority. Two other similar projects have been proposed for Gujarat and Rajasthan.

DATE UPDATED: 07/01/89

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PROJECT NAME: Trombay Unit - 6

LOCATION: Trombay, Bombay
CONTACT: Tata Electric Companies, Support Services Centre, Champur (Bombay)
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 500.	PROJECT COST (1988) IN Rs. : 6.E9
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal/natural gas	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM: Tata Electricity Company
CONSULTANT:	EQUIPMENT TYPE: BHEL
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER: BHEL
UTILITY: Maharashtra SEB	

EXPECTED COMMISSIONING DATE: 1990

DESCRIPTION:
Tata Electric Company (TEC) has started construction on this 500 MW power plant. TEC is India's largest private utility. It generates power and supplies it at high and medium voltage to large customers and to the Maharashtra State Electricity Board (MSEB). The Government of India has given TEC clearance to construct the project. TEC has current thermal capacity of 837.5 MW and hydroelectric capacity of 276 MW.

DATE UPDATED: 07/01/89

PROJECT NAME: Rajasthan Solar Power Project

LOCATION: Rajasthan Province
CONTACT: Mr. L.M. Thapar, Ballarpur Industries, Ltd., Chandigarth
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 30.	PROJECT COST (1988) IN Rs. : 1.E9
TYPE OF POWER PLANT: Non-conventional	FOREIGN EXCHANGE COST: 7.E8
FUEL: Solar	DOMESTIC CURRENCY COST: 3.E8
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE: 1988	ENGINEERING FIRM:
CONSULTANT: LUZ Internat. (USA)	EQUIPMENT TYPE: Solar collectors
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER: LUZ Internat. (USA)
UTILITY: Rajasthan St. Elec. Bd.	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
LUZ International (USA), in conjunction with Ballapur Industries, Ltd., has proposed to build and operate a 30 MW solar thermal power station, using parabolic trough collectors to supply steam to a turbine. The Rajasthan Non-Conventional Energy Development Agency and the central government Department of Non-Conventional Energy Sources (DNES) may provide financial assistance. The proposal is awaiting clearance from the Central Electricity Authority. Two other similar projects have been proposed for Gujarat and Punjab.

DATE UPDATED: 07/01/89

PROJECT NAME: Andhra Pradesh Gas Turbine Plant

LOCATION: Vijjeswram, AP
CONTACT: T.L. Sankar, A.P. State Electricity Board, Hyderabad
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 90.	PROJECT COST (19) IN :
TYPE OF POWER PLANT: Combined cycle	FOREIGN EXCHANGE COST:
FUEL: Natural gas	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (19): U.S. $1.00 =

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE: Gas Turbine
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER:
UTILITY: Andhra Pradesh SEB	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
Andhra Pradesh Gas Power Corporation Ltd. (APGPCL), a joint venture company, was set up in October 1988 by the Andhra Pradesh State Electricity Board (APSEB), the Andhra Sugars Ltd., Shri Vishnu Cement Ltd., Nava Bharat Ferro Alloys Ltd., VBC Ferro Alloys Ltd., Mishra Dhatu Nigom Ltd., Panyam Cement & Minerals Ltd., and various other medium and large scale industries in Andhra Pradesh. The APSEB will have a maximum share of 26%. APGPCL has proposed to build and operate a 90 MW (3x30 MW) combined cycle gas power plant. The electricity generated would be shared between the participating industries and APSEB in proportion to their share. The APGPCL is waiting for a formal Central Government clearance to begin development.

DATE UPDATED: 02/06/89

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PROJECT NAME: AEC Combined Cycle Project

LOCATION: Ahmadebad, Gujarat
CONTACT: Damian Damanos, IFC, Washington, D.C.
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 105.	PROJECT COST (1989) IN $US : 8.3E7
TYPE OF POWER PLANT: Combined-cycle	FOREIGN EXCHANGE COST:
FUEL: Natural gas	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1989): U.S. $1.00 = 16.1

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE: Combustion turbines
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER: BHEL
UTILITY: Ahmadebad Electric Co.	

