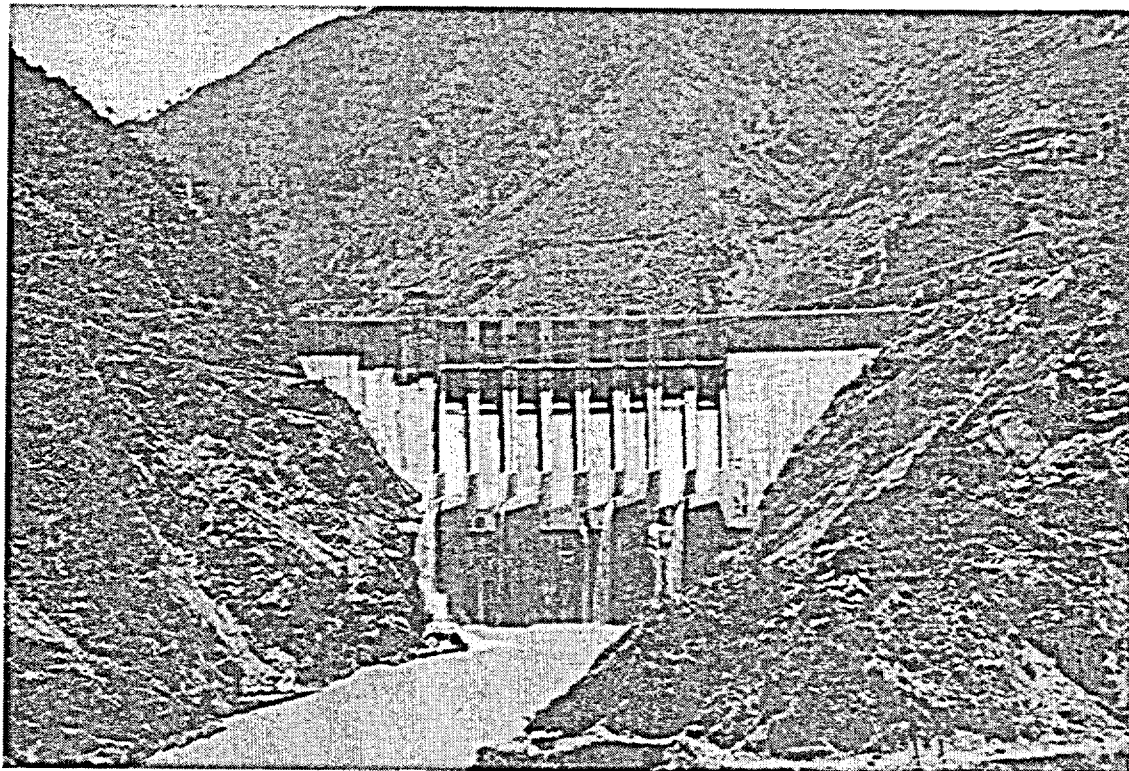


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India's Power Sector:

Business Opportunities for Canadians



Prepared for
Foreign Affairs and International Trade Canada

December 1995



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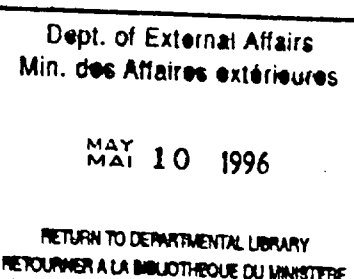
International Development Management Advisory Group, Inc.

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Abbreviations in the Text

AsDB	Asian Development Bank
BCHI	BC Hydro International
BOO	Build/Own/Operate
BOOT	Build/Own/Operate/Transfer
BOT	Build/Operate/Transfer
CCGT	Combined-cycle gas turbine
CEA	Central Electricity Agency
CIDA	Canadian International Development Agency
CKm	Circuit-kilometre
Cr.	Crore (Rs. 1 Crore = ten million rupees)
EDC	Export Development Corporation
EHV	Extra High Voltage
GEF	Global Environment Facility
GW	Gigawatt
HQI	Hydro-Québec Internationale
HS	Harmonized System (of tariff nomenclature)
HV/LV	High Voltage/Low Voltage
HVDC	High Voltage Direct Current
IEA	International Energy Agency
IFC	International Finance Corporation (of World Bank Group)
IPP	Independent (i.e. private) Power Project
IREDA	India Renewable Energy Development Agency
JV	Joint Venture
Kv	Kilovolt
KVA	Kilovolt Ampere
kWh	Kilowatt hour
LOI	Letter of Intent
LROT	Lease/Rehabilitate/Operate/Transfer
MNES	Ministry of Non-Conventional Energy Supply
MOU	Memorandum of Understanding
MW	Megawatt
NHPC	National Hydro-electric Power Corporation
NTPC	National Thermal Power Corporation
OECD	Organization for Economic Cooperation and Development
OHI	Ontario Hydro International
PFC	Power Finance Corporation
PLF	Plant Load Factor
PPA	Power Purchase Agreement
Rs.	Rupees
SCADA	Supervisory Control and Data Acquisition
SEB	State Electricity Bureau
T&D	Transmission and Distribution

State Names Abbreviated in the Tables

AP	Andhra Pradesh	MAH	Maharashtra
GUJ	Gujarat	RAJ	Rajasthan
HAR	Haryana	TN	Tamil Nadu
KAR	Karnataka	UP	Uttar Pradesh
HP	Himachal Pradesh	WB	West Bengal
MP	Madhya Pradesh		

Acknowledgements

In preparing this survey, the authors have drawn on a range of published and unpublished sources. These include trade journals and newspaper reports, World Bank and IEA papers and personal interviews, discussions with Canadian industry, information supplied by Foreign Affairs and International Trade Canada, the Canadian High Commission in New Delhi, the Indian High Commission in Ottawa, and the Ministry of Power in New Delhi, as well as a special run of trade statistics, undertaken by Statistics Canada for this report, and a series of power sector reports carried by the U.S. National Trade Data Bank. Very special thanks are also due to Mr. R. Vasudevan, former Secretary, Ministry of Power, Government of India, who provided some key insights into the current power situation and assisted in obtaining up-to-date Indian Government data through November 1995.

Cover Photo:

Chamera Hydroelectric Project, Stage I, near Dalhousie, Himachal Pradesh. Recently commissioned.

540 MW, 155 m. high concrete arch gravity dam, 6.5 km power tunnel and 2.4 tailrace tunnel under the Ravi River. Capital cost \$1.13 billion.

Canadian equipment, material and services totalling Cdn \$ 620 million. Financing by CIDA and EDC.

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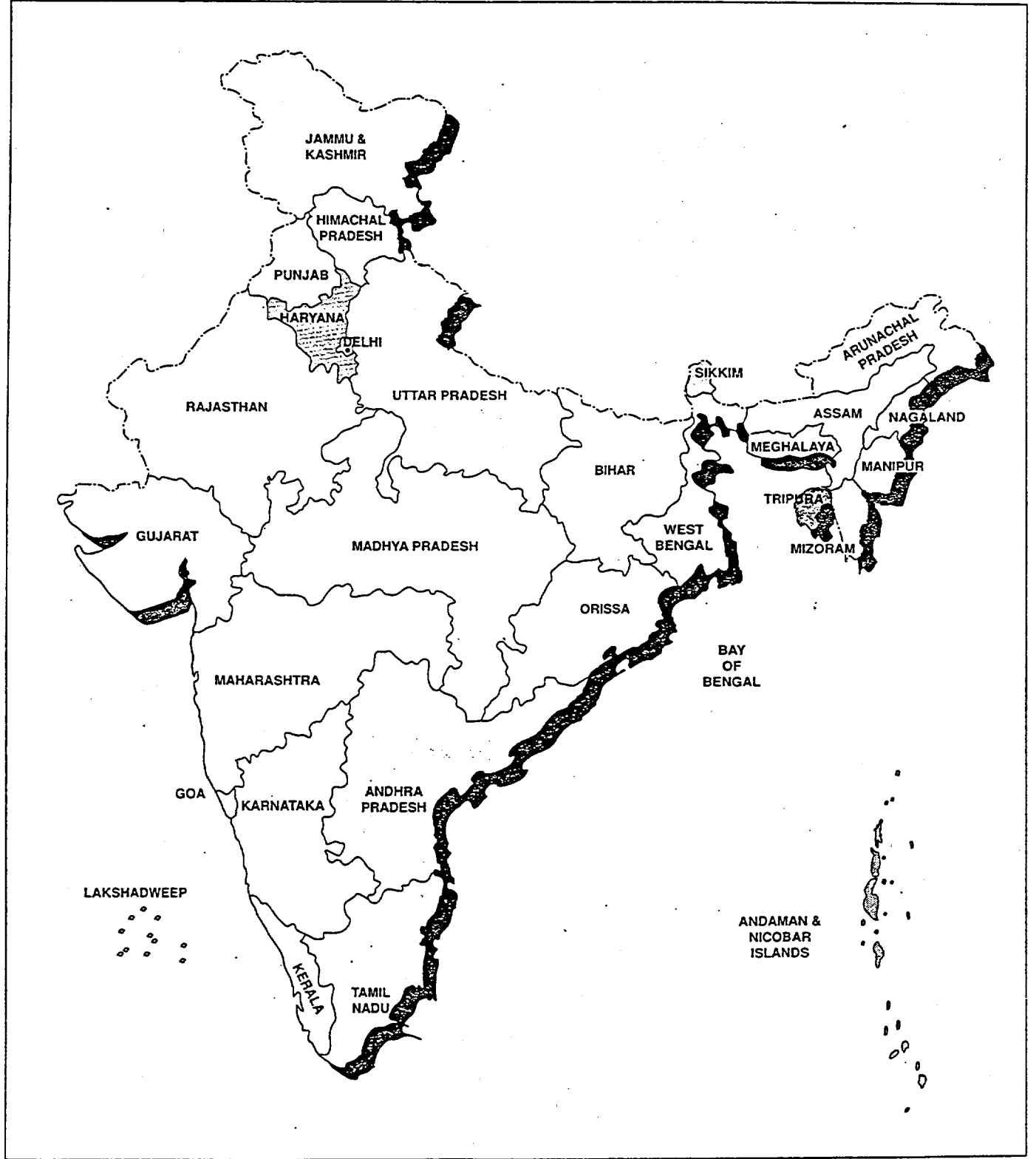
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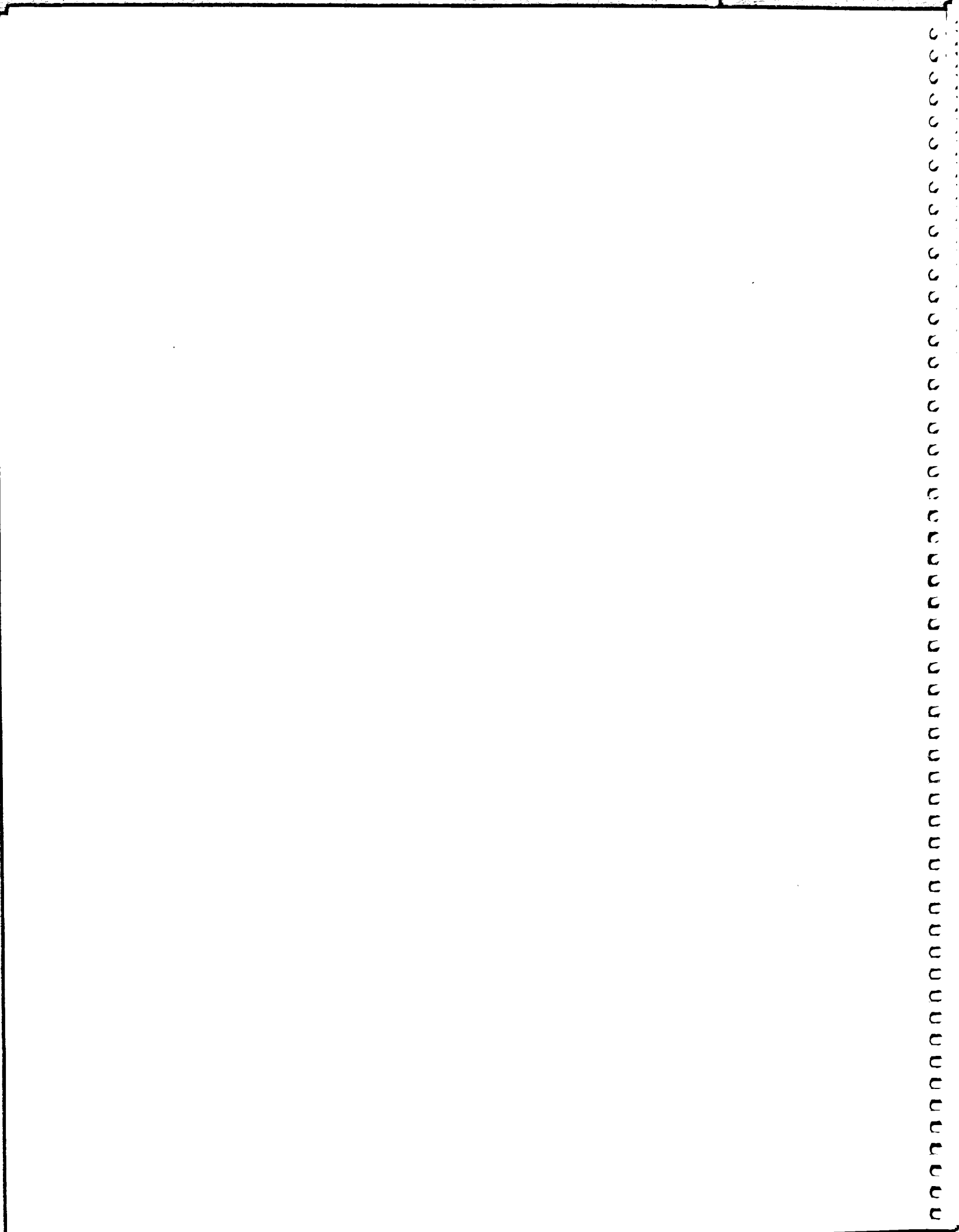
Basic Data on India

Population:	900 million (est. 1995);
Land Area:	3.3 million km ²
Currency:	Indian Rupee (Rs.) US\$ 1.00 = Rs. 31 Large sums are expressed in crores. A crore is 10 million rupees.
GDP:	US\$ 250 billion (est. 1994); Rate of growth 6 per cent (est. 1995)
Income per capita:	US\$ 330 (1991)
Foreign Trade:	Imports: US\$ 36 billion (1994) Exports: US\$ 34 billion (1994)
Foreign debt:	US\$ 96 billion
Electricity consumption:	320 kWh per capita
Major cities:	Bombay (now <i>(population estimates for 1995)</i> renamed Mumbai) 12.6 million Calcutta 11.0 million Delhi 8.4 million Madras 5.4 million

State Profiles:

State <i>(Abbreviations in brackets)</i>	Population <i>(millions)</i>	Per Capita Income <i>(US \$)</i>
Andhra Pradesh (AP)	67	308
Assam	22	256
Bihar	86	161
Gujarat (Guj)	41	351
Haryana (Har)	16	486
Karnataka (Kar)	43	329
Kerala	29	257
Madhya Pradesh (MP)	66	244
Maharashtra (Mah)	79	446
Orissa	32	213
Punjab	20	544
Rajasthan (Raj)	44	245
Tamil Nadu (TN)	56	324
Uttar Pradesh (UP)	139	223
West Bengal (WB)	68	294
Others	35	

Source: World Bank, 1994 Data



INDIA'S POWER SECTOR AT A GLANCE

India is one of the developing world's most exciting prospects for Canadian firms seeking investment or sales opportunities in the power sector.

- Present installed capacity: 82,000 MW
 - much of which needs refurbishing/upgrading
- Electricity demand growing by 8% per year
 - Energy shortfall: 10%
 - Peak power shortfall: 20%
- New capacity to be added by 2010: 115,000 MW
 - thermal (coal and gas), hydro, renewable
 - public and private projects for grid supply, captive plants, co-generation
- 245 private power projects now under consideration
 - for total new capacity of over 90,000 MW
 - 10,000 MW in projects cleared to start
- Installed transmission lines: 236,000 CKm
 - T&D system needs to be expanded/rebuilt/modernized
- Estimated market for power-related equipment and services: over US\$ 5 billion a year; imports at least 10%

Major import items:

- steam boilers, turbines
 - gas turbines
 - hydro turbines
 - generators and large generating sets
 - transformers, especially air-cooled
 - switchgears
- Engineering and consulting services needed:
 - project feasibility, design and construction
 - equipment selection and sourcing
 - distribution systems and demand-side management
 - environmental concerns (emissions, clean coal, etc.)
 - Manufacturing and service opportunities for Canadians as suppliers, consortium members or JV partners with Indian firms
 - new, investor-friendly rules in place for foreign firms in power projects and local manufacturing



Where to look for business:

- Opportunities in:
 - new generating plants
 - transmission and distribution facilities
 - refurbishing of existing installations
 - Private power project promoters, Indian and foreign (mainly USA)
 - Public power projects supported by World Bank and other multilateral agencies
 - Public go-it-alone undertakings at Central and State level
 - Link up with an Indian industrial partner through licensing or JV arrangements
 - *Key information sources:*
 - Central agencies:
 - Investment Promotion Cell (Ministry of Power)
fax: (011 91 11) 371-7519
 - Central Electricity Authority
fax: (011 91 11) 687-7267
 - NTPC - *fax:* (011 11 91) 436-1018
 - NHPC - *fax:* (011 91 129) 278020
 - Powergrid Corp - *fax:* (011 91 11) 642-8357
 - State Electricity Bureaus (SEBs)
 - Indian industry associations, trade journals, trade fairs
 - *Development Business* (UN publication) and the *Home Pages* of the World Bank and Asian Development Bank on the INTERNET's *World Wide Web*
 - Canadian High Commission (New Delhi)
fax: (011 91 11) 687-5387
 - DFAIT, Ottawa - South Asia Division:
Bill Skinner, *fax:* (613) 996-5897
 - *Financial support available through:*
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-

Executive Summary

This report provides Canadian suppliers of power equipment and services with up-to-date information (as of November, 1995) on India's electricity sector - one of the largest and fastest-growing in the world.

India's installed electric generating capacity now stands at 82,000 MW. Although its per-capita electricity consumption is low (320 kWh per year), demand is rising at 8 per cent annually. The nation-wide power shortage is 10 per cent, and the peak shortfall is 20 per cent. India's official plans call for installation of over 140,000 MW in new capacity by 2010. Conservative expectations are for the commissioning of as much as 115,000 MW in that period - more than Canada's entire installed capacity.

Electricity has been a virtual monopoly of Central and State governments since independence in 1947. Over 90 per cent of generating capacity is government-owned, 30 per cent by the Central Government, and the rest by the States. Of the total, 71 per cent is conventional thermal (mainly coal-fired), 26 per cent hydro, and 3 per cent nuclear.

India's power sector is plagued not only by inadequate generating capacity, but by outdated plant, low availability and plant load factors, erratic fuel supplies, inadequate grid structure, heavy transmission and distribution losses (23%), wasteful energy use and cross-subsidized electricity pricing, and the financial and operational weaknesses of most of the State Electricity Bureaux (SEBs).

Since 1991, with World Bank and other international support, India has launched wide-ranging reforms designed to accelerate

new plant construction, rehabilitate existing facilities, rationalize power markets and strengthen the state operating agencies.

Of greatest interest to Canadians is the decision to open the sector to private investment. Private companies, foreign and domestic alike, can now build and own power facilities outright, and enjoy special incentives relating to power tariffs, tax treatment, import duties, profit repatriation, and financial security. Foreign investors are also welcome in the fast-growing power-related manufacturing and services industry, in partnership with Indian firms.

Central and State agencies have been advertising potential power projects to entrepreneurs worldwide. Indian and foreign companies (mainly American) have been quick to respond, and some have made proposals at their own initiative. Some 245 projects are now at various stages of processing.

The privatization policy is still in flux. Initially proposals were negotiated via the MOU route, using a cost-plus approach to power tariff setting. Political difficulties arose in a number of cases, where the "secrecy" of proceedings and suspicions of cost-padding led State authorities to demand renegotiation (the Enron/Dabhol project in Maharashtra, now apparently resolved, was the highest-profile case). Since early 1995 it has been Government policy to put projects out for competitive tender, based on an all-in fixed tariff offer. There will likely be no further Central Government counter-guarantees beyond those now agreed.

At the same time, many of the SEBs are undergoing radical reform. Some are turn-

ing over their production facilities to commercial corporations to refurbish and operate. Consumer tariffs are being raised, billing systems improved and demand management concepts applied. Increased emphasis is being placed on conservation and environmental considerations.

The national Powergrid Corporation has been given the mandate to build a national grid out of the existing five regional systems, and to upgrade long-distance transmission facilities.

There is considerable private investment flowing into "captive" plants for major power-using industries, which can sell any surplus to the grid. Co-generation is also expanding, based on waste products from the sugar, paper, fertilizer, chemical and other industries. SEBs are offering attractive terms for the purchase of such power.

Interest in India's vast potential for non-conventional power generation is growing. Publicly-funded pilot projects are being sponsored in wind, solar and marine energy, and some commercial undertakings have already been launched.

India has a large and well-developed domestic manufacturing and service base in the power sector. Yet key components of many items, and a major share of large-scale and state-of-the-art equipment must be imported. Private project promoters, in particular, are likely to look to imports, for the sake of technological efficiency, on-time delivery and the innovative financing that foreign suppliers can offer.

The Indian market for power-related equipment is estimated at over US\$ 5 billion per year, of which at least 10 per cent represents imports.

Canada was closely associated with India's early power development, and Canadians engineered, equipped and financed the recently-commissioned, 540 MW Chamera I hydro project. Overall market participation by Canadian firms is very modest, however. Canada accounted for barely one per cent of India's power sector imports in recent years.

Canadian firms interested in supplying goods and services to India's power sector have a number of potential entry points.

The best opportunities probably lie with private power promoters, where the propensity to import will be highest. Canadian firms can approach such projects as consortium members or as sub-suppliers. They can also compete for procurement on work being financed by the World Bank and other international agencies. Even go-it-alone State undertakings, from new generating stations through transmission and distribution systems to plant refurbishment, offer opportunities for suppliers of high-tech goods and consulting services who can offer appropriate external financing.

Having an Indian partner or representative will enhance the ability of Canadian firms to establish themselves in the market. For the long haul, a manufacturing presence through JV or licensing arrangements in India is probably essential.

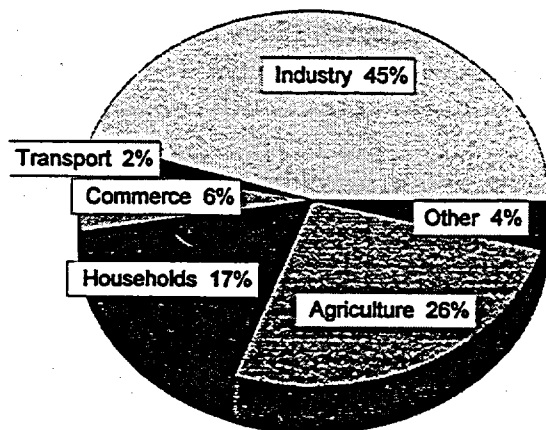
This report and its annexes include key sources of information and support in the power business, identify Indian and foreign firms promoting power projects or producing goods and services in India, and provide a listing of projects now under consideration for private participation.

1. India's Power Sector: Overview

With 900 million people, India is second only to China as the world's most populous nation. While it is a poor country in terms of income per capita, it has a middle class that is huge in absolute numbers – some 250 million people enjoy an income level that sparks demand for power-consuming goods such as television sets and household appliances.

India is not a "typical" developing country – it has a well-developed administrative, legal and political structure, a large supply of

Figure 1.1 Power Demand by Sector



educated manpower (the country has 2 million engineers), an extensive communications and transport network, and a solid industrial base, with an output of capital goods that is growing at 20 per cent a year.

English can be used in business dealings almost everywhere.

Electricity consumption in India is low by Western standards. It now stands at around 320 kWh per person per year, compared with over 600 kWh in China, and a level of 5,000 or higher in OECD countries. Demand for power, however, has been growing at more than 8 per cent a year over the last ten years, and is likely to maintain that rate for the next decade.

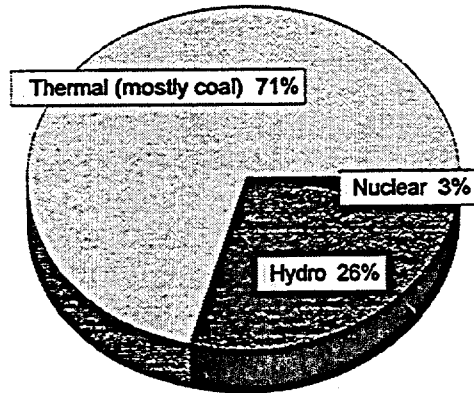
When India became independent in 1947, it had installed electric generating capacity of merely 1,300 MW. By 1970, this had risen to 15,000 MW, and by 1980 to 30,000 MW. In the 1990s, it has been growing at 10 per cent a year, and now stands at about 82,000 MW – more than in the U.K. Transmission lines total 236,000 CKm, with 32,000 CKm of 400 Kv lines. Yet, despite this growth, the sector is beset with serious operational and financial problems, and its needs – which include additional generating capacity, higher levels of efficiency in generation, transmission and distribution, and greater financial stability – are great.

Many areas are still without electricity. Of India's 580,000 villages, 80,000 are not yet connected to a grid, and fewer than 30 per cent of rural households (which comprise as much as 70 per cent of India's population) have electricity.

Actual electricity output falls short of energy demand by 10 per cent nationally, and of peak demand by up to 20 per cent. In some Northern regions of the country, the peak shortfall is 40 per cent. Nationwide, shortages are expected to worsen to 15 per cent on average, and to 30 per cent of peak demand, by the end of the century.

Current and projected demand is such that India will need to install another 140,000 MW by the year 2010 if it is make any headway in reducing the supply gap.

Figure 1.2 Installed Capacity (1995)
82,000 MW



India's Energy Resources

India is a net importer of energy (largely in the form of oil). In terms of conventional energy resources, India has:

- 6 per cent of proven world coal reserves
- 0.5 per cent of proven world oil and gas reserves
- hydro generating potential of 84 GW, of which only 20 GW has been exploited
- uranium: 6,700 tons.

Box 1.1 India's power generating potential

Conventional energy resources:

- Coal: 192 billion tons (78 billion tons proven)
- Oil & Gas: 17 billion TOE (25 per cent proven)
- Hydro: 84 GW (at 60 per cent utilization factor)

Non-conventional energy resources:

- Wind power: 20 GW
- Ocean thermal: 50 GW
- Wave power: 20 GW
- Tidal power: 9 GW
- Biomass: 17 GW
- Mini-hydro: 10 GW
- Solar power: virtually unlimited

How the sector is organized

Although the first electricity generation and distribution systems in India were privately developed, since the 1950s the power sector has been overwhelmingly in government hands, either at the Central or State level.

Under India's constitution, electricity is a shared responsibility of both the Central and State levels of government. Many agencies are involved at both levels, and there is a good deal of overlapping jurisdiction. The essential institutional structure is as follows:

Central Government

Policy and regulation:

Within the Union or Central Government, the Ministry of Power is responsible for overall planning and policy. The senior regulatory agency is the Central Electricity Authority (CEA).

The Ministry of Non-Conventional Energy Sources oversees activities in mini-hydro, wind and solar energy, as well as small-scale local generation in rural areas.

Operating agencies

There are two major National Power Companies, the NTPC (thermal) and the NHPC (hydro), bulk-supply utilities which produce about 30 per cent of the country's electricity, and sell it largely to the State Electricity Boards. There are also two nationally-owned regional power companies, and the Nuclear Power Corporation.

The Powergrid Corporation of India was established in 1989 to create and operate an eventual national grid.

Financing agency

The recently established Power Finance Corporation (PFC) is intended to become the vehicle of choice for financing future projects in the public sector.

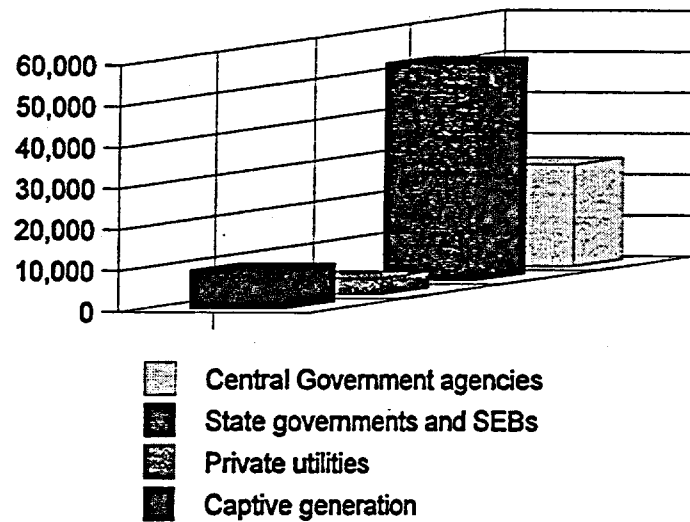
State Governments

About two-thirds of power generation, and virtually all transmission and distribution, is in the hands of 18 State Electricity Boards (SEBs), which also have tariff-setting and regulatory functions. Although nominally independent, they are for the most part under the political sway of the state governments, and are in precarious financial condition.

In between the Central and State systems are the Regional Electricity Boards, which manage India's five regional interconnected systems (Eastern, Northern, North-Eastern, Southern and Western). The Regional Load Dispatch Centres are now

being taken over by the national Powergrid Corporation.

Figure 1.3 Ownership of Installed Capacity 1995 (MW)



Private power generation

There are five private utilities involved in power generation and distribution, dating from pre-independence days. These are: Bombay Suburban Electric Supply Ltd. (BSES) and Tata Electric Companies (TEC), both in the Bombay area; Calcutta Electric Supply Corporation (CESC); and Ahmedabad Electricity Company (AEC), and Surat Electric Company, both in Gujarat State. Together, they account for about 5 per cent of public power supplies. The continuing strength of these companies is living proof that private power can be viable in India.

Autogeneration or "captive" production of power by manufacturing and processing industries is a growing phenomenon, and now equals at least 10 per cent of India's publicly-available installed capacity. It is

mainly used as a backup in case of power cuts, or to supplement power available from the grid. Captive power can be expensive – some industries reportedly pay as much as US\$ 0.25 per kWh, to guarantee themselves a secure source of power.

Box 1.2. Captive power

In the face of costly and unreliable grid service, many Indian industries are assuring their power needs by building their own generating facilities. Two recent examples:

- HEG (Hindustan Electro-Graphite) of the LNJ Bhilwara Group is building a small (14 MW) hydro plant for captive use at its facilities in Madhya Pradesh. It plans to go on to build much larger, grid-connected hydro plants in Himachal Pradesh, in cooperation with Hydro-Québec.
- A Belgian concern, Tractabel, is teaming up with an Indian partner, (O.P. Jindal Group), to build a 2x120 MW power supply for a steel mill at Toranagallu in Karnataka. It will sell its surplus power to the local SEB.

On another front, the Government is planning to invite bids to set up private captive power stations in the country's major ports, where operations are frequently interrupted by lack of power.

Co-generation is another way in which non-utility companies are becoming involved in power generation. Several industries with burnable waste products, especially the sugarcane and paper industries, are installing electric generating capacity for their own use and for sale to the grid.

Sources of power generation

Thermal power generation accounts for 71 per cent of India's total electricity supply. The share of hydro-electricity (called "hydel" in India) has been shrinking, and now stands at 26 per cent. Another 3 per cent is produced by India's small but growing nuclear power program. Non-conventional sources (wind, solar etc.) are attracting increasing interest, but their share is so far minimal.

In turn, about 90 per cent of thermal power generation is coal-fired. The balance is fuelled mainly by natural gas, LPG and naphtha, as well as from biomass, particularly in the sugar industry.

Coal. India's coal reserves are estimated at 192 billion tons, of which 78 bn tons are proven. In this total are 24 bn tons of coking coal (11 bn tons proven). The bulk of coal reserves are in the Bengal-Bihar coal field. In addition, there are 36 bn tons of lignite reserves, mainly in Tamil Nadu.

Indian coal is low in sulphur, but also low in heat content (with an average GCV of under 4,000 kcal/kg), and high in ash (up to 45 per cent). The most commonly used coal-burning technology is still based on pulverized coal, although a 100 MW coal-fired plant with a fluidized bed unit is now being built. Coal supplies may be located far from the generating stations, and the railway system, which must carry the bulk of it, is often inefficient and prone to delays.

The situation is not helped by the fact that coal supply is the virtual monopoly of a state corporation, Coal India, which produces 90 per cent of India's output. The government is now opening up the coal sector to private investors — including the right to build

power stations at the minehead — and is allowing coal to be imported for private power projects. There are, however, major infrastructure bottlenecks that will constrain the immediate scope of imports. The ability to arrange reliable private fuel supplies will be a significant factor in making independent power projects more attractive and bankable.

Meanwhile, the World Bank is contributing to a US\$ 2 billion program for turning Coal India into a "commercially viable and financially self-sustaining" enterprise.

Gas. Gas accounted for only 3 GW of installed capacity in 1992; the current Five-Year Plan expects 4.6 GW of gas-fired capacity to be added by 1997. India's planners would prefer to make more use of gas-fired (especially combined-cycle) generation, because of environmental and thermal efficiency considerations.

Gas supply, however, is a problem for India. Although there is now sizeable production from Bombay High and adjoining areas on the Western shore, significant expansion of gas-fired capacity would require the import of fuel. Pipelines from the Middle East would have to cross Pakistani territory. One option that is being explored is an undersea pipeline direct from Oman. A more likely solution, however, may be to secure LNG supplies by tanker from the Gulf region. Gas could also be imported from Bangladesh to fuel power stations in West Bengal.

Oil. India must import two-thirds of its oil consumption. Apart from start-up or low-load operations, oil is used for less than 5 per cent of electricity production (mainly for captive or small, stand-alone generators),

and no oil-fired capacity additions are planned. The Government has recently issued a liquid fuels policy, which bans the use of high-speed diesel in private power plants, but allows the burning of alternative fuels such as naphtha and furnace oil.

Hydro. India's vast hydroelectric potential, estimated at 84,000 MW, is concentrated in the far North, along the edge of the Himalayas, and in the South-Central Deccan Plateau. Many potential sites are located far from load centres, in difficult terrain. While the Central authorities would like to increase the role of hydropower, transmission difficulties, inter-state water rights disputes and environmental concerns, as well as the high initial cost of facilities, are an impediment to further development.

The pumped-storage potential, which could play an important role in meeting peaking requirements, is estimated at over 90,000 MW.

Nuclear. India's installed nuclear capacity has reached 2,225 MW. There are now 9 nuclear power plants in operation, and a further 4 are under construction or at the advanced planning stage.

Structural and organizational problems

According to the Asian Development Bank, India's lack of adequate power supplies "will be the single most important constraint to economic development in the coming years".

The power sector has not suffered from a lack of investment in generating facilities. Indeed, more than 20 per cent of central

government investment has been devoted to the sector, principally for power generation, under the country's eight consecutive Five-Year Plans. Generating capacity has grown by 9 per cent a year since 1950, and has more than doubled in the past ten years. Yet the system is seriously out of balance, and plagued by inefficiencies which result from a combination of physical, economic and political factors.

On the *generating* side, thermal efficiency, availability and plant load factors are low by Western standards. The average PLF for SEB stations is only 57 per cent (up from 50 per cent ten years ago), compared with an OECD average of 85 per cent. Generating efficiency for base-load coal-fired stations is only 30 per cent (28 per cent for the SEBs, and 35 per cent for the NTPC), compared with the OECD average of 37 per cent.

One major cause of poor performance is the unreliability of the coal supply. Another is that much of the generating plant is more than 20 years old; its technology is out of date, and breakdowns are frequent, leading to a constant threat of brownouts or blackouts. Yet the bulk of investment has habitually been channelled into adding new capacity, rather than upgrading or renewing outdated plant.

In *transmission and distribution*, the situation is even more difficult. Power losses average 23 per cent (4 per cent in transmission, the rest in distribution), and are up to 40 per cent in some areas. (The OECD average for T&D loss is 6 per cent.) The transmission and distribution systems are under-built in comparison to generating

capacity, and hence over-loaded. Transmission technology is outdated. Supply frequency and voltage are subject to wide variations. The systems are prone to leakage. Pilferage is endemic — illegal diversion is thought to account for over half the losses in distribution.

Five regional transmission grids have been established, but competition among the interconnected states drawing power from the grids disrupts their operation, and on occasion this year they were close to collapse. There is as yet no operational national grid.

The SEBs are responsible for all aspects of distribution, including tariff setting. At the behest of the State governments, all of them engage, to varying extents, in politically-motivated cross-subsidization of power, from industrial consumers to domestic and, particularly, agricultural consumers (who take over 25 per cent of output). Tariff rates in most states are now well below the average (let alone the long-run marginal) cost of supply; farmers in many areas receive their power virtually free. The weakness of the billing and collection system cuts revenues further. As a result, the average net return of the SEBs was -14 per cent in 1991. The cost of making up their direct and indirect losses is estimated at 1.5 per cent of the country's GDP — a cost that is shared between the Centre, which often goes unpaid for the power and coal it supplies, and the state governments, which must cover the SEB operating deficits. These losses have been absorbing a significant portion (perhaps 20 per cent) of funds allotted to the power sector for development purposes.

Table 1.1 Generating Plant: Installed Capacity
as of March 1995 (provisional)

Region/State	Installed Capacity (MW)					
	Hydro	Steam	Gas	Diesel/ Wind	Nuclear	Total
1. Northern Region						
Haryana	883.90	892.50	0.00	3.92	0.00	1780.32
Him. Pradesh	273.57	0.00	0.00	0.13	0.00	273.70
Jammu & Kashmir	180.31	0.00	175.00	6.76	0.00	362.07
Punjab	1798.94	1710.00	0.00	0.00	0.00	3508.94
Rajasthan	967.58	975.00	3.00	0.00	0.00	1945.58
Uttar Pradesh	1504.55	4564.00	0.00	6.19	0.00	6074.74
Chandigarh	0.00	0.00	0.00	2.00	0.00	2.00
Delhi	0.00	371.60	214.00	0.00	0.00	586.60
Central Sector (NR)	1530.00	4980.00	1882.00	0.00	895.00	9287.00
TOTAL (NR)	7138.85	13493.10	2274.00	19.00	895.00	22819.95
2. Western Region						
Goa	0.00	0.00	0.00	0.11	0.00	0.16
Gujarat:	427.00	4179.00	297.00	35.47	0.00	4938.47
- SEB	427.00	3729.00	198.00	35.27	0.00	4389.27
- AECo.	0.00	450.00	99.00	0.00	0.00	549.00
- SuratEC	0.00	0.00	0.00	0.20	0.00	0.20
Madhya Pradesh	845.86	3017.50	0.00	0.00	0.00	3863.36
Maharashtra:	1740.22	7155.00	1092.00	0.00	0.00	9987.22
- MSEB	1314.22	5505.00	912.00	0.00	0.00	7731.22
- TEC	426.00	1150.00	180.00	0.00	0.00	1756.00
- BSES	0.00	500.00	0.00	0.00	0.00	500.00
D&N Haveli	0.00	0.00	0.00	0.00	0.00	0.00
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00
Central Sector (WR)	0.00	3360.00	1292.00	0.00	860.00	5512.00
TOTAL (WR)	3013.13	17711.50	2681.00	35.58	860.00	24301.21
3. Southern Region						
Andhra Pradesh	2655.94	2452.50	99.00	0.00	0.00	5207.44
Karnataka	2409.55	840.00	0.00	127.92	0.00	3377.47
- KEB	102.35	0.00	0.00	127.92	0.00	230.27
- KPCL	2289.20	840.00	0.00	0.00	0.00	3129.20
- Shivpur	18.00	0.00	0.00	0.00	0.00	.00
Kerala	1491.50	0.00	0.00	0.00	0.00	1491.50
Tamil Nadu	1947.70	2760.00	10.00	19.35	0.00	4737.05
Pondicherry	0.00	0.00	0.00	0.00	0.00	00
Central Sector (SR)	0.00	4170.00	0.00	0.00	470.00	4640.00
TOTAL (SR)	8504.69	10222.50	109.00	147.27	470.00	19453.46

Table 1.1 Generating Plant: Installed Capacity (continued)

Region / State	Installed Capacity (MW)					
	Hydro	Steam	Gas	Diesel/ Wind	Nuclear	Total
4. Eastern Region						
Bihar:	161.60	1603.50	0.00	0.00	0.00	1765.10
- BSEB	150.00	1603.50	0.00	0.00	0.00	1753.50
- BHPC	11.60	0.00	0.00	0.00	0.00	11.60
Orissa	1271.92	680.00	0.00	0.00	0.00	1551.92
West Bengal:	71.51	3356.38	100.00	22.50	0.00	3550.39
- WBSEB	46.51	1020.00	60.00	22.50	0.00	1149.01
- WBPDC	25.00	1260.00	0.00	0.00	0.00	1285.00
- DPL	0.00	395.00	0.00	0.00	0.00	395.00
- CESC	0.00	655.00	40.00	0.00	0.00	695.00
- Deshergarh	0.00	26.38	0.00	0.00	0.00	26.38
DVC	144.00	2007.50	90.00	0.00	0.00	2241.50
Sikkim	30.89	0.00	0.00	2.70	0.00	33.59
Central Sector (ER)	0.00	2730.00	0.00	0.00	0.00	2730.00
TOTAL (ER)	1679.92	10377.38	190.00	25.20	0.00	12272.50
5. North-Eastern Region						
Arunachal Pradesh	23.55	0.00	0.00	15.81	0.00	39.36
Assam	2.00	330.00	244.50	20.69	0.00	597.19
Manipur	2.60	0.00	0.00	9.41	0.00	12.01
Meghalaya	186.71	5.00	0.00	2.05	0.00	193.76
Mizoram	3.37	0.00	0.00	21.07	0.00	24.44
Nagaland	2.20	0.00	0.00	3.62	0.00	6.82
Tripura	16.01	0.00	32.50	4.85	0.00	53.36
Central Sector (NER)	255.01	0.00	100.50	0.00	0.00	355.51
TOTAL (NER)	492.45	335.00	377.50	77.50	0.00	1282.45
6. Islands						
Andaman & Nicobar Isl.	0.00	0.00	0.00	29.47	0.00	29.47
Lakshadweep	0.00	0.00	0.00	5.37	0.00	5.37
TOTAL (ISL)	0.00	0.00	0.00	34.84	0.00	34.84
7. Totals (All-India)						
Central Sector	1929.01	17247.60	3364.50	0.00	2225.00	24766.01
State Sector	18456.03	32110.60	1948.00	339.19	0.00	52853.82
Private Sector	444.00	2781.38	319.99	0.20	0.00	3544.58
GRAND TOTAL	20829.04	52139.48	5631.50	339.39	2225.00	81164.41
PER CENT OF TOTAL	25.66%	64.24%	5.94%	0.42%	2.74%	100.00%

Source: Ministry of Power, Government of India

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2. How India is Tackling the Power Problem

India is continuing to make massive investments in new-capacity construction. It is clear, however, that India's power shortages will not be solved solely through additions to generating plant. Such projects will need to be accompanied by efforts to upgrade and modernize existing generating plant and fuel supplies, address the inadequacies of T&D systems and grid operations, resolve the financial weakness of the SEBs, and take steps towards energy conservation and demand-side management to reduce the energy-intensity of consumption and flatten the peak-load curve.