EXPECTED COMMISSIONING DATE: 1990/1991

DESCRIPTION:
Ahmadebad Electric Co., Ltd. is a private utility operating in Gujarat. The International Finance Corp. (IFC) has approved a $20 million loan to AEC to construct and operate a 105 MW combined-cycle power plant. The primary cycle gas turbines (2 X 35 MW) will begin operation in late 1990. The second cycle steam turbines (35 MW) will begin operation in 1992.

DATE UPDATED: 12/27/89

PROJECT NAME: National Dairy Development Board Project

LOCATION: Samarka Village, Kheda District, Gujarat
CONTACT: Mr. V. Kurien, Chief, National Dairy Development Board, Anand, Gujarat
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 236.	PROJECT COST (1989) IN $US : 3.1E8
TYPE OF POWER PLANT: Combined cycle	FOREIGN EXCHANGE COST:
FUEL: Natural gas	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1989): U.S. $1.00 = 16.1

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: (Y) DATE:	SUPPLIER:
UTILITY: Gujarat State Electricity Board	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
The 236 MW project will include six gas turbines. The plan also includes further expansion to 489 MW in two stages by the year 2000.

DATE UPDATED: 08/02/89

31

PROJECT NAME: CESC Southern Generating Station

LOCATION: Calcutta (West Bengal)
CONTACT: C. Das Gupta, CECS Ltd., Victoria House, Calcutta - 700001
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 135.	PROJECT COST (1989) IN Rs. : 2.11E9
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1989): U.S. $1.00 = 16.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER: BHEL, Trichy/Hyderabad
UTILITY: Calcutta Elec. Supp. Co	

EXPECTED COMMISSIONING DATE: December 1990

DESCRIPTION:
The 2 x 67.5 MW (135 MW) project is currently under construction. Unit 1 will be commissioned in December 1990, Unit 2 will be commissioned in 1991. Calcutta Electricity Supply Co., Ltd. (CESC) is a private utility operating in Calcutta (West Bengal). CESC's present installed capacity is 320 MW.

DATE UPDATED: 06/18/90

PROJECT NAME: Punjab Rice Husk Project

LOCATION: Jalkheri Village, Patiala District
CONTACT: N.S. Vasant, Punjab State Electricity Board, Patiala, Punjab
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 10.	PROJECT COST (1989) IN Rs. : 3.5E8
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Ag. waste	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1989): U.S. $1.00 = 16.1

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER:
UTILITY:	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
The project will use 70,000 tons of rice residues annually, and is estimated to generate 62 million kWh per year.

DATE UPDATED: 07/01/89

22

PROJECT NAME: Delhi Waste Incineration Project

LOCATION: Delhi
CONTACT: V.K. Gupta, General Manager Energy and Environment Division
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 4.	PROJECT COST (1987) IN Rs. : 1.7E8
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Solid waste	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1987): U.S. $1.00 = 16.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM: J.K. Synthetics
CONSULTANT:	EQUIPMENT TYPE: Boiler/steam turbine
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER: VOLVUND, J.K. Syn.
UTILITY:	

EXPECTED COMMISSIONING DATE: 1897

DESCRIPTION:
This plant was commissioned in 1967.

DATE UPDATED: 03/25/88

PROJECT NAME: CECS Budge Budge Power Project

LOCATION: Budge Budge, Southwest Calcutta (West Bengal)
CONTACT: C. Das Gupta, CECS Ltd., Victoria House, Calcutta - 700001
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 500.	PROJECT COST (1989) IN Rs. :
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL:	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1989): U.S. $1.00 = 16.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER:
UTILITY: Calcutta Elec. Supp. Co	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
Calcutta Electricity Supply Co., Ltd. (CESC) is a private utility operating in Calcutta (West Bengal). CESC's present installed capacity is 320 MW. Any surplus power from the project will be sold to the West Bengal State Electricity Board at a special concessional rate so that the SEB does not incure a loss in sales to subsidized rural customers. The project is awaiting clearance from the Central Electricity Authority, Department of the Environment, and the West Bengal government.