In recent years, the Central Government and a number of States have taken steps to come to grips with these various difficulties. Under the threat of cut-off from Central power supplies, many SEBs are reforming their tariff and distribution policies, and directing more investment into upgrading transmission and distribution facilities.

The World Bank and other international agencies are providing support for these reforms, and have punished laggards by cancelling previous loans.

The States that appear to have made the strongest commitment to reform are Orissa (see Box 2.1), Haryana, Uttar Pradesh, Rajasthan and Andhra Pradesh.

Box 2.1

Orissa: Pioneering electricity reform

The relatively poor east-central state of Orissa has launched what the World Bank calls "a radical program of reform" to restructure and privatize its power sector. Essentially, the State aims to withdraw from utilities operation, and leave the field to privately-managed power companies operating in a competitive but regulated power market.

The SEB has been converted into a regulatory agency. Its existing generation, transmission and distribution facilities have been made commercially independent, and are now being privatized (in thermal generation and distribution) or opened to private participation (hydro generation and transmission). Electricity tariffs are being raised in annual increments.

The World Bank is ready to lend US\$ 350 million as part of a US\$ 2 billion package to support Orissa's power restructuring.

In September, the Chief Minister announced power generation projects totalling 10,000 MW, for which private developers are invited to bid. Orissa has the lowest-priced coal in India. The projects would be mainly large pit-head plants. Huge investments in transmission facilities will be required to carry this much power.

Building new generating capacity

The Central Government's Eighth Five-Year Plan (1992 - 1997) devotes 20 per cent of its planned capital spending (or the equivalent of US\$ 30 billion) to investment in the power sector, distributed as follows:

- Power generation: 69 per cent
- T&D development: 29 per cent
- Training, surveys, R&D: 2 per cent

The Plan originally called for creation of 48,000 MW of additional generating capacity by 1997. This was subsequently scaled down to 30,000 MW (90 per cent in the public sector, i.e. NTPC and the SEBs, and 10 per cent private), and most estimates now are that 20,000 MW at most will be added during the period, because of delays in CEA approval procedures and difficulties in obtaining financing. (The capacity added under this scenario, nevertheless, would be equivalent to two-thirds of Ontario Hydro's entire installed capacity).

The NTPC alone, which has 16 GW of installed capacity (in 10 coal-fired and five gas-fired stations, in a number of states), expects to commission another 10 GW by 2004 from new projects included in the 8th Plan. Most of this will be coal-fired. For its part, the NHPC currently has five hydro projects under construction, for a total of 1,555 MW.

Over the longer term, India's plans for the period 1992-2007 envision the addition of 143 GW, which would effectively triple the 1992 level of installed capacity. Most outside observers consider this target optimistic. The International Energy Agency anticipates, however, that 115 GW could be added by 2010, thus more than doubling the 1992

base. Of this total, the IEA expects 50-65 GW to be coal-fired, and 11 GW gas-fired; most of the rest will be hydro.

Opening the sector to private participation.

The Central Government has recognized that if there is to be any hope of meeting investment targets in electricity supply, it will have to rely heavily on the private sector, domestic and foreign alike. In 1991 — at the depth of an economic crisis — the Central Government announced a series of policy and legislative changes, which were expanded by subsequent decrees. Their main provisions (as they stood until early this year) are:

- Foreign investors are now allowed to own up to 100 per cent of generating facilities. They may build, own and operate generating stations of any size and type (except nuclear), and sell to any buyer (with State approval). Foreigners can invest either as *licensees* of the SEBs, to produce and distribute power within a defined locale, or as *generators* of bulk supply who may sell their power to the SEBs for distribution.
- Their debt-to-equity ratios may be as high as 4:1. The promoter's own share should be at least 11 per cent. Up to 40 per cent of the invested capital may be borrowed from Indian official agencies, leaving the rest to be raised privately, in India or abroad.
- A 16 per cent return-on-equity was assured for generating companies at a 68.5 per cent PLF, with additional returns allowed for higher PLFs. This was to be accomplished through a cost-plus approach that allows a two-part tariff to

2. How India is Tackling the Power Problem

be negotiated in the Power Purchase Agreement (PPA). The two parts reflect, respectively, fixed capital costs and operating costs, including cost of fuel. There is also protection against inflation and currency devaluation.

- A five-year full tax holiday is offered, followed by a 30 per cent tax reduction for a further five years.
- Special depreciation rates apply for plant and machinery.
- Free and full repatriation of dividends and interest on foreign equity and loans is assured.
- Import duties on project-related power equipment (including that for plant refurbishment) have been reduced from over 80 per cent to 20 per cent, if it is

financed from abroad, and excise taxes (so-called "countervailing" duties) on such equipment have been eliminated.

- Licenses are issued for 30 years, and are to be renewable for 20 years at a time.

Approval procedures have, in principle, been centralized and codified to speed up the processing of proposals. An Investment Promotion Cell has been set up in the Power Ministry to expedite clearances, and a High-Powered Board of Ministries is to streamline decision making. In a bid to kick-start the process and attract foreign investors, the Government put the first eight proposals on "fast track" (see Box 2.2) to speed up clearances, and offered a Central counter-guarantee for individual State obligations arising from SEB contracts.

Box 2.2: The eight "fast track" power projects:

<i>Project</i>	<i>Developer</i>	<i>Fuel</i>	<i>Capacity</i>
Dabhol* (Mah)	Enron/GE/ Bechtel	Distillate/ LNG CC	695 MW/ 1,320 MW
Ib Valley* (Orissa)	AES/GE	Coal	420 MW
Vizakhapatnam (AP)	Hinduja Group, National Power	Coal	1,000 MW
Mangalore (Kar)	Cogentrix/GE	Coal	1,000 MW
Jegurupadu (AP)	GVK, CMS, ABB	Gas CC	235 MW
Kakinada (AP) (aka Godavari)	Spectrum Power, Bambino Group	Gas CC	208 MW
Zero Unit/ Neyvili (TN)	ST Power, CMS	Lignite	250 MW
Paguthan (Guj)	Gujarat Torrent Energy	Gas CC	240 MW

* Central counter-guarantee signed



Central and State agencies have advertised over 150 projects for which technical, economic and environmental plans have been prepared, but which could not be developed for lack of financing.

The response to these invitations has been dramatic. As of November, 1995, 243 private power proposals, involving investments equal to more than US\$ 100 billion, had been submitted for clearance at the Central level, either for projects that have been advertised by Central or State authorities or for unsolicited projects (investor initiative). Fifty-two of these proposals are from foreign investors, the majority of them from the United States.

Promoters are for the most part major construction engineering firms, equipment suppliers and independent power project developers. Their proposals are mainly for "greenfield" power stations, representing a total generating capacity of more than 90,000 MW (or more than India's existing plant). By no means all of these proposals are likely to go ahead — difficulties in arranging project clearances and financing will likely stymie many of them.

The sixteen projects approved to date by the foreign investment authorities and the CEA, however, will, if built, add about 10,000 MW of generating capacity. Another 31 proposals involving 23,000 MW are thought likely to be approved in the coming months.

A policy still in flux

Political and financial difficulties with some of these projects (see Box 2.3) have led the Central authorities to adopt a somewhat more cautious approach during 1995. No

further counter-guarantees are likely to be approved, beyond those promised in principle for the eight "fast-track" projects. The Government has also ruled that future IPPs and their associated PPAs *must be based on competitive bidding*, rather than negotiated MOUs, if they are to be approved by the CEA. The Power Ministry has advised SEBs to weed out non-serious proposals among the MOUs already signed, and re-tender them for bidding.

As a result, the concepts of an assured 16 per cent ROE and the two-part tariff may be abandoned, since bidders are likely to have to quote a fixed per-unit price of power, as the competitive core of their offer. This will expose bidders to much higher risks, with respect to ensuring fuel supplies etc. (for which special insurance provisions are being explored). Standard guidelines for PPAs have now been circulated, and detailed bidding documents are being developed by the Power Finance Corporation with World Bank assistance.

In practice, moreover, official processing of projects is taking longer than originally hoped. There are still 18 separate clearances required at the Central and State levels, and these will have to be speeded up if a significant number of private projects are to break ground soon. Continuing efforts are underway to restructure the bureaucracy and streamline the approval process.

One example: in a move that is perhaps indicative of a broader shift in emphasis from mega-projects towards more modest ones (under 100 MW), approval of the CEA will no longer be required for projects costing up to Rs 400 crore (about US\$ 120 million), provided they are awarded on the basis of competitive tenders.

The most fundamental problem facing the IPP policy remains the financial weakness of the SEBs, and their doubtful ability to honour their PPA commitments. Unwilling to provide more counter-guarantees, the Central Government has suggested alternative forms of investor security, which include allowing generating companies to sell directly to the Powergrid Corporation,

distribute to and collect directly from credit-worthy industrial users (in effect, "cherry-picking" among the SEB's customers), or establish various types of priority-claim escrow accounts, into which the SEB would make deposits. The World Bank is also prepared to provide limited guarantees for private investors where the SEB in question is undertaking suitable reforms.

Box 2.3: The Dabhol/Enron Project

The recent controversy over the Enron project at Dabhol, in Maharashtra State – the largest-ever foreign private investment in India – has threatened to derail India's drive to attract private power developers.

Dabhol, the first (and so far the only) IPP to begin construction, has been in the spotlight since the unsolicited proposal was first made in 1992. Enron Corp. of Houston, Texas, with an 80 per cent stake, together with GE Capital (10 per cent) and Bechtel (10 per cent), proposed to build a two-stage 2,015 MW, US\$ 2.8 billion plant to be fuelled initially by distillate and later by gas. Financing was provided through equity, Indian and off-shore bank loans, US Eximbank and OPIC. There was no Indian partner, nor were any of the multilateral financial institutions involved.

When the State government of Maharashtra changed after elections early this year, the incoming Shiv Sena-BJP coalition set out to review the Power Purchase Agreement (PPA) contract signed by the previous Congress government, for "irregularities". In July, the new Chief Minister, Mr Joshi, announced suspension of Stage I and cancellation of Stage II. His stated objections to the project were essentially that:

- It was a negotiated deal, concluded "in secret" without competitive bidding or public scrutiny.
- The capital costs used to calculate the tariff to the SEB were inflated, and Maharashtra was going to pay too much for the power.

In addition there was opposition from environmental groups — although the project had been through two environmental clearances — and from nationalists who objected to the proposed import of LNG from the Mid-East.

After months of negotiation and legal manoeuvring, Enron and Maharashtra in late November announced that they had reached a settlement which entailed sharply reduced capital costs and a lower price for electricity, thus clearing the way for work to resume.

Meanwhile, there was wide speculation that the "Enron fiasco" would frighten off other IPP promoters, and cause lenders to exact a higher country-risk premium for India. With the announced settlement, major Western industry sources now feel that the damage to India's reputation can be repaired, and suggest that IPP promoters can draw valuable lessons from the Dabhol case.

Meanwhile, it has become clear that the risk that a new government may review commitments made by a previous administration is not confined to Maharashtra. The new State government of Orissa has sought renegotiation of AES Trans-power's Ib Valley project, and has asked four other promoters with which MOUs have been signed to submit

fresh proposals to reduce the costs of power, failing which it will put the projects up for bidding. Several other states have requested renegotiation of PPAs, including those for most of the "fast track" projects. (Cogentrix is reported to have reduced the capital cost of its Mangalore proposal by over 25 per cent.)

3. Where the Opportunities Are

The recent confusion and uncertainty surrounding the status of private power projects should not obscure a basic fact:

India needs all the power it can get. Whatever the mix that emerges between private and public investment, or domestic and international financing, growth in the power sector over the next decade will be enormous, and will occur at every stage of generation, transmission and distribution. It will involve both the building of new facilities and the refurbishing of old ones. It will create tremendous demand for both equipment and services.

There are many potential points of entry for Canadian firms in India's power sector.

Power generating projects

New power generating projects will be undertaken at three levels:

- Central government projects, undertaken mostly by NTPC and NHPC for direct feed into regional grids, with individual States assigned shares of the output;
- State projects, undertaken mainly by the SEBs or their commercialized successors, including some public-private ventures in the so-called "joint" sector;

- Private projects, either
 - (a) in response to invitations-to-bid issued by Central agencies or individual States: the majority of such projects will be for coal-fired stations; but some will be for CCGT and hydel; or
 - (b) unsolicited (like Enron's Dabhol station): these will include private captive and co-generation power, as well as large grid-feed projects.

Box 3.1 A Canadian "first": Jawaharpur

Pacific Electric Power Development Corp. of Vancouver has received approval to develop a US\$ 1.1 billion, 2x400 MW coal-fired private power project in the State of Uttar Pradesh. It will be located at Jawaharpur, 250 km from Delhi in one of the most populous and power-deficient districts of India.

PEPDC, an affiliate of Mr. Ashok Dhillon's Canasia Power Corp of Vancouver, will develop the project on a build-own-operate basis, under a power purchase agreement signed last June with the Uttar Pradesh State Electricity Board. It is the first "all-Canadian" private power project in India. SNC-Integ, Monenco-Agra and New Brunswick Power are also involved.

Final clearances are expected shortly, and construction is slated to begin in mid-1996.

To take the state of Uttar Pradesh (India's largest) as an example, power stations now planned or underway amount to 3,550 MW in SEB projects, 1,750 MW (UP's share) in Central projects, and 2,200 MW in private projects for which MOUs have already been negotiated (including Pacific Power's Jawaharpur project — see Box 3.1). Proposals have been invited for a further 1,730 MW in private projects, and Canadian firms are believed to be pursuing three of these.

Private Power Projects. This is the area that has attracted the most attention internationally. A few Canadian firms have already entered the field. There are several ways Canadian companies can participate in such projects: as prime promoter and investor, as a consortium or joint-venture partner, or as a supplier of goods and services.

Many of the promoters of IPPs — U.S. firms are predominant among the foreign ones (see Box 3.2) — are themselves suppliers of power equipment and services. Canadian manufacturers and engineering companies who are willing to assume some risk and can arrange the requisite financing for such an approach will see the advantage of being able to control the shape and design of the project, and tailor it to their supply capabilities.

The recent controversy over foreign-sponsored, negotiated deals suggests that would-be Canadian investors should follow these pointers:

- Have an Indian partner. The new rules may permit 100 per cent foreign ownership, but having a committed local investor as a partner is an invaluable asset in avoiding the kind of political isolation that Enron found itself in. A joint venture partner could be a private Indian firm, or even one of the SEBs.

Box 3.2: Some U.S. firms sponsoring IPPs in India

AES Power
Asia Power Corp.
Bechtel Enterprises Inc.
Besicorp Brooklyn
CMS
Caithness International Power Corporation
Chicago Power Corp.
Cogentrix Inc.
Enron Corporation
GVK
Houghdon Inc.
Independent Power Group
J. Makowski
Mission Energy
Northeast Energy Services Inc.
Southern Electric Corporation
Spectrum Technologies and
S.T. Power Systems

- Make certain that all dealings are transparent, and can stand up to public scrutiny, especially if the local government changes. The best way to ensure this may be to go after projects that are being put to competitive tender, rather than the now-tarnished MOU route.
- Make sure that claimed capital costs are fully justifiable. The idea that India is being "ripped off" by foreign operators is a recurrent theme in the controversy over IPPs.
- Do not expect a Central Government guarantee. Instead, negotiate one of the alternative means of security (escrow accounts, etc.) now offered. The best assurance of reasonable financial security is a well-structured PPA that deals adequately with issues like fuel supply. The best assurance of political security is

probably to involve a multilateral institution like the World Bank, the IFC or the Asian Development Bank. These agencies have all shown interest in IPPs, and are offering innovative financial support.

Several large, financially strong Indian industrial houses in non-power businesses have now become active in promoting power generation projects. An example is Rajasthan Spinning and Weaving Mills Ltd (RSWM), part of the Bhilwara Group, which is planning to undertake hydro power projects in nearby Himachal Pradesh, in cooperation with Hydro-Québec, and sell its electricity to the Northern Grid.

A second example is the petroleum refining industry, which has been explicitly encouraged by the Central Government to enter into private power generation projects. Such companies can be approached as JV partners, or as potential purchasers of Canadian supply.

IPP's are also perhaps the best bet for Canadian companies interested only in supplying equipment and services. This is because the private promoters are sure to insist on the best and most up-to-date technology available, with guaranteed on-time delivery — and this in turn will frequently mean importing it.

A complete listing of IPP prospects in India prepared for this report, with their status as of November, 1995, is provided in Annex V, and is also available on DFAIT's electronic bulletin board.

In addition to new, greenfield stations, there is growing private activity in *power plant*

refurbishment. The NTPC and several SEBs are inviting private parties to take over, renovate and operate their older stations and sell the power back to them. New Central guidelines envision three options:

- LROT (lease, rehabilitate, operate and transfer);
- outright purchase of the plant; and
- joint public-private ventures.

Public sector (Central or State) projects supported by the World Bank and other international official lending agencies (including Japan's untied foreign assistance program). Because these agencies generally require international bidding, Canadian companies should have a fair opportunity to compete for the equipment and services.

Public-sector go-it-alone projects. Whatever happens on the private project front, a significant portion of power generation and transmission projects over the next decade will be undertaken, as in the past, by local authorities — the SEBs and the NTPC/NHPC — on the basis of local funding and supply. Direct sales opportunities for foreign equipment and services will be limited, in light of the local industry's abilities and the high prevailing customs tariffs. But there will be increasing chances for Canadian firms to enter joint-venture and licensing partnerships, as Indian manufacturers seek to upgrade technology. Canadians may also be able to demonstrate to the local SEBs that high-technology components like SCADA systems, which are for the most part imported, can enhance the performance and profitability of their plants. The ability to offer EDC-type export financing will be crucial in such sales.