DATE UPDATED: 08/01/89

PROJECT NAME: Bombay Suburban Electric Supply Ltd. (BSES)

LOCATION: Dahanu, 75 miles north of Bombay
CONTACT: Shri M.L. Shishoo, Chairman & Managing Director, BSES, Bombay
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 500.	PROJECT COST (1988) IN Rs. : 6.E9
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER:
UTILITY: Marahashtra SEB	

EXPECTED COMMISSIONING DATE: 1994-1995

DESCRIPTION:
The Bombay Suburban Electric Supply Company, a private distribution company in Maharashtra which was established in 1929, has been given clearance by the Central Electricity Authority and the Department of Power to build its first generation unit, a 500 MW (2 X 250 MW) power plant, that will supply electricity to the Maharashtra State Electricity Board (MSEB). The project will use 5,000 tons of Orissa coal per day. The proposal envisions possible expansion to 1,000 MW at the same site. There has been some local resistance by environmentalists to the project. The World Bank is considering partial financing of the project.

DATE UPDATED: 07/15/89

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PROJECT NAME: PRME Rice Residue Project

LOCATION: Khanna, Punjab Province
CONTACT: Ron Bailly, PRM Energy Systems, Stuttgart, Arkansas
STATUS: ACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 3.	PROJECT COST (1989) IN $US : 7.E6
TYPE OF POWER PLANT: Boiler/Steam turbine	FOREIGN EXCHANGE COST:
FUEL: Ag. waste	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID: Y	EXCHANGE RATE (1989): U.S. $1.00 = 16.1

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM: ICB (India)
CONSULTANT:	EQUIPMENT TYPE: Boiler
UTILITY/OWNER AGREEMENT: (Y) DATE: 08/89	SUPPLIER: PRM Energy Systems
UTILITY: Punjab SEB	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
Punjab Agro Industries Corp. of Chandigarth, India has issued a Letter of Intent to PRM Energy Systems (PRME) for the purchase of a $7 million rice residue-fired energy center in Khanna, India. The project will be implemented by a joint venture corporation comprised of PRME, Punjab Agro Industrics and ICB (an Indian engineering/construction firm). PRME India, the joint venture company, has power purchase agreements with both the Haryana and Punjab State Electricity Boards to buy the output at Rp. 1.2 ($US 0.075) per kilowatt hour. An initial commitment has been made to construct a 3 MW facility at Khanna. The project is awaiting financial commitments from lenders and investors. PRME India has plans to construct up to three hundred 3 MW centers in Punjab and Haryana over the next 10 years with a combined capacity of 900 MW.

DATE UPDATED: 12/27/89

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PROJECT NAME: Faridabad Industries Power Project

LOCATION: Faridabad, Haryana
CONTACT: Ram S. Verma, HSEB, Chandigarh
STATUS: INACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 100.	PROJECT COST (1988) IN Rs. : 1.E9
TYPE OF POWER PLANT: Diesel generator	FOREIGN EXCHANGE COST:
FUEL: Oil	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 15.

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: (Y) DATE: 06/14/88	SUPPLIER:
UTILITY: Haryana SEB	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
The Faridabad Industrial Association (FIA) proposed the development of the 100 MW power plant. FIA set up a public limited company, the Faridabad Captive Power Systems Ltd. (FCPS), made up of member industries interested in investing in the project. On June 14, 1988, FCPS reached an agreement with the Haryana State Electricity Board (HSEB) to generate and distribute electricity to its member owners through HSEB transmission lines. Under the agreement, HSEB will keep 10 percent of the electricity generated by the plant on a yearly basis in lieu of wheeling charges. FCPS is currently negotiating with turnkey contractors and is finalizing the financial arrangements for this project. All central government permits and licenses required for fuel supplies, pollution, and power plant construction have been granted. With expected power supply improvement in Haryana, some of the project sponsors are hesitating to invest their capital in a power generation project.

DATE UPDATED: 03/20/90

PROJECT NAME: TIDCO Power Projects

LOCATION: Cuddallore, Tamil Nadu
CONTACT: Mrs. S. Sampath, Chariperson, TIDCO, Madras
STATUS: INACTIVE

TECHNICAL DETAILS	FINANCIAL DETAILS
CAPACITY (MW): 210.	PROJECT COST (1988) IN US : 1.25E8
TYPE OF POWER PLANT: Boiler/steam turbine	FOREIGN EXCHANGE COST:
FUEL: Coal	DOMESTIC CURRENCY COST:
SYNCHRONIZED WITH THE GRID:	EXCHANGE RATE (1988): U.S. $1.00 = 13.4

PROJECT DEVELOPMENT INFORMATION

PROPOSAL DATE:	DESIGN DATE:
FEASIBILITY STUDY DATE:	ENGINEERING FIRM:
CONSULTANT:	EQUIPMENT TYPE:
UTILITY/OWNER AGREEMENT: ( ) DATE:	SUPPLIER:
UTIL'TY:	

EXPECTED COMMISSIONING DATE:

DESCRIPTION:
The project is estimated to cost Rs. 2 billion (US $125 million). Under the proposed financing arrangement Rs. 550 million or 27.5% would be equity (Rs. 350 million would come from Tidco; Rs. 200 million from Essar) and Rs. 450 from public sources. The remaining funds, Rs. 1 billion (50%), would be borrowed.

DATE UPDATED: 02/23/88

PROJECT NAME: Century Textiles Project

LOCATION: Rajasthan
STATUS: ACTIVE
CONTACT: Century Textiles

CAPACITY (MW):	FUEL:
POWER SYSTEM:	FUEL SOURCES:

ELECTRICITY USAGE:
GOVERNMENT/UTILITY CLEARANCE:
OWNERSHIP:
PROJECT COST/FINANCING:
Estimated cost is RS. 605 crores (US $400 million)

DESCRIPTION:
The Rajasthan State Government has issued a licence to Century Textiles and Industries to construct a power plant.

DATE UPDATED: 07/11/89

PROJECT NAME: Goenka Thermal Project

LOCATION: Bihar
STATUS: ACTIVE
CONTACT: R.P. Goenka Group

CAPACITY (MW): 500.	FUEL:
POWER SYSTEM: R.P. Goenka Gorup	FUEL SOURCES:

ELECTRICITY USAGE:
GOVERNMENT/UTILITY CLEARANCE:
OWNERSHIP:
PROJECT COST/FINANCING:
The project sponsors have estimated the cost to be Rs. 10,000 million (U.S. $570 million).

DESCRIPTION:
R.P. Goenka Group, the noted industrialist, has proposed to build and operate a 500 MW (2 X 250 MW) thermal power plant in Bihar.

DATE UPDATED: 08/02/90

PROJECT NAME: Mangalore Thermal Project

LOCATION: Mangalore, Karnataka
STATUS: ACTIVE
CONTACT:

CAPACITY (MW): 840.	FUEL:
POWER SYSTEM: Boiler/steam turbine	FUEL SOURCES:

ELECTRICITY USAGE:
GOVERNMENT/UTILITY CLEARANCE:
OWNERSHIP: Joint ownership: NRI Capital Corp. and Karnataka State Government.
PROJECT COST/FINANCING:

DESCRIPTION:
The Tata Consultancy Service (TCS) has been commissioned to conduct a detailed project report on the technical and economic feasibility study for the first two units of this project which were proposed by the NRI (Non-Resident Indian) Capital Corporation in collaboration with the government of Karnataka. Final clearance for this project has not been granted.