Box 3.3: A second-hand market?

A Canadian trading company is negotiating the sale of an existing 280-MW thermal generating plant, now installed in a Canadian provincial power facility, to a private buyer for captive use in Maharashtra State.

Captive power plants. Many large industrial concerns in iron and steel, fertilizers, cement, petroleum, aluminum, chemicals and petrochemicals are investing in their own secure power source. The units are typically in the 15-25 MW range, and sometimes much larger. Central and State governments are encouraging this investment: captive plant developers enjoy essentially the same privileges as IPP promoters, and are assured a remunerative rate for any surplus power they sell to the local SEB. By identifying Indian companies with an interest in building or upgrading such facilities, Canadian firms can open the way for either joint venture or direct procurement possibilities.

**Box 3.4:
Co-generation from new sources**

The State of Punjab is planning to require all paper-making plants to meet 60 per cent of their own power requirements through co-generation, in order to reduce the State's growing power shortage.

In Madras, the Tamil Nadu Industrial Development Corporation (TIDCO) has signed an MOU with a British firm to build a US\$ 6 million, 5 MW garbage-to-power plant that will consume 600 of the city's daily 2000 tons of garbage.

Co-generation for power sales to SEBs. The current potential is estimated at about 8,000 MW, of which the sugar industry accounts for more than 5,000 MW. The total potential is expected to rise to 45,000 MW by 2015, mainly in sugar refining, but also in the textiles, paper, chemicals and fertilizer industries. Progress in this area is now hampered by a lack of adequate high-pressure boilers and turbine accessories in India.

Non-Conventional Power Generation. India is investing in many forms of renewable energy development. The Ministry of Non-Conventional Energy Sources (MNES) is planning for the installation of 2,000 MW during the current Five-Year Plan, and is forecasting the addition of 10,000 MW during the Ninth Plan (to 2002) and another 20,000 - 30,000 MW during the Tenth Plan (to 2007). These plans, which call for both decentralized, stand-alone systems and the production of grid-quality power, are attracting support from multilateral and bilateral development agencies.

Special investor incentives in this sector are similar to those for conventional IPPs: accelerated depreciation, 20 per cent import duty on power plant and equipment imports, a five year tax holiday, etc. In addition, grants and subsidies are available from the Central Government and from individual States (Tamil Nadu is a leader), which are actively promoting such projects and will guarantee to purchase the power produced.

Power Transmission

India has standardized on 800 kV and 400 kV transmission over grid lines and 230 kV, 110 kV and 11 kV lines for sub-transmission. Normal distribution is 430 Volts, 3-phase and 230 Volts single-phase 50 Hz.

Box 3.5: Non-conventional power development

Wind power: India's estimated potential for wind generation is 20,000 MW. The 8th Five-Year Plan called for the installation of 500 MW. In fact, during the last year, projects producing 236 MW have been commissioned, taking the installed total to 556 MW, nearly all of which is in private hands. 85 suitable sites for a total of over 4,000 MW have now been documented in 8 states, and large wind farm projects totalling 1,800 MW are said to be in the pipeline, in Southern and Western states. A good portion of the required goods and services will have to be imported. Denmark has dominated the import market to date.

Small hydro: Definitions: *Small hydro:* 2 MW to 25 MW; *Mini hydro:* 0.1 M to 2 MW; *Micro hydro:* below 100 KW. India's potential is estimated at 10,000 MW, and the installation target for the 8th Plan is 600 MW. 2000 suitable sites have been identified. MNES is offering grants for project preparation work. The United Nations Development Fund (UNDP), together with the multilateral Global Environmental Facility (GEF), is helping to promote small-hydro development in the Himalayan foothills. Private investors are welcome to participate through joint ventures. One Canadian company, Canadian Hydro, has successfully pursued a series of such projects in India.

Biomass co-generation. As one of the world's leading cane sugar producers, India has a tremendous potential for generating power by using refinery waste products (bagasse) as fuel. So far, more than 400 sugar mills have been identified as suitable, with a potential of 3,500 MW. The 8th Plan envisions installation of 300 MW in new bagasse-based power. Several projects have already been undertaken, either as "captive" plants to meet the power needs of the sugar mill itself, or for selling power directly to the SEBs. MNES offers subsidies for demonstration projects, and there are 12 now under consideration.

Solar power: This source of power is already widely used in India. There are some 150,000 small photovoltaic systems in place, powering remote lighting, water-pumping and telecommunications facilities, and supplying villages with electricity. During the 8th Plan to date, MNES has received BOO or BOT proposals totalling 10 MW from private promoters seeking to erect grid-connected photovoltaic plants of 2 MW capacity or more.

In the area of *solar thermal power*, MNES is contemplating a 35 MW demonstration project, for which World Bank/ GEF funding is being discussed. A private proposal for a 10-year, 150 MW solar thermal project in the Kutch desert (bringing 15 MW on stream each year) was submitted by Enron and Amoco, at the invitation of the State Government of Rajasthan — which now, under the new Central guidelines, has cancelled negotiations, and opened the project to competitive tender.

Ocean power (thermal, tidal and wave). The total potential along India's 5,600 km coastline is estimated at 50,000 MW. The first 100 MW marine thermal conversion project has been proposed by a U.S. company, for installation off the coast of Tamil Nadu. MNES is actively pursuing a proposed 900 MW tidal plant in the Gulf of Kutch, off the Gujarat coast. A wave power plant of 150 MW has been installed in Kerala. A pilot project for a new, Swedish-designed "floating" wave power concept is reportedly planned for the Andaman Islands.

Major investments in the expansion and restructuring of power transmission facilities will be required over the next few years, as new generating stations begin to feed into a system that is already overloaded and subject to heavy losses. Moreover, since the economics of energy transportation favour moving it in the form of electricity rather than coal, there will be increasing emphasis on long-distance power transmission from generating stations near the coalfields of Eastern India to markets throughout the country.

Much of this work will be undertaken by Powergrid Corp (which, together with the SEBs, accounts for 80 per cent of procurement). Powergrid had 23,000 circuit kilometres (CKm) of lines in 1993, and anticipates installing another 18,000 CKm during the 8th Plan period. Powergrid's current transmission standard is 800 KV AC, but it will be looking increasingly to HVDC and FACT (flexible AC transmission) links to reduce losses in bulk power transmission, as it completes its mandate to build a national grid out of the five regional systems. Power

Box 3.6: The World Bank Group's role in Indian power

The *World Bank* has made a total of 36 IBRD loans (US\$ 6.8 billion) and 19 IDA "soft" credits (US\$ 2.4 billion) to India for public power sector development over the years, mainly to NTPC and a few selected SEBs. The Bank has worked very closely with India on power sector reform issues, at both the central and state (SEB) levels. Because progress in reforming SEB tariff structures and other problems has been slow, the Bank has suspended loans to some of them, and in fact has approved no new power sector loans since 1993.

In its pipeline for India, the World Bank currently has under study three "Power Sector Restructuring" programs to support reform in the states of Haryana, Orissa and Uttar Pradesh, for a total of almost US\$ 1 billion. The projects are aimed primarily at rehabilitation and upgrading of generation and T&D facilities, load management and conservation, demand-side management, and assistance with privatization efforts. They will lead to substantial procurement of both consulting services and equipment.

The Bank has also provided technical assistance to a number of SEBs (via the central PFC) to hire consulting advice in preparing projects for tendering as IPPs, and for assessing and negotiating proposals received.

The *International Finance Corporation (IFC)*, the World Bank's corporate financing arm, has invested US\$ 203 million in four of the five long-standing private utilities. It is also investing in private power projects in Orissa, AP and TN. IFC now has an office in New Delhi, where it is actively seeking new power project opportunities. Many IFC projects involve a partnership of two or more firms, and IFC may even act as "matchmaker" between compatible Indian and foreign firms. IFC supplements its own investment by taking the lead in arranging funding from other sources, including ECAs and loan syndications.

The *Global Environment Facility (GEF)*, administered by the Bank, supports environment-related research and demonstration projects.

Finally, the World Bank's *MIGA (Multilateral Investment Guarantee Agency)* is available to provide political security for projects in India.

Canadian procurement under World Bank prior review contracts since 1991 is shown in Table 6.1.

grid will also be investing to equip the five regional dispatch centres with state-of-the-art technology.

Powergrid is said to be seeking consultancy services for the preparation of PPAs and power-trading arrangements. There is also scope for consultancies in various aspects of EHV transmission lines, sub-stations, tower designs and system planning and design.

Improving the System's Efficiency

India cannot meet its energy demands through the expansion of generation and transmission capacity alone, and will have to look to efficiency improvements at every point in the cycle from generation to consumption. The Central Government has estimated that every percentage point improvement in average PLF effectively adds almost 400 MW to generating capacity. In addition, it has shown that India could add 30 per cent to its effective power output through efficiency measures and by taking advantage of the conservation potential. Such improvements will require major investment, for the most part by Central and State agencies, and the purchase and installation of new technologies.

Retro-fitting and upgrading of existing plant. In addition to the old-plant privatization initiatives referred to above, the NTPC/NHPC and the SEBs will be required, for both efficiency and environmental reasons, to improve the performance and profitability of their generation facilities. There will be opportunities for Canadian firms to enter

into joint ventures and technology transfer agreements with Indian partners to undertake this work.

Reducing T&D losses. To reduce technical losses will require transmitting electricity at higher voltages and at appropriate HV/LV transmission ratios, the installation of capacitors, re-conductoring, and eliminating over-loading and under-loading of distribution transformers.

If market-related losses are to be reduced, metering systems will have to be installed, billing procedures improved, etc. There is a role here for Canadian companies to provide technical and financial advice and management services. Ontario Hydro International has been providing assistance of this kind to the Maharashtra SEB.

Environmental considerations. Environmental policy for the sector is the responsibility of the Ministry of Environment and Forests (MOE&F). All new stations must be cleared by MOE&F, must submit an EIA, and must be passed by the Central and State Pollution Control Boards.

Local and international non-governmental organizations are a factor to contend with, and some may be expected to protest any significant power development: *thermal*, because it will add to the global load of carbon dioxide; *hydro*, because of reservoir flooding and displacement of people; and *nuclear* — because it is nuclear. On the other hand, increasing public ecological awareness suggests opportunities for the supply of environmental equipment and services.



The NTPC is said to be seeking consultancy services in the areas of effluent and solid waste management and pollution monitoring and control.

Clean coal. Given India's heavy dependence on coal for thermal power generation, interest in clean-coal technologies has been growing. As new generating installations are built, particularly privately-financed ones, there will be a trend towards modernized combustion processes: stage burners, reburning and fluidized-bed combustors, as opposed to the pulverized coal systems now in use. There will also be demand for post-combustion emission control technologies, including flue-gas scrubbing systems and fly-ash utilization programs.

It has been demonstrated that the washing of coal can actually pay for itself, wherever coal has to be transported more than 1,000 kilometres.

The Canadian Energy Research Institute (CERI) of Calgary has a cooperative research program in place with India's Tata Energy Research Institute.

Box 3.7:

The Asian Development Bank (AsDB)

The AsDB has provided over US\$ 1 billion in loans for power generation projects in India. It is supporting the Ib Valley project in Orissa with US\$ 50 million from its private sector window, and is expected to provide US\$ 190 million in loan and equity funds for the 500 MW Balagarh Thermal Power Project in West Bengal. It is also involved, with a US\$ 275 million loan, in Powergrid's efforts to rationalize and improve regional and national transmission networks, and provides funding for non-conventional power development through MNES and IREDA.

4. The Competition

The Indian industry's capabilities¹

India has developed a broad domestic heavy electrical industry which supplies at least 85 per cent of procurement. Indian manufacturers have obtained licenses from most of the world's major companies in the sector. ABB, GEC-Alsthom and Siemens have a long and firmly established manufacturing presence in India, and GE has moved in strongly in recent years. GE Canada has an arrangement with BHEL to build large Francis turbines.

Nuclear, thermal and hydroelectric generators, turbines, switchyards, coal and ash handling equipment, electro-static precipitators etc. are all made in India, and in fact many items are exported. Indian engineering groups have considerable experience in turnkey projects, from site selection and system design to erection, commissioning and manpower training, and are now exporting this expertise throughout Asia and Africa. In general, however, Indian electrical products tend to be "standard"; equipment of higher ratings, and incorporating the latest technology, is often not available locally. Delivery times, too, may be inadequate — up to 18 months.

¹ The following discussion of India's industrial capabilities and import requirements, and the selection of HS Code lines of prime interest, is based on a series of U.S.-commissioned studies in 1993, carried in the U.S. National Trade Data Bank. The trade figures have, however, been updated to 1995 for the present paper, using Indian government sources.

Box 4.1:

Indian giants in the power industry

India's first 500 MW thermal station, commissioned in 1984 at Trombay (near Bombay), was built for Tata Electric, a private utility, by Tata Consulting Engineers, who claimed at the time to have engineered 35% of India's installed thermal capacity. Bharat Heavy Electricals Limited (BHEL) made and supplied the generating equipment, with the import of drums, mills, and control systems through a partnership with Combustion Engineering (USA).

BHEL is a state-owned company. It has dominated the Indian market for standard boilers and turbines, where it is said to enjoy a 25% price advantage over imports. It can produce 7,000 MW of power generating equipment annually, and has supplied two-thirds of India's installed plant. It has built thermal equipment to 500 MW, hydro equipment to 165 MW and combined-cycle gas turbines to 200 MW, and is now developing 1000 MW thermal and 250 MW hydro sets.

As private power entrepreneurs begin to outweigh traditional customers among the SEBs and the NTPC, India's big manufacturers fear their orders will drop, because of the innovative financing that foreign competitors can offer. BHEL and Tata are reported to be forming a consortium with Larsen and Toubro Ltd., Engineering India Ltd. and the Industrial Credit and Investment Corporation of India (ICICI), to go after turnkey contracts, equipment supply, construction and consultancy work on IPPs — starting with the "fast track" projects. With ICICI's financial backing, the consortium expects to offer stiff competition to foreign suppliers.

In the transmission and distribution segment of the sector, India manufactures a wide range of transmission hardware, accessories, string insulators, AAAC/AAC/ACSR conductors, lightning arrestors etc. Various types of transformers suitable for units up to 500 MW are made. Also manufactured in India is the entire range of circuit breakers (bulk oil, minimum oil, air blast, earth leakage, vacuum and SF6), LT switchgears and controlgears, MCBs, switches, receivable and HRC fuses, control equipment and systems and other associated equipment and accessories.

The Indian cable industry offers a wide range of high/ medium/low voltage XLPE, PILC, PVC, VIR and rubber cables. Indian manufacturers of transmission line towers and related hardware can execute turnkey contracts for design and erection of entire transmission systems.

Indian firms are developing equipment-making capacities for renewable energy production (wind generators, photovoltaic cells, etc.), but the import component is still high — typically 50 per cent or more. (*See Annex IV for a list of major Indian suppliers of electrical equipment and services.*)

India's import requirements

The import market for large generators, turbines, switchgears, transformers, control gears and transmission hardware is likely to increase substantially in the next 5 years.

The most important factor driving this increase is the large expected investment in

private power projects, whether by domestic or foreign promoters. These promoters can be expected to insist on equipment of the highest quality and technical performance, with guaranteed delivery schedules. The reduction of India's normally high import tariffs (typically 80 per cent or more, plus excise taxes of another 30 per cent) to 20 per cent and no excise for power project-related equipment should make imports feasible and attractive. The heavy presence of U.S. investors in the IPP field may tend to shift imports from the traditionally-favoured European suppliers.

Table 4.1 provides import statistics (Indian government data) for the major items of interest for the last four years.

Transmission and Distribution. U.S. sources recently estimated the Indian market for power transmission equipment at over US\$ 3 billion. Since Indian industry currently supplies over 90 per cent of procurement, this represents an import market of some US\$ 250-300 million, which is expected to grow by 20 per cent a year. The principal imported items are transformers, cables, insulators, conductors, switchboards and relays, capacitors and circuit breakers.

A large quantity of co-axial, insulated and power cables is imported. Electrical insulators of ceramics, glass and porcelain are imported from Japan, Germany, the U.S., and Italy. The United States supplies the majority of liquid dielectric transformers of higher ratings (up to 250,000 KVA), followed by Italy and France. Fixed capacitors are provided by the U.S., Japan and Singapore. Electrical resistance wire is also imported from the the U.S., Japan, U.K. and Italy. Germany, Japan, the U.S. and U.K. are

Table 4.1 India: Imports of Major Electrical Products (US \$ million)

<i>Product Category (HS Code)</i>	<i>Year</i>			
	<i>1991-92</i>	<i>1992-93</i>	<i>1993-94</i>	<i>1994-95</i>
Steam and other vapour generating boilers; super-heated water boilers (HS Code 8402) <i>Italy (6%) Japan (20%)</i> <i>UK (14%)</i>	3.3	4.2	6.9	1.8
Auxiliary plant for use with boilers (HS Code 8404) <i>Germany (80%) UK (9%)</i> <i>Netherlands (6%)</i>	17.5	1.6	7.1	2.7
Steam turbines and other vapour turbines (HS Code 8406) <i>Russia (29%) France (16%)</i> <i>Germany (15%)</i>	35.4	55.3	17.8	33.0
Hydraulic turbines, water wheels (HS Code 8410) <i>Germany (89%) USA (5.5%)</i> <i>Finland (2.2%)</i>	4.8	1.8	0.9	2.0
Turbo-jets, propellers and other gas turbines (HS Code 8411) <i>Japan (39%) USA (30%)</i> <i>UK (12%)</i>	59.0	23.1	135.2	133.4
Electric motors and generators excluding generating sets (HS Code 8501) <i>Japan (28%) Germany (16%)</i> <i>Denmark (11.2%)</i>	24.8	23.9	25.9	42.8
Generating sets and rotary converters (HS Code 8502) <i>Finland (33%) Denmark (28%)</i> <i>Germany (24%)</i>	17.8	8.8	16.2	54.8
Electrical transformers, static onverters (e.g. rectifiers) and inductors (HS Code 8504) <i>Japan (24%) USA (14%)</i> <i>Singapore (12%)</i>	17.8	8.8	16.2	54.8
Electrical apparatus for switching or protecting electric circuits, for voltage exceeding 1000 Volts (HS Code 8535) <i>Germany (26%) UK (18%)</i> <i>France (15%)</i>	1.7	3.3	5.1	4.4
Electrical apparatus for switching or protecting electric circuits, for voltage not exceeding 1000 Volts (HS Code 8536) <i>Japan (20%) USA (17%)</i> <i>Germany (16%)</i>	39.2	71.4	68.1	77.9

Source: Government of India

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major suppliers of high rupturing capacity fuses and switchgear.

There is relatively little import activity at the distribution equipment end of the spectrum. Canadian firms, however, should find opportunities for consulting and service contracts with the SEBs, and for joint ven

tures and technology licensing arrangements with local manufacturers.

The foreign competition. Table 4.1 also shows percentage shares of the three largest foreign-country suppliers for items of major interest. Annex IV includes information on foreign companies that have collaborative arrangements with Indian manufacturers.

5. Canada and India's Power Sector

Canada's historical role

In the years following India's independence, Canada played a key role in the power sector. With financing from Canada's bilateral aid program, Canadian firms were responsible for building and equipping projects that even today represent 10 per cent of India's installed hydro capacity.

These included the *Canada Dam* at Mayurkshi in West Bengal, *Umtru* in Assam, *Kundah* in Tamil Nadu, *Idukki* in Kerala, and (more recently, with EDC parallel financing) *Chamera I* in Himachal Pradesh. Canada also supplied the reactors for the *RAPP 1* and *RAPP 2* nuclear power stations in Rajasthan. Important Canadian transmission undertakings have included the *Rihand-Delhi HVDC line*, and the *Vindhychal* back-to-back project.

In the late 1980s, official Canadian financing for the power sector tailed off, and Canadian industry's involvement in Indian power began to decline. But with India's economic recovery since 1991, and the reforms that have been undertaken in the power sector, more Canadian companies are now exploring business opportunities there.

India has demonstrated that it is serious in encouraging a renewed Canadian role in power sector development. During the summer of 1995, a high-powered Indian delegation, including the new Secretary of the Power Ministry, an SEB chairman (from UP, the largest state), a private utility chairman, and the CEA's chief engineer toured Canada for roundtables with Cana-

dian industry, sponsored by the Conference Board of Canada.