DATE UPDATED: 07/25/88

PROJECT NAME: Amul Dairy Cogeneration Plant

COMPANY: Amul Dairy
CONTACT: Daniel J. Marinacci, Manager, O'Brien Machinery
TYPE OF PLANT:
LOCATION: Anand
STATUS: Operating

CAPACITY (MW): 10.	PROJECT COST (19 IN):
POWER SYSTEM: Combustion turbine	FOREIGN EXCHANGE:
FUEL: Natural gas	DOMESTIC CURRENCY:
USE OF HEAT: Food processing	EXCHANGE RATE (19): US $1.00 =
HEATING MEDIUM: Steam	
CONNECTED TO THE GRID: Y	
EXPORT EXCESS ELECTRICITY: Y	

PROJECT DEVELOPMENT STATUS:

FEASIBILITY STUDY DATE:	DESIGN DATE:
CONSULTANT:	ENGINEERING FIRM:
UTILITY/OWNER AGREEMENT (Y) DATE:	EQUIPMENT TYPE: Kongsberg KG2-3C
UTILITY: Gujarat SEB	SUPPLIER: O'Brien Machinery

EXPECTED COMMISSIONING DATE: August 1988

DESCRIPTION:

The Prudential Leasing Company has built and now operates the 10 MW (2X5 MW) gas turbine project at the Amul Dairy to provide electricity and steam to the dairy and sell the excess electricity to the Gujarat State Electricity Board. Two dual-fuel gas turbine generator sets were supplied by O'Brien Machinery to the food processing plant in Anand, India. The system supplies 3 MW of electricity to the Amul Dairy, India's largest food producer. The remaining 7MW is sold to the grid. Natural gas from a local gas field is the primary fuel.

DATE UPDATED: 01/04/89

PROJECT NAME: Baroda Rayon Corporation Cogeneration Project

LOCATION: Surat, Gujarat
CONTACT:
TYPE OF PLANT: Rayon plant
TYPE OF SYSTEM: Boiler/steam turbine

NEW INSTALLATION/RETROFIT: N	USE OF HEAT:
CAPACITY (MW): 10.	CONNECTED TO THE GRID:
FUEL: Coal	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No information available

PROJECT FINANCING: No information available

DESCRIPTION:
Baroda Rayon (India) has a 3 MW cogeneration system sychronized to the grid. The company is considering adding a 10 MW (2 X 5 MW) fluidized bed combustion boiler system.

DATE UPDATED: 02/23/88

PROJECT NAME: Gujarat Heavy Chemicals Cogeneration Project

LOCATION: Veraval, Gujarat
CONTACT:
TYPE OF PLANT: Chemicals
TYPE OF SYSTEM: Boiler/steam turbine.

NEW INSTALLATION/RETROFIT: R	USE OF HEAT:
CAPACITY (MW): 22.	CONNECTED TO THE GRID:
FUEL: Coal	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No development

PROJECT FINANCING: No development

DESCRIPTION:
This 22 MW project is not yet commissioned. Bharat Heavy Electricals Ltd. (BHEL) has expressed an interest in supplying the equipment.

DATE UPDATED: 02/23/88

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PROJECT NAME: IPCL Baroda Cogeneration Project

LOCATION: Baroda
CONTACT: Mr. S. Ganguli, Chairman, IPCL
TYPE OF PLANT:
TYPE OF SYSTEM: Diesel generator

NEW INSTALLATION/RETROFIT: R	USE OF HEAT:
CAPACITY (MW): 72.	CONNECTED TO THE GRID:
FUEL: Oil	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No development

PROJECT FINANCING: No development

DESCRIPTION:
IPCL has proposed to build a 72 MW diesel cogeneration plant. IPCL Baroda currently has a 56 MW (2 X 28 MW) conventional steam system and a 30 MW (2 X 15 MW) cogeneration system synchronized with the grid.