Canada's market presence in India's power sector in recent years has been statistically very small, in terms of equipment supplies. On the one hand, using the broad OECD/UN definition of power generating machinery and equipment, Canada is among the seven leading OECD exporters worldwide. Yet, while India's annual imports from OECD countries for the years 1990-1992 under this definition averaged some US\$ 600 million, Canada accounted for barely one per cent of those imports.

Table 5.1 shows Statistics Canada's records of Canadian goods and equipment exports under the HS code items of major interest for the period January, 1992 to September, 1995. Sales to India accounted for only one per cent of those exports.

Canadians already on the ground

This modest performance for Canadian power sector exports is likely to change, with an increasing number of Canadian companies engaged in or pursuing opportunities for power business in India. In addition to *Pacific Electric Power Development Corporation*, with its proposed project at Jawaharpur in Uttar Pradesh (Box 3.1), the following have been reported among Canadian firms currently active in India.

Hydro-Québec and *Ontario Hydro* are members of the "E-7", a group of (actually eight)

5.1 Canadian Power Sector Exports to India and World, 1992 to 1995

Item (HS Code)	1992	1993	1994	1995 Jan-Sept
<i>Exports to India by Category:</i>				
	(Cdn \$ thousands)			
Boilers (8402)	46	2	59	9
Boiler aux. Plant (8404)	-	-	-	8
Steam turbines (8406)	21	237	14	-
Hydraulic turbines (8410)	1,297	-	103	-
Gas turbines (8411)	3,016	7,591	1,223	2,135
AC/DC generators (8501)	40	2	92	313
Generating sets (8502)	-	-	-	-
Parts of generators and generating sets (8503)	992	270	148	-
Transformers (8504)	97	2,886	1,021	579
Switching/protection apparatus >1,000 v. (8535)	-	-	-	-
Switching/protection apparatus <1,000 v. (8536)	94	94	128	466
Power cables (8544)	28	479	71	85
	(Cdn \$ millions)			
<i>Total exports of above items to India</i>	5.6	11.6	2.9	3.6
<i>Total exports, same items, to World</i>	2,795	3,266	3,500	3,067

Source: Statistics Canada

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utilities in North America, Europe and Japan which is assisting India's NTPC to train staff and implement its Environmental Action Plan. OHI is also helping the State of Maharashtra, under a 994 contract, to improve energy efficiency through new metering, billing procedures and Demand Side Management (DSM). HQI is in partnership with a major Indian industrial concern (Rajasthan Spinning & Weaving Mills Ltd, RSWM, of the LNJ Bhilwara Group) on two projects (Malana and Allain-Duhangan), for which MOUs have been signed with the State of Himachal Pradesh.

BC Hydro International is working with Indian industrial partners to pursue BOOT projects, both hydro and thermal, in several States, as well as adjacent areas of Nepal.

One of these would involve taking over a partially-completed hydro station in UP. The company expects to have at least one letter-of-intent signed during 1996. BCHI has also provided consultancy services for the State of Himachal Pradesh.

GE Canada has supplied equipment and technology for 15 hydro-electric projects in India, including Kundah, Idukki and Chamera I. It also refurbishes and modernizes old hydro plants, and recently completed a project to upgrade generators at Sharabathy for Karnataka Power Corp. GE Canada has a collaboration with BHEL to manufacture large-capacity Francis turbines, some of which are now being installed at the Ranganadhi project in Sikkim.

The Foundation Company of Canada, with its Indian partner Continental Construction, has won two important contracts on the huge (1,500 MW) World Bank-financed Naphta Jhakri hydro project in Himachal Pradesh.

SNC Lavalin's Chamera I hydro project (540 MW) in Himachal Pradesh has been commissioned, and the company is now pursuing Chamera II and other projects in several states, in partnership with Jaiprakash Industries Ltd.

Monenco Agra and Fording Coal have formed a consortium, West Power, with the Indian groups M.M. Bhagat and SMS Investments to pursue lignite-based power projects.

Cantherm is understood to have made a proposal for the Yamuna Nagar Thermal Power Station (2x210 MW) in Haryana.

Other Canadian firms recently reported in India and Nepal include the *Asia Power Group* (a consortium of HQ, OHI and Power Corp), *Algonquin Power, Acres International, TransAlta, Westinghouse, Matthews International, Universal Water & Power Ltd, and Eastern Power Developers Inc.*

In total, Canadian firms, as of summer 1995, were involved in or actively pursuing state-sponsored or private power projects totalling over 10,000 MW. In addition to the almost-4,000 MW of hydro projects in Himachal Pradesh (Box 5.1), and PEPDC's Jawaharpur project, these included: *Vishnuprayag* (400 MW), *Maneri Bhali II* (304 MW) and *Pala Maneri* (416 MW), all hydro projects in Uttar Pradesh; *Teesta Hydrel III* (1200 MW, Sikkim), *Barsinghsar* (240 MW, lignite-fuelled, Rajasthan), and *Kozhicode* (diesel), *Lower Periyar*, and the extension to *Kuttiyadi*, all in Kerala.

Box 5.1: Himachal Pradesh: a "hotspot" of Canadian activity

Endowed with almost a quarter of India's hydro-electric potential, this small Northern state in the Indian Himalayas has attracted much attention from Canadian power firms, many of whom attended a power sector conference with the State's Chief Minister at Simla in May 1995. The Canadian-funded and built 540 MW *Chamera I* project had recently been commissioned, and Canadian companies were at that time engaged in or pursuing almost 4,000 MW of new hydro projects in HP: *Chamera II* (300 MW), *Karcham Wangtoo* (900 MW), *Malana* (86 MW), *Allain Duhangan* (192 MW), *Koldam* (800 MW), *Nathpa Jakhri* (India's largest hydro station, at 1,500 MW) and *Larji* (126 MW).

Of HP's hydro potential of 20,000 MW, only 4,000 is currently being exploited in commissioned projects. Projects now under construction by State and Central agencies will add another 2,100 MW. A further 3,700 MW capacity in private power projects is in the advanced planning stage, and projects for 650 MW are "under investigation".

The State government favours run-of-the-river type hydro development, rather than dam storage. It is also eager to promote foreign private sector involvement in mini-hydro plants, for which HP has an estimated potential of 500 MW.

6. How to Get in on the Action

Opportunities for Canadian equipment and services

Strategies for entering the Indian market may range from the promotion of turnkey IPPs (independent power projects) to the exploitation of *niche* markets for highly specialized goods or services. Canadian firms, large and small, should enjoy competitive advantage in the following areas:

Hydro-electric power plants: supply, construction and upgrading. Of particular interest may be the emphasis India is placing on smaller hydro plants.

Coal-fired power plants – renovation and modernization. New captive power plants under 100 MW.

Gas-fired power, particularly combined cycle plants – gas turbines.

Co-generation plants – in sugar, paper, refinery, chemical industries.

Non-conventional power generation – wind, solar, marine power.

Transmission equipment and services – HVDC/EHV lines – design and construction of 400 and 800 KV lines – medium and heavy-duty transformers and capacitors – specialty wires and cables.

Supervisory control and data acquisition (SCADA) systems.

Demand side management programs – metering systems.

Energy efficiency and conservation technologies.

Power-related environmental equipment and technologies.

Consulting services to SEBs, government ministries and agencies, and private project promoters. India's new entrants in the power sector will require assistance for feasibility studies, design and construction, selection and sourcing of equipment, setting up distribution networks, cost analysis, management, and standardization of products and equipment.

Where to seek business

The greatest potential for Canadian goods and services is likely to arise from the private power projects now planned for execution. Short of undertaking their own IPPs, alone or as consortium members, firms interested in direct sales or sub-supplier opportunities should make contact with the promoters of these projects, preferably through their Indian offices or affiliates.

Such contacts should not be limited to foreign-based developers — many private projects are led by Indian companies. In the case of co-generation and "captive" projects, these may be in industries that are not directly related to power.

Box 6.1: Some Indian promoters of power projects

Tata Power
BSES
CESC
S. Kumar's
Hinduja National Power Corporation
RFG Korba West Power Company Ltd
Shree K.V. Maheshwar Hydel Power Corporation Ltd
Panch Power Ltd.
Central India Power Corporation
Reliance Jamnehar Power Company Ltd
Rosa Power Supply Company Ltd
GCK Industries
Gujarat Torrent Energy Corporation Ltd.
Jaiprakash Hydro Power Ltd.

An agent or representative in India can facilitate such contacts, and can research the local market more closely. The Canadian High Commission in New Delhi and the Canadian Consulate in Bombay can supply names of suitable candidates.

For firms seeking longer-term prospects in the Indian market, and especially for those hoping to sell to public-sector entities, a manufacturing presence in India can be very important. This can range from an import-and-assemble arrangement with an Indian manufacturer to licensing agreements and joint ventures with well-established local partners. At least 120 collaborations to date have been set up between Canadian and Indian firms in various sectors, including power. There are 27 Indo-Canadian joint ventures in the Delhi area alone.

Since 1991, the Government of India has made it easier for international companies to invest in many sectors of Indian industry.

Power generation and transmission equipment is one of these sectors. Foreign firms can now own up to 51 per cent (and in some cases more) of the equity in new enterprises. Automatic investment clearance is given, provided the foreign equity contribution is sufficient to cover the cost of imported capital goods.

Annex IV lists a number of Indian firms supplying power equipment and services. Canadian firms will view some of these as competitors, others as potential joint venture or licensing partners. Other Indian manufacturers can be identified through the information sources cited below.

Financial considerations

For suppliers of large capital goods of the kind needed in the power sector, the ability to offer competitive financing has long been a key condition of success. During the 1980s, competition among major foreign suppliers, backed by their national export credit or development assistance agencies, made "concessional" financing the norm for power projects in India, and the country came to be regarded as a "spoiled market".

During the period 1982 to 1993, India received some US\$ 5.2 billion in official development assistance for the power sector, more than any other developing country, and ranked first among power sector recipients in the bilateral aid programs of Japan, Germany, the UK, Sweden and Canada. India was also one of the main targets for offers of "mixed credits" and other blends of aid and export credit funding, especially from France and Italy.

In 1992, new disciplines on export financing

were negotiated in the OECD (the "Consensus" rules), which declared most types of power projects "ineligible" for any kind of tied aid credit short of "pure aid". Despite scepticism in some quarters, these disciplines appear to be holding — only five tied-aid credits for India had been challenged under the new rules as of March, 1995. This is good news for Canadian suppliers, since capital project aid financing and mixed credits are virtually unavailable from Canadian sources. It means that Canadian exporters should not normally be at a disadvantage if they can offer standard EDC-type financing.

More important, though, is to recognize that the situation of India itself has changed. The nation's demand for power investment far outstrips any amounts of foreign aid that donor countries would be willing to provide, and concessional funding is not an issue when it comes to IPPs, the fastest-growing segment of the market.

Moreover, the major sources of "official" development financing, the World Bank Group and the *Asian Development Bank*, require competitive bidding (although co-financing by export credit agencies is frequently involved as well). Funding from Japan's Overseas Economic Cooperation Fund (which accounts for up to 50 per cent of all bilateral power-sector aid) and much of the co-financing provided by its EximBank is also in principle open to foreign procurement.

The coming of IPPs is shifting the focus towards "innovative" financing. Since IPPs are generally undertaken on a limited-course basis, must be largely financed from abroad, and may involve a large number of players from several countries, putting

together project finance is a complex business that is becoming an industry in itself. This is one reason why Canadian firms interested in becoming involved in IPPs are advised, for the most part, to work with a lead developer or a broader international consortium.

Sources of Financing

The *Multilateral Development Banks* — the World Bank and the Asian Development Bank (Boxes 3.6 and 3.7) — have traditionally been important sources of power sector funding in India. Over the last two years, in concert with some bilateral aid agencies, they have shifted their approach from direct funding of discrete projects to encouraging — or insisting upon — the reform process in the SEBs, more investment in transmission and distribution, and major private sector participation.

Procurement under projects involving MDB funding is subject to international competitive bidding. To "stretch" the impact of their funding, however, these agencies are making increasing use of co-financing arrangements as part of an overall financing package. Suppliers of equipment and services may, therefore, be asked to include in their bids an offer of financing from their export credit agencies or other sources. EDC has engaged in several co-financing arrangements of this sort on behalf of Canadian exporters.

India is also mobilizing new *internal resources* for power investment. The *Power Finance Corporation (PFC)* was established in 1989 to provide funding both to Central agencies (NTPC, NHPC and Powergrid) and

Table 6.1 World Bank prior-review contracts awarded to Canadian firms for power projects in India since 1991

<i>Name of Project</i>	<i>Description of Contract</i>	<i>Name of Supplier</i>	<i>Value of Contract (US\$ million)</i>
Kerala Power	Construction management	SNC-Shawinigan	3.0
Nathpa Jakhri (HP)	Construction of dam and civil works	Foundation Company of Canada (2 contracts)	62.7 73.9
Maharashtra Power	Engineering	Golder Associates	0.3
Northern Region Transmission	T&D	RSW Canada	1.1

Source: DFAIT

the SEBs. The Government is now exploring ways to utilize funds of the state-owned Indian Life Insurance Company (LIC) and the General Insurance Company (GIC). At the same time, major Indian industrial houses with large equity and capital bases are investing in power projects of all kinds — captive plants, co-generation and even large grid-feed stations. In the non-conventional power area, the *India Renewable Energy Development Agency, Ltd (IREDA)*, a Government of India Enterprise under MNES, has a mandate and modest funding (including World Bank, GEF and AsDB funds) to support manufacturing, technology development and consultancy services in new and renewable energy development: solar, small hydro, wind, bio-energy and co-generation.

Canadian Financial Support

Export Development Corporation (EDC) offers financing and insurance support for sales of Canadian equipment and services, as well as investment insurance. EDC has

long experience, and significant existing exposure, in India. In addition to its traditional lending to sovereign-risk borrowers, EDC is now examining a broader range of financial risk in India, including banks, large industrial corporations and even certain State governments. In light of the growing importance of IPPs, EDC has created a Project Finance Unit, which currently has several limited-recourse projects under review in the power sector.

CIDA's Industrial Cooperation Program, CIDA INC, has been active in providing support for joint ventures and technology transfer arrangements in the power sector. Its Professional Services program provides matching (and conditionally reimbursable) funding to Canadian firms for pre-feasibility and feasibility studies of potential projects in developing countries, while its Investment program helps pay for supplementary training and technical assistance that Canadian suppliers can offer in the course of implementing a project. This could be particularly valuable to Canadian SMEs consider-

ing possible joint ventures and licensing deals with Indian partners.

Canadian banks. Scotiabank and TD Bank have branches in India.

Box 6.2: A selective focus

India is a vast country geographically — almost a third the size of Canada. Canadian companies new to India may wish to focus their efforts, at least initially, on a few States. Looking at overall attractiveness, from the viewpoint of natural resource endowment, fuel costs, institutional effectiveness, progress in reform and restructuring, and overall socio-political stability, particular consideration might be given to business prospects in the following States:

- Orissa
- Karnataka
- Gujarat
- Andhra Pradesh
- Madhya Pradesh
- Tamil Nadu
- Himachal Pradesh
- Rajasthan
- Haryana
- Uttar Pradesh
- Maharashtra (assuming a satisfactory conclusion to the Enron affair).

Sources of Information

Information on power projects underway and planned can be obtained from a variety of sources in India.

At the Central level, the key operating companies to contact are *NTPC, NHPC and Powergrid*. For investment prospects, contact should be made with the Power Ministry's *Investment Promotion Cell*. At the State

level, the best contacts will be the *State Electricity Bureaux*.

Annexes I to III of this brochure list the addresses of the key Central and State regulatory and operating agencies, industry associations and power-related publications in India.

Regular information on projects being financed by the *World Bank* and *Asian Development Bank* can be obtained from *Development Business*, a fortnightly guide to consulting, contracting and supply opportunities around the world, published by the United Nations.

The same publication includes *The World Bank Monthly Operational Summary*, which provides a ready reference to all proposed World Bank projects²

In the case of the Asian Development Bank, a subscription should also be obtained to the monthly *ADB Business Opportunities*, which provides project information, with contact addresses, on each proposed project.³ This AsDB listing includes technical assistance projects, such as those for project preparation, as well as capital projects.

² The November 1995 issue of *The World Bank Monthly Operational Summary* includes proposed loans of US\$ 300 million for Haryana Power Sector Restructuring, US\$ 350 million for Orissa Power Sector Restructuring and US\$ 300 million for Uttara Pradesh Power Sector Restructuring.

³ The October 1995 issues of *ADB Business Opportunities* lists US\$ 275 million for Power Transmission, US\$ 150 million for Renewable Energy Development and US\$ 190 million for the Balagarh Thermal Power project.

Project summaries and other documents can also be obtained via *INTERNET* on the respective *Home Pages* of the World Bank (<http://www.worldbank.org>) and the Asian Development Bank (<http://www.asiandevbank.org>). Current status of a project should be checked with the responsible project officers by telephone.

Followup enquiries on projects should be addressed to the *implementing agency* — in most cases the NTPC, NHPC and Powergrid at the Central level, and the SEBs or Power Ministries at the State level.

For information on multilaterally financed projects

Development Business
One United Nations Plaza
Room DC1-560
New York, N.Y. 10017, U.S.A.

For subscriptions:

P.O. Box 5850
Grand Central Station
New York, NY 10163-5850

Tel (212) 963-1515

Fax (212) 963-1381

Subscriptions, Information Office
Asian Development Bank
P.O. Box 789
0980 Manila, Philippines
Fax (63-2) 741-7961/ 632-6816

Development Business Liaison Unit
World Bank,
Room S11-149
1818 H Street, NW
Washington, DC 20433, U.S.A.
Tel (202) 458-2397
Fax (202) 5222-3316



Canadian government sources of information and contacts:

Canadian High Commission
7/8 Shantipath, Chankyapuri
P.O. Box 5208
New Delhi 110021
Tel: (91-11) 687-6500
Fax: (91-11) 687-5387
Commercial officer (power): Ashwani Nanda

Consulate of Canada
41/42 Maker Chambers VI
Jamnalal Bajaj Marg, Nariman Point
Bombay, 400 021
Tel: (91-22) 287-5479
Fax: (91-22) 287-5514

Department of Foreign Affairs and International Trade
South Asia Division
125 Sussex Drive
Ottawa, K1A 0G2
Contact: Bill Skinner
Tel: (613) 996-5903
Fax: (613) 996-5897

Export Development Corporation
South Asia Division
150 O'Connor Street
Ottawa, K1A 1K3
Contact: Didier Delahousse, Relationship Manager, Industrial Equipment Team
Tel: (613) 598-2756
Fax: (613) 598-2503

CIDA INC
Canadian International Development Agency - Industrial Cooperation
Place du Centre, 5th Floor
200 Promenade du Portage
Hull, Quebec K1A 0G4

Contact: Susan Brown, Manager, South Asia, CIDA INC
Tel: (819) 997-0563
Fax: (819) 953-5024

Office of Liaison with International Financial Institutions (OLIFI)
Canadian Embassy
501 Pennsylvania Avenue, N.W.
Washington, D.C. 20001
Tel: (202) 682-7788
Fax: (202) 682-7789

Private-sector associations:

Canada-India Business Council
55 Metcalfe Street
Ottawa, K1P 6N4
Tel: (613) 238-4000
Fax: (613) 238-7643

Asia-Pacific Foundation of Canada
999 Canada Place, Suite 666
Vancouver, V6C 3E1
Tel: (604) 684-5986
Fax: (604) 681-1370

Industrial Associations in India:

Confederation of Indian Industry
23-26, Institutional Area, Lodi Road
New Delhi 110 003

Indian Electrical & Electronics Manufacturer's Association
501 Kakad Chambers,
132 Dr. Annie Besant Road
Bombay 400 018

Electrical Research and Development Association
P.B. No. 760, Makarpura
Vadodara 390010

Trade Publications:

Electrical India
Chari Publications
33, Vaibhav Industrial Estate
Sion Trombay Road
Deonar, Bombay 400 088

IEEMA Journal
Indian Electrical & Electronics Manufacturer's Association
501 Kakad Chambers,
132 Dr. Annie Besant Road
Bombay 400 018

Indian Electrical Contractor and Trader
107 Marol Co-operative Industrial Estate
Bombay 400 059

The Hindu Survey of Indian Industry
Kasturi & Sons, Kasturi Building
Madras 600 002

Trade Fairs and Exhibitions

ELECRAMA-96, to be held in Delhi in January, 1996, will be the third in a series sponsored every three years by the Indian Electrical & Electronic Manufacturers Association (IEEMA). ELECRAMA features equipment for the power and the energy sector, including electrical power equipment, electronics and industrial equipment. The last ELECRAMA show, held in New Delhi in January 1993, had 250 participating companies, including participants from Germany, Japan and the U.K.

Contact:
Dr. Govind M. Phadke
Secretary General
Indian Electrical & Electronic
Manufacturers Assoc.(IEEMA)

501 Kakad Chambers
132 Dr. Annie Besant Road, Worli
Bombay 400 018
Phone: 91-22-4930532; 4930786
Fax: 91-22-4932705

**INFRASTRUCTURE & INVESTMENT
INDIA '96, September 25-28, 1996**

Includes power and energy, transportation
and communication equipment

Contact:

Mr. Y.L. Arora
Wisitex Foundation
113, Jogani Industrial Complex
Bldg. No. 5, Near AT1. Sion
Bombay - 400 022
Tel: (91-22) 5524554, 5524771
Fax: (91-22) 5521339

**INDIA INTERNATIONAL TRADE
FAIR '96, November 14-27, 1996**

All aspects of industry, trade, scientific and
technological advancement

Contact:

India Trade Promotion Organization
Pragati Bhawan, Pragati Maidan
New Delhi 110 001

**INDIA INTERNATIONAL POWER
GENERATION ENERGY EXHIBITION
AND CONGRESS, November 1-4, 1995, in
New Delhi.**

Power and energy generation equipment
and machinery

Contact:

Mr. Mukesh K. Sharma
International Trade & Exhibitions
(India) Pvt. Ltd.
301, 3rd floor, W-III,
Greater Kailash-I
New Delhi 110 048
Tel: (91-11) 6415921, 6483393
Fax: (91-11) 4624150



Central Government Ministries and Agencies

MINISTRY OF POWER

P. Abraham, Secretary (power)
Shram Shakti Bhawan
Rafi Marg, New Delhi 110 001
Tel: (11) 3710271
Fax: (11) 3717519

INVESTMENT PROMOTION CELL (Ministry of Power)

Address: Shram Shakti Bhawan
Rafi Marg, New Delhi 110 001
Tel: (11) 3310247
Fax: (11) 3717519

MINISTRY OF NON-CONVENTIONAL ENERGY SOURCES

B.R. Prabhakara, Secretary
Block 14, CGO Complex
Lodhi Road, New Delhi 110 003
Tel: (11) 4361481/4362772

S.K. Chopra, Senior Advisor
Tel: (11) 4361830

CENTRAL ELECTRICITY AUTHORITY

M.I. Beg, Chairman
Sewa Bhawan, R.K. Puram
New Delhi 110 066
Tel: (11) 602583/609212
Fax: (11) 6877267

NATIONAL HYDRO-ELECTRIC POWER CORPORATION (NHPC)

S.R. Narasimhan,
Chairman and Managing Director
NHPC Office Complex, Sector 33,
Faradabad 121 003 - Haryana
Tel: (129) 278017/275920
Fax: (129) 278020/277941

NATIONAL THERMAL POWER CORPORATION (NTPC)

Rajendra Singh,
Chairman and Managing Director
NTPC Corporate Centre
NTPC Bhawan, SCOPE Complex
7, Lodhi Road, New Delhi 110 003
Tel: (11) 4361199/4360044
Fax: (11) 4361018

POWERGRID CORPORATION OF INDIA LTD.

S.C. Parakh,
Chairman and Managing Director
PGCIL, 10th floor,
Hemkunt Chambers
89, Nehru Place, New Delhi 110 019
Tel: (11) 6213389/6473303
Fax: (11) 6428357



**POWER FINANCE CORPORATION
(PFC)**

Uddesh Kohli,
Chairman and Managing Director
PFC, Chandra Lok
36, Janpath, New Delhi
Tel: (11) 3315824
Fax: (11) 3315922

**CENTRAL POWER RESEARCH
INSTITUTE (CPRI)**

M.G.K. Pillai, Director General
CPRI, Prof. Sri C.V. Raman Road
Raja Vilas Extension, P.O. Bag 9401
Bangalore 560 094 - Karnataka
Tel: (80) 331457
Fax: (80) 3334213

**INDIAN RENEWABLE ENERGY
DEVELOPMENT AGENCY LTD.
(IREDA)**

V. Bakthavatsalam,
Managing Director
IREDA, Cor-4-A, East Court
Indian Habitat Centre Complex,
1st Floor,
Lodhi Road, New Delhi 110 003
Tel: (11) 4602733

State Electricity Boards

1. ANDHRA PRADESH

J. Parthasarathy, Chairman
Andhra Pradesh State
Electricity Board (APSEB)
Vidyut Soudha
Hyderabad 500 049 – AP
Tel: (40) 317643/317663
Fax: (40) 393317

2. ASSAM

Dr. Ishwar Prasanna Hazarika,
Chairman
Assam State Electricity Board
Bijulee Bhawan, Palton Bazar
Guwahati 781 001 – Assam
Tel: (361) 540311/541088
Fax: (361) 41090

3. BIHAR

S. P. Kochhar, Chairman
Bihar State Electricity Board
Vidyut Bhawan, Bailey Road
Patna 800 001 – Bihar
Tel: (612) 225036/224504
Fax: (612) 222968

4. DELHI

R.K. Narayan, General Manager
Delhi Electric Supply Undertaking
Shakti Bhawan, Nehru Place
New Delhi 110 019
Tel: (11) 6410802/6412833
Fax: (11) 6460942

5. GUJARAT

P.K. Das, Chairman
Gujarat Electricity Board
Vidyut Bhawan, Race Course
Vadodara 390 007 – Gujarat
Tel: (265) 338299 Fax: (265) 337918

6. HARYANA

B.S. Ojha, Chairman
Haryana State Electricity Board
Panchkula 134 109 – Haryana
Tel: (172) 560579 Fax: (172) 560087

7. HIMACHAL PRADESH

A.K. Goswami, Chairman
Himachal Pradesh
State Electricity Board
Vidyut Bhawan
Shimla-4 – Himachal Pradesh
Tel: (177) 213563/216553
Fax: (177) 212800

8. KARNATAKA

B.S. Patil, Chairman
Karnataka Electricity Board
Cauvery Bhawan
Bangalore 9 – Karnataka
Tel: (80) 2214342 Fax: (80) 2213526

K. Jairaj, Managing Director
Karnataka Power Corporation
No. 82, Shakti Bhawan
Race Course Road
Bangalore 560001
Tel: (80) 2255606 Fax: (80) 2252144

9. KERALA

R. Sivadasan, Chairman
Kerala State Electricity Board
Vidyut Bhawan, Pattom
Tiruvananthapuram - Kerala
Tel: (471) 442125/441328/448128
Fax: (471) 448246

10. MADHYA PRADESH

V.P. Chawla, Chairman
Madhya Pradesh Electricity Board
P.B. 34, Shakti Bhawan
Jabalpur 482 008 - MP
Tel: (761) 311565/313251
Fax: (761) 311696

11. MAHARASHTRA

M.P. Pinto, Chairman
Maharashtra State Electricity Board
Prakashgad Bandra
Bombay (Mumbai) 400 051 -
Maharashtra
Tel: (22) 6443740/6422211
Fax: (22) 6443749

12. MEGHALAYA

V.S. Jafa, Chairman
Meghalaya State Electricity Board
Lum Jingshai Short Round Road
Shillong 793 001 - Meghalaya
Tel: (364) 226638/226367
Fax: (364) 226345

13. ORISSA

M.Y. Rao, Chairman
Orissa State Electricity Board
Vidyut Bhawan, Shahid Nagar
Bhubaneswar 751 007 - Orissa
Tel: (674) 410098/413396
Fax: (674) 411904/412734/411161

14. PUNJAB

R.N. Gupta, Chairman
Punjab State Electricity Board
The Mall
Patiala 147001 - Punjab
Tel: (175) 812005 Fax: (175) 79421

15. RAJASTHAN

P.N. Bhandari, Chairman
Rajasthan State Electricity Board
Vidyut Bhawan,
Vidjut Marg, Jyoti Nagar
Jaipur 302005 - Rajasthan
Tel: (141) 515359/515018
Fax: (141) 515594

16. TAMIL NADU

A.P. Muthuswamy, Chairman
Tamil Nadu Electricity Board
N.P.K.R.R. Maaligai,
Electricity Avenue
Madras 2 - Tamil Nadu
Tel: (44) 8521300 Fax: (44) 8520210

17. UTTAR PRADESH

B.S. Mathur, Chairman
Uttar Pradesh State Electricity Board
Shakti Bhawan
14, Ashok Marg
Lucknow 226001 - UP
Tel: (522) 246736 Fax: (522) 233289

18. WEST BENGAL

S.R. Sikdar, Chairman
West Bengal State Electricity Board
Vidyut Bhawan
Calcutta 91 - WB
Tel: (33) 3591915 Fax: (33) 3591954

Private Power Utilities

AHMEDABAD ELECTRICITY COMPANY LTD. (AEC)

A. Prasad, Managing Director, AEC
Electricity House, 2nd floor
Lal Darwaza
Ahmedabad 380 001
Tel: (79) 5351099 Fax: (79) 5353578

BOMBAY SUBURBAN ELECTRIC SUPPLY LTD. (BSES)

R.V. Shahi, Chairman and Managing Director
BSES, E-7 MIDC, Marol
Andheri (E), Bombay 400 093
Tel: (22) 8220995 Fax: (22) 8220997

CALCUTTA ELECTRIC SUPPLY COMPANY LTD. (CESC)

R.P. Goenka, Chairman
CESC Ltd., Victoria House,
Chowringhee Square
Post Box 304,
Calcutta 700 001
Tel: (33) 276000 Fax: (33) 276790

SURAT ELECTRICITY COMPANY LTD.

R.S. Bhatt, Chairman
Station Road,
Surat 395 003 - Gujarat
Tel: (261) 2652543 Fax: (261) 422294

TATA ELECTRIC COMPANIES

H.N. Sethna, Chairman
Tata Electric Companies, Bombay House
24 Homi Modi St.
Bombay 400 001
Tel: (22) 2041047 Fax: (22) 2045359



Other Indian Companies Engaged in Electricity Supply

BHORUKA POWER CORPORATION LTD.

S.N. Chandrasekhar, Executive Vice President
Fifth floor, Hitananda II
48 Lavelle Road, Bangalore 560 001
Tel: (80) 2273285
Fax: (80) 2270605

BPL GROUP

Ajit G. Nambiar, Managing Director
BPL Limited, Dynamic House, 64 Church Street
Bangalore 560 001
Tel: (80) 5587787
Fax: (80) 5587843

BOMBAY ELECTRIC SUPPLY AND TRANSPORT UNDERTAKING

Suresh Chandra, General Manager
BEST Bhawan, BEST Marg, P.B. 192
Bombay 400 039
Tel: (22) 2873961
Fax: (22) 2851244

GUJARAT INDUSTRIES POWER CO. LTD.

S.G. Mankad, Chairman
Gujarat Industries Power Co. Ltd.,
P.O. Petrofils 391327
Dist. Baroda
Tel: (2712) 20243
Fax: (265) 373207

Major Indian Manufacturers of Electrical Equipment⁴

1. AEG-NGEF LIMITED

150, Bangalore-Varthur Road
Kodihalli
Bangalore 560017
Tel : (080) 568406, 568413, 568438
Fax : (080) 5593455
Tlx : 0845-2642 GEAW IN

Contact Executive : Mr. P.K. Sehgal, Managing Director

Established : 1963

Turnover : Rs. 300 million

Collaborations : AEG AG, Germany

Products : LT/HT Switchboards, relay and control panels, MCCBs, contact ors, overhead relays, power control centres etc.

2. ALUMINIUM INDUSTRIES LIMITED

Udarasiromani Road
Trivandrum
Kerala 695 010
Tel : (0471) 64319, 67328
Fax : (0471) 67418
Tlx : 0435-206 ALCO IN

Contact Executive : Mr. S.N. Nayar, Managing Director

Established : 1946

Turnover : Rs. 983 million

Collaborations : Alcan, Canada; Alcan SA, Switzerland; Aluminium Development Laboratories, UK; Kokoku Iron and Steel Wire Mfg Co, Japan; Alsthom, France; Maidensha Corpn, Japan; Mars Relais et Automobiles Tec, France; and others

Products : Conductors and Cables, Switchgear, Relays, Steel Wires, Machinery, Turnkey electrification jobs.

⁴ This list is based on information in the U.S. Trade Databank, originally prepared in 1993. Information, however, has been updated and corrected, where possible, for this report, as of November 1995, using current Indian sources.

3. ANDREW YULE & COMPANY LIMITED (Govt of India Undertaking)

8, Dr. Rajendra Prasad Sarani

Calcutta 700001

Tel : (033) 2428210, 2428550, 2422421

Fax : (033) 2422943, 2426477 *Tlx* : 021-5101, 021-5139

Contact Executive : Mr. Sujit Chakravorti, Chairman & Managing Director

Established : 1919

Turnover : Rs. 2,073.1 million

Collaborations : Togami Electrical Manufacturing Co., Japan; Daihen Corporation, Japan

Products : Switchgears, contactors, relays, MCCBs, switches, power transformers, voltage regulators etc.

4. ASEA BROWN BOVERI LIMITED

71, Sona Towers, Miller Road

Bangalore-560 052,

Karnataka

Tel : (080) 2265390

Fax : (080) 2264147 *Tlx* : 080-8674, 8394

Contact Executive : Mr. K.N. Shenoy, Managing Director

Established : 1949

Turnover : Rs. 4,518 million

Collaborations : Asea Brown Boveri Limited, (Switzerland, Germany and Sweden)

Products : Outdoor EHV apparatus; circuit breakers, transformers, capacitors, line traps and isolators, switchgear, busducts, relays and protection systems, instrumentation panels, power line communication systems, SCADA, network controls, non-conventional energy systems, process control systems etc.

5. BEST & CROMPTON ENGINEERING LIMITED

Khetan Bhawan, 1st Floor

Sir Jamshedji Tata Road

Churchgate, Bombay-400 020

Maharashtra

Tel : (022) 2873616, 245342, 221635

Contact Executive : Sri Vijay Mallya, Chairman

Established : 1975

Turnover : Rs. 1,886 million

Collaborations : Beacon Neyrpic, France; Beacon Rotork Controls Ltd, UK; Beacon Tileman Ltd, UK; Beacon Weir Ltd, UK

Products : Pumps, Castings, Micro/mini/small hydel turbines, Busducts, Alternators, Generators, Powerline accessories, Control and relay panels, Design and engineering, Contracts for transmission lines, railway electrification etc.

6. BHARAT BIJLEE LIMITED

2, MIDC Belapur Road
P.O. Box 100
Thane-400 601
Maharashtra
Tel : (0215) 7691656
Fax : (0215) 7691401, 7691402
Tlx : 01312-202 BEBE IN

Contact Executive : Mr. N.J. Danani, Vice Chairman and Managing Director

Established : 1946

Turnover : Rs. 1399 million

Collaborations : Inventio AG, Switzerland; Siemens AG, Germany

Products : AC Induction Motors, Power and distribution transformers, lifts, variable speed drives

7. BHARAT HEAVY ELECTRICALS LIMITED

BHEL House
Siri Fort
New Delhi 110 049
Tel : (011) 649-3031, 649-3037
Fax : (011) 644-4021
Tlx : 031-73355

Contact Executive : Dr. R.K.D. Shah, Chairman and Managing Director

Established : 1964

Turnover : Rs. 33,300 million

Collaborations : Siemens AG, Germany; General Electric Company, USA; Asea Brown Boveri, Sweden; General Electric Canada Ltd, Canada; Henry Vogt Machine Company, USA; Sulzer Brothers Ltd, Switzerland; National Oilwell, USA; Stock Equipment Company, USA; Balcke Duerr AG, Germany; Stein Industrie, France; May and Christe GmbH, Germany; and others

Products : Steam Turbines and Generators upto 1000 MW; Gas Turbines upto 200 MW; Hydro turbines of Kaplan, Francis and Pelton types with matching generators upto 200 MW unit size; Turbines and Generators for nuclear power plants upto 500 MW unit size; Mini/Micro hydro sets, associated equipment, boilers and pressure vessels and auxiliaries; electrostatic precipitators; pumps; power station electric equipment; switchgear; busducts; transformers; motors; controlgear; traction equipment; insulators; capacitors; compressors, transportation equipment; oilfield equipment; castings and forgings; seamless steel tubes; silicon rectifiers; thyristor equipment; power devices; bio-gas operated engines, wind electric generators; solar thermal pumps and water heating systems; telecom equipment; light aircraft (under development).

8. BHARTIA CUTLER-HAMMER LIMITED

1101, New Delhi House
27, Barakhamba Road
New Delhi 110 001
Tel : (011) 331-6029, 828-5414
Fax : (011) 331-3465
Tlx : 031-66580 BCH IN

Contact Executive: Sri A.P. Gandhi, Chief Executive Officer

Established : 1965

Turnover : Rs. 530.8 million

Products : Contactors and Overload relays, Logic devices, Power distribution controls, electronic controls and devices

9. CABLE CORPORATION OF INDIA LIMITED

Datta Pada Road
Borivali (East)
Bombay-400 066
Maharashtra
Tel : (022) 493-7603, 492-3905, 492-3820
Fax : (022) 805-9948
Tlx : 011-70014

Contact Executive : Sri V.R. Sankaran, President

Established : 1957

Turnover : Rs. 1,418 million

Collaborations : Siemens AG, Germany; Mitsubishi Industries Ltd, Japan

Products : Wide range of cables and cable accessories

10. CONTROLS AND SWITCHGEAR COMPANY LIMITED

222 Okhla Industrial Estate
New Delhi 110 020
Tel : (011) 683-6020, 683-6171, 683-8249
Fax : (011) 684-7154
Tlx : 031-75417 GSGR IN

Contact Executive : Mr. R.N. Khanna, Managing Director

Established : 1966

Turnover : Rs. 337 million

Collaborations : Tarasaki Electric Co. Ltd, Japan; ABB Stromberg, Finland; La Telemecanique, France; Schaltanlagen Elektronik Gerate GmbH, Germany; A. Von. Kaick, Germany; Simelectro, France; Whipp and Bourne Ltd, UK; Zettler, Germany.

Products : Switches, Circuit Breakers, Bus Ducts, Power ontrols, Relays

11. CROMPTON GREAVES LIMITED

1, Dr. V.B. Gandhi Marg
Fort
Bombay 400 023
Tel : (022) 277-525, 276-610
Fax : (022) 202-8025, 262-5814 Tlx : 011-2207

Contact Executive : Mr. K.K. Nohria, Managing Director and President

Established : 1937

Turnover : Rs. 8855.8 million

Collaborations : Emily Haefely Co. Ltd, Switzerland; Elin Union, Austria; Westinghouse Electric Corporation, USA; MELCO, Japan; Hitachi Ltd, Japan; Hundt & Weber, Germany; Brush Electrical Machines Ltd, UK; Westinghouse Brake and Signals Ltd, UK; Hawker Siddeley Power Transformers Ltd, UK; Siemens AG, Germany; Sekar Enterprises, USA; Power Conversion Inc., USA.

Products : Transformers, Switchgear, LT controlgear, Capacitors, Motors, Consumer Electricals, Vacuum Interrupters, Instruments and Relays, Computers, Programmable controllers, Stampings etc.

12. ECE INDUSTRIES LIMITED

ECE House
28A Kasturba Gandhi Marg
New Delhi 110 001
Tel : (011) 331-4237, 331-4239
Tlx : 031-63139 ECE IN

Contact Executive : Mr. R.N. Jaju, President

Established : 1945

Collaborations : Tungsram, Hungary; Toshiba Corporation, Japan; Mitsubishi Electric Corporation, Japan

Products : Transformers, Switchgear, Power Meters, Household electricals

13. FINOLEX CABLES LIMITED

26/27 Bombay-Pune Road, Pimpri
Pune 411 018
Tel : (0212) 775-963, 775-967; Fax : (0212) 772-239, 777-217; Tlx : 0146-211, 271

Contact Executive : Mr. P.P. Chhabria, Chairman and Managing Director

Established : 1967

Turnover : Rs. 2620 million

Collaborations : NSW, Germany

Products : Wide range of power and telecom cables.