DATE UPDATED: 02/23/88

PROJECT NAME: Nepa Mills Cogeneration Project

LOCATION: Nepa Ngar, Distt. Khandwa Madhya
CONTACT: V.C. Arzare, General Manager.
TYPE OF PLANT: Paper mill
TYPE OF SYSTEM: Boiler/steam turbine

NEW INSTALLATION/RETROFIT:	USE OF HEAT: Process steam
CAPACITY (MW): 10.	CONNECTED TO THE GRID:
FUEL: Coal	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No development

PROJECT FINANCING: No development

DESCRIPTION:
Nepa Mills has solicited bids for power supply equipment.

DATE UPDATED: 02/23/88

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PROJECT NAME: Oswal Agro Furnane Cogeneration Project

LOCATION: Ludhiana, Punjab
CONTACT: Adhai Oswal, Chairman, Oswal Agro Furnane Ltd.
TYPE OF PLANT: Organic chemicals
TYPE OF SYSTEM: Boiler/steam turbine

NEW INSTALLATION/RETROFIT: N	USE OF HEAT:
CAPACITY (MW): 4.	CONNECTED TO THE GRID:
FUEL: Ag. waste	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No development

PROJECT FINANCING: No development

DESCRIPTION:
This proposed project will be utilized for the production of rice based organic chemicals.

DATE UPDATED: 02/24/88

PROJECT NAME: Reliance Industries Cogeneration Project

LOCATION: Ahmedabad
CONTACT: Mr. D.H. Ambani, Managing Director, Reliance Industries Ltd., Ahmedabad
TYPE OF PLANT:
TYPE OF SYSTEM: Combustion turbine

NEW INSTALLATION/RETROFIT:	USE OF HEAT:
CAPACITY (MW): 10.	CONNECTED TO THE GRID:
FUEL: Natural gas	EXPORT EXCESS ELECTRICITY :

INTERCONNECTION ISSUES: No development

PROJECT FINANCING: No development

DESCRIPTION:
Reliance Industries Ltd. (India) is considering a 10 MW (2 X 5 MW) project at its operations in Ahmedabad.

DATE UPDATED: 02/23/88

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TITLE: Cogeneration in Developing Countries

AUTHOR:

CORPORATE AUTHOR: RCG/Hagler, Bailly, Inc.
SPONSOR: A.I.D./Office of Energy
PUBLISHER: Energy Conservation Services Program
PUBLICATION DATE: May 1986
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
This report analyzes the prospects and problems of cogeneration as an alternative power supply and energy conservation scheme in developing countries. The report first estimates the cogeneration potential in selected A.I.D.-assisted countries; reviews the involvement of international development organizations, and American manufacturers; and discusses the economic, technical, and institutional factors that affect cogeneration development in developing countries. Finally, the report discusses the role of A.I.D. in promoting private sector involvement in cogeneration development as a way to expand power supply and improve fuel efficiency in developing countries.

KEYWORDS: Cogeneration, LDC, private power

TITLE: Country Privatization Strategy

AUTHOR:

CORPORATE AUTHOR: Center for Privatization
SPONSOR: A.I.D.
PUBLISHER:
PUBLICATION DATE: June 1987
DOCUMENT HOLDER: Center for Privatization

ABSTRACT:
This paper provides a framework and guidelines for use by A.I.D. Missions and governments in less developed countries (LDCs) to: 1) shape and pursue a country privatization strategy; 2) identify and bring about needed policy changes; 3) increase public awareness and understanding; 4) privatize a specific government enterprise/facility/activity; and 5) institutionalize the privatization process within an LDC.