14. FORT GLOSTER INDUSTRIES LIMITED (Cable Division)

21, Strand Road
Calcutta 700 001

Tel : (033) 29-8241; *Fax* : (033) 29-5665, 29-9572; *Tlx* : 021-5668 FGI IN

Contact Executive : Mr. S.K. Bangur, Director

Established : 1959

Turnover : Rs. 1,127 million

Collaborations : Sumitomo Electric Industries Ltd, Japan

Products : Power cables.

15. GUEST KEEN WILLIAMS LIMITED (Electrical Stampings Division)

Wakefield House, 4th Floor
Sprott Road, Ballard Estate
Bombay-400 038

Tel : (022) 2650171 *Fax* : (022) 2617898; *Tlx* : 011-83366

Contact Executive : Mr. S.M. Batra, Managing Director

Established : 1934 *Turnover* : Rs. 2,266 million

Products : Stampings, Parts for Electrical Products

16. HINDUSTAN WIRE PRODUCTS LIMITED

14 Netaji Subhas Road
Calcutta 700 001
Tel : (033) 20-9576, 20-0681

Fax : (033) 20-3663

Tlx : 021-7573 HWP IN

Contact Executive : Mr. P.L. Dhanuka, Chairman

Established : 1954

Turnover : Rs. 1,380 million

Products : Copper wire, parts for electrical products.

17. INCAB INDUSTRIES LIMITED

9 Hare Street
Calcutta 700 001
Tel : (033) 28-0161

Fax : (033) 28-5766

Tlx : 021-7202 INCAB IN

Contact Executive : Mr. K. Tapuriah

Established : 1920

Turnover : Rs. 1,612 million

Collaborations : Ericsson AB, Sweden; BICC plc, UK

Products : Power and telecom cables, accessories.

18. INSTRUMENTATION LIMITED

Jhalawar Road
Kota, Rajasthan 324 005
Tel : (0744) 426914, 424476
Fax : (0744) 424322, 422505, 425510
Tlx : 0305-203/227/238 ILK IN

Contact Executive : Brig. H.N. Ramamurthy, Chairman and Managing Director

Established : 1964

Turnover : Rs. 1,272 million

Collaborations : Yamatake Honeywell, Japan; Hartmann & Braun, Germany; Fuji Electric Co., Japan; ABB Kent Ltd, UK; Toshiba Corporation, Japan; Nuovo Pignone, Italy; Dr. Thiedig & Co., Germany; Tokyo Keiso Co, Japan; Kyosan Electric Manufacturing Co., Japan; August Systems Ltd, UK; Westinghouse Inc., Ireland; Segault, France; and Ets. L.Bernard, France.

Products : Control valves and accessories; wide range of microprocessor-based control systems and instruments.

19. JYOTI LIMITED

Industrial Area
P.O. Chemical Industries
Vadodara 390 003 - Gujarat
Tel : (0265) 32-1041, 32-1419, 32-1397
Fax : (0265) 33-7866 Tlx : 0175-6214, 6481

Contact Executive : Mr. J.S. Negi, Joint Managing Director

Established : 1943

Turnover : Rs. 720 million

Collaborations : Toshiba Corpn., Japan; National Research Development Corpn., UK

Products : Hydro-electric generating sets, electrical motors, induction generators, converters, alternators, switchgear, control systems

20. KEC INTERNATIONAL LIMITED

F-7, Connaught Circus
United India Life Building
New Delhi-110 001
Tel : (011) 331-7494, 331-5056, 331-3281
Fax : (011) 331-3281 Tlx : 031-61386

Contact Executive : Mr. H.V. Goenka, Chairman

Established : 1945

Turnover : Rs. 1,025 million

Products : Transmission line towers, substation and allied structures

21. KIRLOSKAR ELECTRIC COMPANY LIMITED

P.B.No. 5555, Malleswaran (W)

Bangalore 560 055

Karnataka

Tel : (080) 332-2469, 332-0655, 332-2111

Fax : (080) 332-2111, 332-0706

Tlx : 0845-2230, 2790

Contact Executive : Mr. Vijay R. Kirloskar, Vice Chairman and Managing Director

Established : 1946

Turnover : Rs. 2,720 million

Collaborations : Toyo Denki Seizo, Japan; AEG, Germany; Fuji Electric Co., Japan; Anilam Corporation, USA; Toshiba Corporation, Japan; Indramat, Germany; Reis GmbH, Germany; Termomacchine, Italy; Adolph Numerical Controls, UK; Ocrev, Italy

Products : AC Motors, Transformers, Ac and DC Generators, Control Equipment, Industrial Electronics, Welding systems etc.

22. LARSEN AND TOUBRO LIMITED

L&T House

Ballard Estate

Bombay 400 038

Tel : (022) 261-8181

Fax : (022) 262-0223;

Tlx : 011-80020

Contact Executive : Mr. S.D. Kulkarni, C.E.O.

Established : 1938

Turnover : Rs. 17,350 million

Collaborations : Yasakawa Electric Mfg Co Ltd, Japan; Jeumont Schneider, France; Bull HN Information Systems, Italy; Y-E Data Inc., Japan; Gould Inc., USA; Kontron Instruments, France; Erbe Elektromedizin, Germany; Bio Cardo Biomedica, Italy; Western Digital (Singapore) Pte Ltd, Singapore; Sonatest plc, UK; Tettex Instruments, Switzerland

Products : Switchgear, Industrial electronic control systems, Transmission line towers and switchyard structures, test and measuring instruments, telecom equipment, medical equipment, computer peripherals, construction and erection engineering.

23. NGEF LIMITED

Post Box No. 3876

Old Madras Road

Byappanahalli

Bangalore 560 038

Tel : (080) 58-3719

Fax : (080) 54-1694; Tlx : 0845-2210, 8057

Contact Executive : Ms. Teresa Bhattacharya, Chairman and Managing Director

Established : 1965

Turnover : Rs. 1,610 million

Collaborations : Siemens AG, Germany; Toshiba Corporation, Japan; AEG, Germany;

SACE, Italy; Westcode Semiconductors, UK

Products : Transformers, Switchgear, Circuit Breakers, Switchboards, Busducts, motors, alternators, thyristor converters, pumps etc.

24. NICCO CORPORATION LIMITED (Cable Division)

NICCO House

2 Hare Street

Calcutta 700 001

Tel : (033) 248-8220, 220-2005, 248-5102

Fax : (033) 220-9443; *Tlx* : 021-2653 NICC IN

Contact Executive : Mr. Rajive Kaul, Chairman & Managing Director

Established : 1942

Turnover : Rs. 1,343 million

Products : Cables, AAC, ACSR, other conductors, engineering services

25. PUNJAB POWER GENERATION MACHINES LIMITED

SCO 108-109

Sector 8C

Chandigarh 160 018

Tel : (0172) 42782, 29025;

Tlx : 0395-484 PPGM IN

Contact Executive : Mr. R.K. Nair, Managing Director

Established : 1989

Turnover : Rs. 107 million

Collaborations : Voest Alpine, Austria; Kosslev G., Austria

Products : Hydro turbines upto 20 MW

26. SAE (INDIA) LIMITED

29-30 Community Centre

Basant Lok, Vasant Vihar

New Delhi 110 057

Tel : (011) 688-2665, 688-5801

Fax : (011) 687-3963, 688-5958

Tlx : 031-72092, 82068 SAE IN

Contact Executive : Mr. Aloke Mookherjee, Managing Director

Established : 1951

Turnover : Rs. 834 million

Collaborations : Member of the ABB Group

Products : Transmission Line Towers, Powerhouse and Substation structures.



27. SIEMENS LIMITED

Thane Belapur Road, Kalwa
Thane-400 601
Maharashtra
Tel : (022) 493-1350, 493-1360
Fax : (022) 494-1552;
Tlx : 011-76352

Contact Executive : Mr. K. Pernshch, Managing Director

Established : 1957

Turnover : Rs. 4,220 million

Collaborations : Siemens AG, Germany; ATEA NV, Netherlands

Products : Wide range of Motors, Switchgear, Switchboard, Signalling Equipment, Industrial Electronics, Medical Equipment, EPABXs

28. GEC ALSTHOM INDIA LTD.

Magnet House
314/315 Anna Salai
Teynampel
Madra-600 18

Contact Executive : Mr. C.R. Balasubramaniam, Managing Director

Established : 1957

Turnover : Rs. 1,418 million

Collaborations : Part of the GEC Alstom Group. Formerly English Electric, Calcutta, merged with The General Electric Co. of India to form GEC Alsthom India Ltd.

Products : Complete range of Fusegear, Switchgear and Controlgear, Control systems

GEC ALSTHOM INDIA LTD.

Magnet House
6 Chittaranjan Avenue
Calcutta 700 072

Tel : (033) 27-2880, 27-8500; *Fax* : (033) 26-8974; *Tlx* : 021-5033 GECL IN

Contact Executive : Mr. C.R. Balasubramaniam, Managing Director

Established : 1911

Turnover : Rs. 2,212 million

Collaborations : Formerly General Electric Company of India, merged with The English Electric Co. to form GEC-Alsthom India Limited.

Products : Consumer electricals, Transformers, Circuit Breakers, Motors, Pumps, Air Pollution Control Equipment etc.

29. UNIVERSAL CABLES LIMITED

P.O. Birla Vikas
Satna
Madhya Pradesh 485 005
Tel : (07672) 3561, 3562, 3565;
Fax : (07672) 5344;
Tlx : 0766-202 UCL IN

Contact Executive : Mr. D.R. Babsal, President

Established : 1962

Turnover : Rs. 1,448 million

Collaborations : ABB Cables AB, Sweden

Products : Wide range of cables and conductors

30 VOLTAS LIMITED (Electricals Division)

19, J.N. Heredia Marg
Ballard Estate
P.O. Box 1198
Bombay 400 038
Tel : (022) 261-1469
Fax : (022) 261-8504

Contact Executive : Mr. V.H. Munishi, Managing Director

Established : 1954

Turnover : Rs. 9,200 million

Products : Circuit Breakers, Transformers, Turnkey Substation and Switchyard Projects



Tentative Expressions of Interest by Private Sector Companies⁵

As of 9th November 1995

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⁵ Source: Investment Promotion Cell, Ministry of Power, Government of India.

Table V.1**Tentative Expressions of Interest (through MOU/LOI Route) (Up to Rs. 100 crores)****Award 1****as of 9th November 1995**

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
Assam						
1	Adamtilla Open Cycle	9.0	52.500	Gas	03/09/93	DLF Power Company Ltd.
2	Banskandi Open Cycle	15.5	78.750	Gas	03/09/93	DLF Power Company Ltd.
TOTAL 2		24.50	131.250			
Karnataka						
3	Anandka HEP	9.0	31.500*	Hydel	22/10/94	Arvind Mills, Ahmedabad
4	Bidar	20.0	70.000*	Diesel	01/09/94	HMG Power Ltd.
5	Ceevy MHS	6.5	22.750*	Hydel	20/04/93	C.V. Mathew Charayel, Mysore
6	Chunchanakatte	15.0	52.500*	Hydel	19/04/93	Graphite India Ltd.
7	Haranga LBC HEP	4.5	15.750*	Hydel	11/11/93	North East Energy Services, USA
8	Hemavathy LBC	15.0	52.500*	Hydel	06/09/94	Sandhur Magnese & Iron Ore Ltd.
9	Indi	20.0	70.000*	Diesel	01/09/94	HMG Power Ltd.
10	Jam Khandi	20.0	70.000*	Diesel	01/09/94	HMG Power Ltd.
11	Kabini DPH	20.0	80.000	Hydel	06/09/94	Subhash Project & Marketing Ltd.
12	Keerthe Hole	21.0	98.000	Hydel	06/09/94	Subhash Project & Marketing Ltd.
13	Kolar	20.0	70.000*	Diesel	01/09/94	HMG Power Ltd.
14	Narayanpur LBC HEP	9.0	31.500*	Hydel	22/10/94	Murdeswara Power Corporation Ltd.
15	Tunga Anecut	20.0	70.000*	Hydel	06/09/94	Dandeli Steel & Ferro Alloys Ltd.
16	Upper Kaneri HEP	3.5	12.250*	Hydel	22/10/94	Gujarat Spinner Co.
17	Varahi IDPH	15.0	52.500*	Hydel	22/10/94	Bhoruka Power Corporation Ltd.
18	Varahi Tail Race	15.0	52.500*	Hydel	06/09/94	Sandhur Magnese & Iron Ore Ltd.
TOTAL 16		233.50	851.750			
Kerala						
19	Anakkayam HEP	8.0	36.000	Hydel	29/09/92	Ideal Project & Services (P) Ltd.
20	Barapole HEP	9.0	28.730	Hydel	/ /	Ideal Project & Services (P) Ltd.
21	Boothathankettu	16.0	56.000	Hydel	07/08/92	Silcal Metallurgic (P) Ltd.
22	Chathankottunada-II	7.0	22.010	Hydel	29/09/92	Ideal Project & Services (P) Ltd.
23	Chembukkadavu-II	7.0	22.290	Hydel	29/09/92	Ideal Project & Services (P) Ltd.

Table V.1
Tentative Expressions of Interest (through MOU/LOI Route) (Up to Rs. 100 crores)

Award 1

as of 9th November 1995

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
<i>Kerala cont'd.</i>						
24	Karikkayam HEP	12	42.000	Hydel	31/11/92	Travancore Electro Chemical Indus. Ltd.
25	Kuthungal HEP	20	70.000	Hydel	24/08/92	Indsil Electosaeets Ltd.
26	Palchurum HEP	3.5	12.280	Hydel	29/09/92	Ideal Project & Services (P) Ltd.
27	Ullunkal HEP	6	21,000	Hydel	21/11/92	Travancore Electro Chemical Indus. Ltd.
28	Vilangad HEP	7	24.960	Hydel	29/09/92	Ideal Project & Services (P) Ltd.
29	Western Kallar HEP	5	14.240	Hydel	29/09/92	Ideal Project & Services (P) Ltd.
TOTAL 11		100.5	349.510			
<i>Madhya Pradesh</i>						
30	Tawa HEP (Captive)	12	65.000	Hydel	01/11/92	HEG Ltd.
TOTAL 1		12	65.000			
<i>Orissa</i>						
31	Jalaput TOE	3x6	63.000*	Hydel	07/11/94	Orissa Power Corporation Ltd.
32	Samal Barrage HEP	4x5	70.000*	Hydel	29/01/95	
TOTAL 2		38.00	133.000			
<i>Tamil Nadu</i>						
33	Periyarvagai	2x5	35.000*	Hydel	18/02/95	Silcal Industries Ltd., Coimbatore
TOTAL 1		10.00	35.000			
<i>West Bengal</i>						
34	Dankuni	20	70.000	Gas	01/01/93	Spectrum Technology, USA
TOTAL 1		20	70.000			
GRAND TOTAL 34		438.50	1635.510			

* Rs. 3.5 Crs./MW has been assumed as capital cost wherever the State or promoter has not given a provisional cost estimate.

Table V.2

Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)

Award 1

as of 9th November 1995

SL. NO.	Name of Project	Capacity (MW)	Prov. Cost (Rs. Crores)	Type	MOU/ Approval Date	Name of Company
<i>Andhra Pradesh</i>						
1	Bhudalpalli	135	472.500*	Coal	18/02/95	Lewis Stanley Energy Group USA
2	Cuddapah	420	1470.000*	Coal	18/02/95	Lewis Stanley Associates Inc.
3	East Godavari	100	350.000*	Furnace oil	18/02/95	Rayalaseema Petro Chemicals Ltd.
4	Godavari	208	748.430	Gas/Naptha	13/06/93	Spectrum Tech. USA/Jaya Foods & NTPC
5	Godalpally	250	875.000*	Coal	18/02/95	Orient Paper & Industries
6	Hyderabad	200	700.000*	Furnace oil	18/02/95	Balaji Hotel & Enterprises Ltd.
7	Hyderabad	200	700.000*	LSHS	18/02/95	G.M.R.Vasavi Industries Ltd.
8	Hyderabad	700	2450.000*	C.N.D.Gas	18/02/95	RPG Industries Ltd.
9	Hyderabad	200	700.000*	Furnace oil	18/02/95	Balaji Distilleries Ltd.
10	Hyderabad	200	700.000*	Furnace oil	18/02/95	Balaji Biotech Ltd.
11	Jegurupadu GBPP	216	827.000	Gas/Naptha	16/03/92	GVK Industries Ltd., USA
12	Kadinada	660	2310.000*	Naptha	18/02/95	S. Kumar's Power
13	Kakinada	250	875.000*	C/N/D/Gas	18/02/95	Advanced Radio Masts
14	Kakinada Port	1000	3500.000*	Coal	18/02/95	Hadosum Pty Ltd.
15	Kalingapatnam	120	420.000*	Coal	18/02/95	Krishna Godavari Basin Power Utilities Ltd.
16	Karimnagar	120	420.000*	Coal	18/02/95	Lewis Stanley Associates Inc.
17	Machilipatnam	500	1750.000*	C/N/D/Gas	18/02/95	Anagram Finances Ltd.
18	Manuguru	1000	3500.000*	Coal	18/02/95	Sanghi Group of Industries
19	Manuguru	500	1750.000*	C/N/D/Gas	18/02/95	Sri Siva Power Ltd.
20	Nellore	530	1855.000*	Coal	18/02/95	GSX International Group Inc. Houston USA
21	Nizamabad	200	700.000*	Coal	18/02/95	Richiman Silks Ltd.
22	Ramagundam	500	1750.000*	C/N/D/Gas	18/02/95	Advanced Radio Masts
23	Ranigunta	200	700.000*	Furnace oil	18/02/95	Balaji Industrial Corporation Ltd.
24	Simhadri	1000	3500.000*	Coal	18/02/95	Nagarjuna Fertilizers and Chemicals Ltd.
25	Twin Cities	250	875.000*	Coal	18/02/95	Richiman Silks Ltd.
26	Visakhapatnam	650	2275.000*	Naptha/gas	18/02/95	Essar Investments Ltd.
27	Visakhapatnam	500	1750.000*	Coal	18/02/95	Sri Siva Power Ltd.
28	Visakhapatnam	500	1750.000*	C/N/D/Gas	18/02/95	Amtrex Appliances
29	Visakhapatnam	2x500	4797.000	Coal	17/07/92	Hinduja, National Power Corporation Ltd.
30	Vizianagaram	220	770.000*	Naptha	18/02/95	Pan Power Corporation
31	Wadapally TPS	120	420.000*	Coal	18/02/95	Krishna Godavari Power Utilities Ltd.
TOTAL 31		12649	45659.930			

Table V.2**Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)****Award 1***as of 9th November 1995*

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
<i>Arunachal Pradesh</i>						
32	Kameng HEP	600	1800.000	Hydel	06/03/93	InterCorp Industries/ Snowy Mountain Engg.
33	Kharsang GBPP	48	223.000	Gas	06/03/93	InterCorp/Snowy Mountain Engg., Australia
TOTAL 2		648	2023.000			
<i>Assam</i>						
34	Anguri GBPP	280	1280.000	Gas	10/06/93	Assam Power Partners, Northern Eng. Inc. USA/AGRA Industries
35	Karbi Langpi HEP	2x50	282.300	Hydel	25/03/93	Bharat Hydro Power Corp.
36	Namrup TPS Ext.	90	315.000*		15/02/95	Williamson Magor
TOTAL 3		470	1879.000			
<i>Bihar</i>						
37	Chandil TPS	2x250	1637.000	Coal	01/12/90	RPG Enterprises
38	Jojobera	3x67.5	1240.000	Coal	05/02/93	Tata Steel/Mission Energy, USA
TOTAL 2		702.50	2877.000			
<i>Gujarat</i>						
39	Akrimota TPS	240	840.000*	Lignite	//	Gujarat Mineral Devel.CORP (GMDC)
40	GIPCL Expansion	145	399.000	Gas	//	Gujarat Industries Power Co.
41	Hazira CCPP	515	1764.940	Gas	05/01/95	Essar Group
42	Jamnagar	2x250	1967.000	Pet-Coke	09/12/94	Reliance Power Ltd.
43	Mangrol TPS	250	1082.810	Lignite	15/09/94	Gujarat Industries Power Co., Baroda
44	Paguthan CCPP	655	2298.140	Gas	12/05/94	Gujarat Torrent Energy Corp/ Siemens, Germany
TOTAL 6		2305	8352.890			

* Rs 3.5 Crs/MW has been assumed as capital cost wherever state/promoter has not given provisional cost estimates.