KEYWORDS: Privatization, LDC

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TITLE: How to Mitigate Power Deficit in the Eighth Plan

AUTHOR: Federation of Indian Chambers of Commerce and Industry (FICCI)

CORPORATE AUTHOR:
SPONSOR: FICCI
PUBLISHER: FICCI
PUBLICATION DATE: July 1989
DOCUMENT HOLDER: FICCI

ABSTRACT:
The report indicates that the private sector can augment the current power generation capacity by 10,000 MW during the Eighth Plan to wipe off the deficit envisioned in the power sector during the period. The current expansion plan for the Central Electricity Authority includes 38,000 MW of a projected need of 48,000 MW. The report states that captive generation can provide 2000 MW, generation by cooperatives 1000 MW, investments by non-resident Indian (NRIs) and Build-Own-Transfer of projects 2000 MW and by expansion of existing licensed private utilities 3000 MW.

KEYWORDS: India, private sector, power generation, Eighth Plan

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TITLE: Non-Utility Power Generation in the Indian States of Gujarat and Maharashtra: Potential, Impediments, and Policy Issues

AUTHOR:

CORPORATE AUTHOR: RCG/Hagler, Bailly, Inc.
SPONSOR: A.I.D./Office of Energy and Bureau for Asia and the Near East
PUBLISHER: Energy Conservation Services Program
PUBLICATION DATE: June 1987
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
The results of this study indicate that non-utility power generation from large-scale domestic fossil fuel plants, industrial and commercial cogeneration systems, and renewable energy sources for sale to the grid presents a viable option for improving power supply in Gujarat and Maharashtra. The study demonstrates that the power generation potential from these options is large enough to eliminate power shortages in these states and reduce expansion needs of government utilities. The study also identifies various impediments affecting private power generation, and recommends measures to overcome these impediments.

KEYWORDS: India, power generation, non-utility, potential, impediments, policy, private power, cogeneration

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TITLE: Opportunities for Private Sector Power Generation in Developing Countries: Pakistan, Thailand, India, and the Dominican Republic

AUTHOR: Henri-Claude Bailly, Pircoz Sharafi

CORPORATE AUTHOR: RCG\Hagler, Bailly, Inc.
SPONSOR:
PUBLISHER:
PUBLICATION DATE: November 1987
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
The objective of this document, presented at The Eighteenth National Conference on the Outlook for Cogeneration, is to examine the prospects for private sector power generation in developing countries, specifically, Pakistan, Thailand, India and the Dominican Republic. The document first summarizes the results of studies done on each of these countries. It then goes on to discuss the implications of these results on other developing countries as well as U.S. suppliers of power generation equipment and services. The paper concludes that there is a sizable potential for private power generation in developing countries. It also claims that industrial cogeneration in and power production from waste fuels represent the most attractive options for small scale power systems. It then goes on to identify the impediments to private power development and how these impediments can be overcome.

KEYWORDS: Cogeneration, Pakistan, Thailand, India, Dominican Republic, private power, opportunities

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TITLE: Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector

AUTHOR:

CORPORATE AUTHOR:
SPONSOR: U.S. Agency for International Development
PUBLISHER:
PUBLICATION DATE: March 1988
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
Recognizing that "energy shortfalls are causing a serious constraint to development in over half of all A.I.D.-assisted countries," the Committee on Appropriations of the U.S. House of Representatives requested a report from the U.S. Agency for International Development on the "magnitude of the crisis, its implications for future economic and social development and the potential for U.S. technologies and services to address this problem," including an assessment of "appropriate incentives for private sector participation and the feasibility of an Energy Guaranty Program modeled on A.I.D.'s Housing Guaranty Program." This report analyzes the magnitude, causes, and impacts of power shortages in developing countries, identifies possible solutions, describes a role for the private sector, and identifies an appropriate role for A.I.D.

KEYWORDS: Power sector, LDC, electricity demand, private sector

TITLE: Private Sector Participation in Electric Power

AUTHOR:

CORPORATE AUTHOR: Asian Development Bank
SPONSOR: Asian Development Bank
PUBLISHER:
PUBLICATION DATE: February 1989
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
The report surveys the private power activities in India, Indonesia, Malaysia, Pakistan, Philippines, and Thailand. The report addresses issues related to private sector participation in the power sector in terms of the additionality of resources available through the private sector, balance-of-payment implications, resource planning, the role of the national utility, and impacts on tariffs.