Table V.2**Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)****Award 1****as of 9th November 1995**

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
<i>Himachal Pradesh</i>						
45	Allain-Duhangan	192	672.000	Hydel	28/08/93	Rajasthan Spinning & Weaving Mills Ltd.
46	Baspa-ST-II	300	949.230	Hydel	23/11/92	Jai Prakash Industries Ltd
47	Dhamwari HEP	70	463.080	Hydel	28/08/93	Harza Engineering Co., USA
48	Hibra HEP	231	1020.000	Hydel	28/08/93	Harza Engineering Co., USA
49	Karcham Wangtoo	900	3150.000	Hydel	28/08/93	Jai Prakash Industries Ltd.
50	Malana HEP	86	456.000	Hydel	28/08/93	Rajasthan Spinning & Weaving Mills Ltd.
51	Neogal HEP	15	106.120	Hydel	28/08/93	Om Power Corporation, New Delhi
52	UHL-III HEP	2x50	516.000	Hydel	10/02/92	Ballarpur Industries Ltd., Delhi
TOTAL 8		1894	7332.430			
<i>Haryana</i>						
53	Yamuna Nagar TPS	2x350	3500.000	Coal	05/04/94	Eisenberg Group Of Cos., Israel
TOTAL 1		700	3500.000			
<i>Karnataka</i>						
54	Almatti Dam	600	1900.000	Hydel	27/07/92	Asia Power Company (TAPCO), USA, KPC
55	Bellary Hospet	2x120	839.000	Gas/Coal	09/12/94	Jindal Group/Tractabel, Belgium
56	Bijapur	150	525.000*	Diesel	01/09/94	Kei Energy
57	Devangontha	76	266.000*	Diesel	01/09/94	Independent Power Services, USA
58	Hoody	40	140.000*	Diesel	01/09/94	Khoday India Ltd.
59	Hospet TPS	2x250	2240.000	Coal	30/07/92	HOK Intercontinental Limited, USA
60	Koppal	50	175.000	Diesel	01/09/94	Kirloskar Oil Engine Ltd.
61	Kumaradhara	48	168.000*	Hydel	06/09/94	Bhoruka Power Corporation Ltd.
62	Mangalore	2x22.5	174.410	Thermal	/ /	M.R.P.L.
63	Mangalore TPS	4x250	3654.000	Coal	30/07/92	Cogentrix Inc., USA
64	Mangalore TPS	3x120	1260.000	Coal	27/01/94	Jayaprakash Engineering & Steel Co. Ltd.
65	Nagarjuna	2x500	4000.000	Coal	27/01/94	JESCO (Nagarjuna Group)
66	Peenya	50	175.000*	Diesel	22/10/94	Subhash Project & Marketing Ltd.
67	Raichure ST V & VI	2x210	1750.000	Coal	20/07/92	Public Power Int.(NE Energy) USA

Table V.2**Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)***Award 1**as of 9th November 1995*

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
<i>Karnataka cont'd</i>						
68	Thubinakere	130	455.000*	Diesel	01/09/94	India Power Partners
69	Tumkur	50	175.000*	Diesel	22/10/94	Subhash Project & Marketing Ltd.
70	White Field	200	700.000*	Diesel	18/02/95	Karnataka Breweries & Distillers
TOTAL 17		4959	18596.310			
<i>Kerala</i>						
71	Kasargod	500	1750.000*	Gas/Naptha	29/11/94	Finolex Cables Ltd.
72	Kasargod TPC	2x500	5250.000*	Coal	03/11/94	RPG Industries Ltd. (JV)
73	Thrikkaripur TPP	2x210	1470.000	Coal	10/01/94	BPL Group
74	Vaipen	500	1750.000*	Naptha	29/11/94	Finolex Cables Ltd/Black & Weatch, USA
TOTAL 4		2920	10220.000			
<i>Madhya Pradesh</i>						
75	Bhandar Dual Fuel	330	1280.000	Gas/Naptha	12/10/94	Essar Inv. Ltd., Bombay
76	Bhilai TPS	2x250	2150.000	Coal	25/10/94	JV of Sail, L&T, CEA (USA)
77	Bina TPS	1000	4000.000	Coal	29/10/94	Grasim Ind. Ltd.
78	Birsinghpur TPS	500	2000.000	Coal	26/10/94	Houston Energy India Inc./Gujarat Ambuja Cement Ltd.
79	Burhanpur DCPD	150	525.000*	Heavy oil	02/02/95	Subhash Projects & Marketing Ltd.
80	Burhanpur Khandwa	120	420.000*	Gas	02/02/95	Subhash Projects & Marketing Ltd.
81	Guna Dual Fuel TPS	330	1155.000*	Gas/naptha	20/01/05	STI, Indore
82	Gwalior II (Diesel)PP	120	420.000*	Diesel	11/11/94	Wartsila Diesel, Finland
83	Jhabua	330	1300.000	Gas/naptha	21/01/95	Kedia Distilleries Ltd.
84	Korba East TPP	250	875.000*	Coal	20/01/95	Raipur Alloys & Steel Ltd., Raipur
85	Korba East TPS	250	875.000	Coal	07/10/94	Daewoo Corporation, South Korea
86	Korba West Extn	2x210	1600.000	Coal	28/07/93	Mukand Ltd
87	Korba West TPS	2x250	1687.000	Coal	21/01/95	RPG Industries Ltd.
88	Maheshwar HEP	10x40	1073.000	Hydel	28/07/93	S. Kumar's/Bechtel, USA
89	Mandideep DCPD	150	525.000*	Diesel	21/12/94	DCW Power Corp. Ltd. Bombay
90	Narsingpur	150	520.000	Furnace oil	16/12/94	Global Boards Ltd.

Table V.2

Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)

Award 1

as of 9th November 1995

SL. NO.	Name of Project	Capacity (MW)	Prov. Cost (Rs. Crores)	Type	MOU/ Approval Date	Name of Company
<i>Madhya Pradesh cont'd.</i>						
91	Narsinghpur DCPD	150	525.000*	Diesel	16/12/94	Global Boards Ltd.
92	Pench TPS	500	2500.000	Coal	16/06/94	Soros Fund Management, USA
93	Pithampur DCPD	120	420.000*	Diesel	21/12/94	Shapoorji Pal-On-Ji Power CO., Bombay
94	Rajgarh TPS	2x250	4000.000	Coal	21/10/94	Jindal Trips Pvt. Ltd.
95	Rajgarh Dual Fuel TPS	330	1155.000	Naptha/gas	21/01/95	Alpine India Pvt. Ltd
96	Ratlam	150	525.000*	Diesel	21/12/94	G.V.K. Power limited
97	Tikamgarh	150	525.000*	Heavy oil	30/01/95	I.T.C. Ltd., Calcutta
TOTAL 23		8650	30065.000			
<i>Maharashtra</i>						
98	Bhadrawati TPS	2x536	5187.000	Coal	18/06/93	Ispat Alloys Ltd/EDGE, UK/EDF, France
99	Bhivpuri CCGT	450	1340.000	Gas	//	Tata Electric Companies, Bombay
100	Bhivpuri PSS	90	315.000	Hydel	//	Tata Electric Cos.
101	Dabhol CCGT (LNG)	2015	9051.270	LNG	20/06/92	Enron Devel. Corp, GE, Bechtel, USA
102	Khaperkheda TPS 5&6	2x210	1353.000	Coal	28/01/93	Aranco Line Shipping Co., Malta, Singapore
103	Wani-Warora	500	1750.000*	Coal	//	RPG Group
TOTAL 6		4547	18996.270			
<i>Orissa</i>						
104	Balimela HEP 7&8	2x60	420.000*	Hydel	26/11/93	LMZ
105	Bomlai TPS	4x250	3500.000*	Coal	02/04/94	Galaxy Power Co. & Indeck, USA
106	Chipulima B	200	700.000*	Hydel	16/09/94	J.K. Corp Ltd., New Delhi
107	Choudawar CPP	110	385.000*	Coal	//	Indian Charge Chrome Ltd.
108	Duburi TPS	500	1750.000*	Coal	25/01/92	Kalinga Power Corp (NE Power, USA)
109	Durgapur	2x250	1750.000*	Coal	01/11/94	J.K. Corporation Ltd. New Delhi
110	Hirakud B	208	1914.000	Hydel	16/09/94	J.K. Corporation Ltd.
111	Hirma TPS ST-1	5x660	14033.000	Coal	22/09/94	Consolidated Electric Power Asia (HK)
112	Ib Valley TPS	420	1993.630	Coal	09/12/92	AES Corporation, USA
113	Kamalanga	2x250	2400.000	Coal	//	L&T with CEA, USA

Table V.2**Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)***Award 1**as of 9th November 1995*

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>MOU/ Approval Date</i>	<i>Name of Company</i>
<i>Orissa cont'd.</i>						
114	Lapanga TPS	500	1750.000*	Coal	25/10/94	Pioneer & Panda Engineering, USA/Samlai Lapanga Co.
115	Mesco	240	840.000*	Thermal	/ /	Indeck Energy Services, USA
116	Naraj TPS	2x250	2170.000	Coal	08/10/94	India Power Partners/OPGL/WTI Intl Energy
TOTAL 13		8598	33605.630			
<i>Rajasthan</i>						
117	Chittorgarh TPS	500	1750.000	Coal	01/04/88	Century Textiles & Industries Ltd.
118	Dholpur	2x350	2958.000	Coal	17/02/94	RPG Enterprises
TOTAL 2		1200	4708.000			
<i>Tamil Nadu</i>						
119	Basin Bridge Stage II	200	750.000	Diesel	13/01/95	GNR Vasavi Power Corp.Ltd.
120	Cuddalore TPS	2x660	5664.000	Coal	05/12/92	Internat. Contracting & Marketing, USA
121	Gummidipoondi	500	1750.000*	Coal	25/10/94	Videocon International
122	Gummidipoondi	1000	3500.000*	Gas	19/02/95	GVK Industries
123	Jayamkondam Lignite	3x500	4679.000	Lignite	27/08/93	McNally Bhart Engg & TIDCO (JV)
124	North Madras II	2x500	3500.000*	Coal	18/02/95	Videocon International, Bombay
125	North Madras III	500	1750.000*	Coal	18/02/95	Tri-Sakthi Energy Ltd., Madras
126	Pillaipuru Malnallur	320	1120.000*	Gas/naptha	09/12/92	Dynavision (Reddy Group)/J. Makowski, USA
127	Relocation TPS	6x120+4x200	5320.000*	Thermal	18/02/95	HMZ Power Ltd.
128	Samal Patti DEPP	100	350.000*	Diesel	18/02/95	Siv Industries Ltd., Coimbatore
129	Samayanallur DEPP	100	384.000	Diesel	16/09/94	Balaji Power Corp Ltd.
130	Srimushnam Lignite	250	875.000*	lignite	19/02/95	Ticapco, GN Swamy Associates
131	Tuticorin IV TPS	500	1750.000*	Coal	18/02/95	Tamil Nadu Petro Products, Madras
132	Vembar TPP	2000	7000.000*	Gas	18/02/95	CRSS Capital Corp & Intell Resources, USA
133	Zero Unit (Neyveli)	250	1325.110	Lignite	31/09/92	ST Power Systems Inc., USA
Total 15		11060	39717.110			

Table V.2

Tentative Expressions of Interest (through MOU/LOI Route) (More than Rs. 100 crores)

Award 1

as of 9th November 1995

SL. NO.	Name of Project	Capacity (MW)	Prov. Cost (Rs. Crores)	Type	MOU/ Approval Date	Name of Company
<i>Uttar Pradesh</i>						
134	Aligarh Power Project	100	350.000*	Diesel	04/02/95	Unison Power Ltd.
135	Chandausi Power Proj.	100	350.000*	Diesel	04/02/95	India Power Partners Ltd.
136	Gajraula Power Proj.	100	350.000*	Diesel	04/02/95	Enpro India Ltd.
137	Greater NOIDA PP	100	350.000*	Diesel	04/02/95	RPG Industries Ltd
138	Jawaharpur TPS	800	2896.000	Coal	17/11/93	Pacific Elec. Power (PEPDC) Canada
139	Kosi Kala PP	60	210.000*	Diesel	30/01/05	DSM Ltd.
140	Moradabad	100	350.000*	Diesel	04/02/95	Global Boards Ltd.
141	Muzaffarnagar PP	100	350.000*	Diesel	04/02/95	Subhash Projects & Marketing Ltd.
142	Panki PP	100	350.000*	Diesel	30/01/95	Dalmia Bros. Ltd.
143	Renusagar	2x70	424.330	Thermal	/ /	Hindalco Industries Ltd.
144	Rosa (aka Roza) TPS	3x250	2587.470	Coal	17/11/93	Indo-Gulf Fert&Chems & Power Gen, UK
145	Sahibabad PP	100	350.000*	Diesel	04/02/95	Modi Mirrless Blackstone Ltd.
146	Sikendrabad PP	100	350.000*	Diesel	30/01/95	Dalmia Bros. Ltd.
147	Srinagar HEP	330	1510.000	Hydel	27/08/94	Duncan Agro Ind. Ltd.
148	Vishnu Prayag HEP	4x100	1287.130	Hydel	14/10/92	Jaiprakash Industries Ltd.
TOTAL 15		3380	12064.930			
<i>West Bengal</i>						
149	Bakreshwar TPS 4&5	420	1860.000	Coal	16/02/94	DCL Kuljian/CMS Generation, USA & WBPDC
150	Balagarh TPS	2x250	2235.000	Coal	01/01/93	Balagarh Power Ltd (CESC/ADB/TFC)
151	Budge Budge	2x250	1959.000	Coal	/ /	CESC Ltd., Calcutta
152	Gauripore TPS	2x75	732.870	Coal	20/05/94	BTS, TES, USA, BHEL, WBSEB
153	Sagardighi TPS	2x500	4960.000	Coal	21/09/92	DCL Kuljian/CMS Generation, USA & WBPDC
TOTAL 5		2570	11746.870			
154	Group of power projects	6700	23450.000	Coal	22/09/94	Consolidated Electric Power Asia Ltd., Hong Kong
155	Energy Efficiency Cen	200	700.000	Biomass-Naptha	13/02/95	JMC Development, USA/ Apollo Hospitals
GRAND TOTAL 155		74152.50	275494.670			

* Rs 3.5 Crs/MW has been assumed as capital cost wherever state/promoter has not given provisional cost estimates.

Table V.3

Tentative Expressions of Interest (awarded or being awarded through bidding)
(Up to Rs. 100 crores)

*Award 2**as of 9th November 1995*

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>Name of Company</i>
<i>Himachal Pradesh</i>					
1	Khouli	10.50	36.750	Hydel	Under bidding
2	Patikri	20.00	70.000	Hydel	Under bidding
3	SAL-1	8.25	28.875	Hydel	Under bidding
TOTAL 3		38.75	135.625		
GRAND TOTAL 3		38.75	135.625		

Table V.4

Tentative Expressions of Interest (awarded or being awarded through bidding)
(More than Rs. 100 crores)

*Award 2**as of 9th November 1995*

<i>SL. NO.</i>	<i>Name of Project</i>	<i>Capacity (MW)</i>	<i>Prov. Cost (Rs. Crores)</i>	<i>Type</i>	<i>Name of Company</i>
<i>Andhra Pradesh</i>					
1	Kalingapatnam TPS	250	875.000	Coal	Under bidding
2	Krishnapatnam "A" TPS	500	1750.000	Coal	GVK Industries Ltd.
3	Krishnapatnam "B" TPS	500	1750.000	Coal	Besicorp Int. Power
4	Ramagundum	2x250	1603.700	Coal	BPL Group
TOTAL 4		1750	5978.700		
<i>Delhi</i>					
5	Bawana GBPP	800	2000.000	Gas	Under bidding
TOTAL 1		800	2000.000		
<i>Gujarat</i>					
6	Coastal TPS	1x1000	3500.000	Coal	Under bidding
7	Ghogha	1x250	875.000	Lignite	Under bidding
8	Pipavar	1x615	2152.500	Gas	Under bidding
TOTAL 3		1865	6527.500		

Table V.4
Tentative Expressions of Interest (awarded or being awarded through bidding)
(More than Rs. 100 crores)

Award 2

as of 9th November 1995

SL NO.	Name of Project	Capacity (MW)	Prov. Cost (Rs. Crores)	Type	Name of Company
<i>Himachal Pradesh</i>					
9	Baspa - Stage I	240	840.000	Hydel	Under bidding
10	Budhil	81	283.000	Hydel	Under bidding
11	Chirgaon Majhgaon	46	161.000	Hydel	Under bidding
12	Kol Dam	800	2800.000	Hydel	Under bidding
13	Kuthr	240	840.000	Hydel	Under bidding
14	Rampur	680	3380.000	Hydel	Under bidding
15	Sawra Kuddu	86	301.000	Hydel	Under bidding
16	Shongtong Karchan	225	787.500	Hydel	Under bidding
TOTAL 8		2398	8393.000		
<i>Haryana</i>					
17	Ambala DPP	75	262.500	Diesel	Under bidding
18	Faridabad DPP	75	262.500	Diesel	Under bidding
19	Gurgaon	75	262.500	Diesel	Under bidding
20	Hissar TPS	2x250	1750.000	Coal	Under bidding
21	Kundli DPP	75	262.500	Diesel	Under bidding
22	Mohinderghar DPP	75	262.500	Diesel	Under bidding
TOTAL 6		875	3062.500		
<i>Jammu and Kashmir</i>					
23	ANS	37	150.000	Hydel	Under bidding
24	Burser HEP	1020	2000.000	Hydel	Under bidding
25	Chutak	12	100.000	Hydel	Under bidding
26	Kishenganga HEP	3x110	1000.000	Hydel	Under bidding
27	Pakaldul HEP	1000	2000.000	Hydel	Under bidding
28	Parkhachak	30	200.000	Hydel	Under bidding
29	Parnai HEP	3x12.5	150.000	Hydel	Under bidding
30	Sawlkot	3x200	2000.000	Hydel	Under bidding
31	Sewa-II	3x40	350.000	Hydel	Under bidding
TOTAL 9		3186.50	7950.000		
<i>Maharashtra</i>					
32	Khaperkheda Units 3&4	2x250	1750.000	Coal	Ballarpur Industries Ltd.
33	Nagathone GBPP	410	1435.000	Gas	Reliance
TOTAL 2		910	3185.000		

Table V.4
Tentative Expressions of Interest (awarded or being awarded through bidding)
(More than Rs. 100 crores)

Award 2

as of 9th November 1995

SL NO.	Name of Project	Capacity (MW)	Prov. Cost (Rs. Crores)	Type	Name of Company
<i>Orissa</i>					
34	Rengali TPS	2x250	1750.000	Coal	Under bidding
TOTAL 1		500	1750.000		
<i>Punjab</i>					
35	GNTOP St-IV	2x250	1750.000	Coal	Under bidding
36	Govindwal Sahib	2x250	1750.000	Coal	Under bidding
TOTAL 2		1000	3500.000		
<i>Rajasthan</i>					
37	Abu Road	75	262.500	Diesel	Under bidding
38	Barsingsar TPS	240	840.000	lignite	Under bidding
39	Bhiwadi	75	262.500	Diesel	Under bidding
40	Jaipur	75	262.500	Diesel	Under bidding
41	Jalipa	4x250	1967.540	Lignite	Under bidding
42	Jodhpur	75	262.500	Diesel	Under bidding
43	Kapurdi	2x250	1932.460	Lignite	Under bidding
44	Mia-Alwar	75	262.500	Diesel	Under bidding
45	Suratgarh Stage II	2x250	1597.900	Coal	Under bidding
46	Udaipur	75	262.500	Diesel	Under bidding
TOTAL 10		2690	7912.000		
<i>Sikkim</i>					
47	Teesta III	1200	4200.000	Hydel	Under bidding
TOTAL 1		1200	4200.000		
<i>Uttar Pradesh</i>					
48	Bowala-Nandaprayag	3x44	347.000	Hydel	Under bidding
49	Loharinag-Pala	4x130	637.000	Hydel	under bidding
50	Maneri Bhali II HEP	304	1064.000	Hydel	Under bidding
51	Pala Maneri HEP	416	1456.000	Hydel	Under bidding
52	Tapovan Vishnugad HEP	360	1260.000	Hydel	Under bidding
TOTAL 5		1732	2764.000		
<i>West Bengal</i>					
53	Parakka	5x25	602.000	Hydel	Under bidding
TOTAL 51		125	602.00		
GRAND TOTAL 53		19031.50	59825.600		

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