KEYWORDS: Asia, India, Pakistan, Philippines, Indonesia, Malaysia, Thailand, private power, privatization, captive power, cogeneration

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TITLE: Privatization: A Technical Assessment

AUTHOR: L. Gray Cowan

CORPORATE AUTHOR:
SPONSOR: A.I.D./Office of Policy Development and Program Review
PUBLISHER: Center for Privatization
PUBLICATION DATE: August 1987
DOCUMENT HOLDER: A.I.D./Center for Privatization

ABSTRACT:
This study outlines the advantages of privatisation and the barriers that governments in less developed countries (LDCs) face when trying to implement a privatization strategy. The study goes on to define the role that the AID Missions can play in planning the privatization strategy.

KEYWORDS: Privatization, impediments, strategies, LDC

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TITLE: The A.I.D. Experience With Independent Power Generation

AUTHOR: James B. Sullivan

CORPORATE AUTHOR:
SPONSOR: A.I.D./Office of Energy
PUBLISHER:
PUBLICATION DATE: August 1988
DOCUMENT HOLDER: RCG/Hagler, Bailly, Inc.

ABSTRACT:
This paper, presented at the Central American and Caribbean Workshop on Private Power and Demand Management, discusses A.I.D.'s involvement in energy and energy conservation and demand management, as well as independent power production in developing countries.

KEYWORDS: Caribbean, Central America, private power, A.I.D., LDC

The Office of Energy

The Agency for International Development's Office of Energy plays an increasingly important role in providing innovative approaches to solving the continuing energy crisis in developing countries. Three problems drive the Office's assistance programs: high rates of energy and economic growth accompanied by a lack of energy, especially power in rural areas; severe financial problems, including a lack of investment capital, especially in the electricity sector; and growing energy-related environmental threats, including global climate change, acid rain, and urban air pollution.

To address these problems, the Office of Energy leverages financial resources of multilateral development banks such as The World Bank and the InterAmerican Development Bank, the private sector, and bilateral donors to increase energy efficiency and expand energy supplies, enhance the role of private power, and implement novel approaches through research, adaptation, and innovation. These approaches include improving power sector investment planning ("least-cost" planning) and encouraging the application of cleaner technologies that use both conventional fossil fuels and renewable energy sources. Promotion of greater private sector participation in the power sector and a wide-ranging training program also help to build the institutional infrastructure necessary to sustain cost-effective, reliable, and environmentally-sound energy systems integral to broad-based economic growth.

Much of the Office's strategic focus has anticipated and supports recently-enacted congressional legislation directing the Office and A.I.D. to undertake a "Global Warming Initiative" to mitigate the increasing contribution of key developing countries to greenhouse gas emissions. This strategy includes expanding least-cost planning activities to incorporate additional countries and environmental concerns, increasing support for feasibility studies in renewable and cleaner fossil energy technologies that focus on site-specific commercial applications, launching a multilateral global energy efficiency initiative, and improving the training of host country nationals and overseas A.I.D. staff in areas of energy that can help to reduce expected global warming and other environmental problems.

To pursue these activities, the Office of Energy implements the following seven projects: (1) The Energy Policy Development and Conservation Project (EPDAC); (2) The Biomass Energy Systems and Technology Project (BEST); (3) The Renewable Energy Applications and Training Project (REAT); (4) The Private Sector Energy Development Project (PSED); (5) The Energy Training Project (ETP); (6) The Conventional Energy Technical Assistance Project (CETA); and (7) its follow-on Energy Technology Innovation Project (ETIP).

The Office of Energy helps set energy policy direction for the Agency, making its projects available to meet generic needs (such as training), and responding to short-term needs of A.I.D.'s field offices in assisted countries.

Further information regarding the Office of Energy's projects and activities is available in our Program Plan, which can be requested by contacting:

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