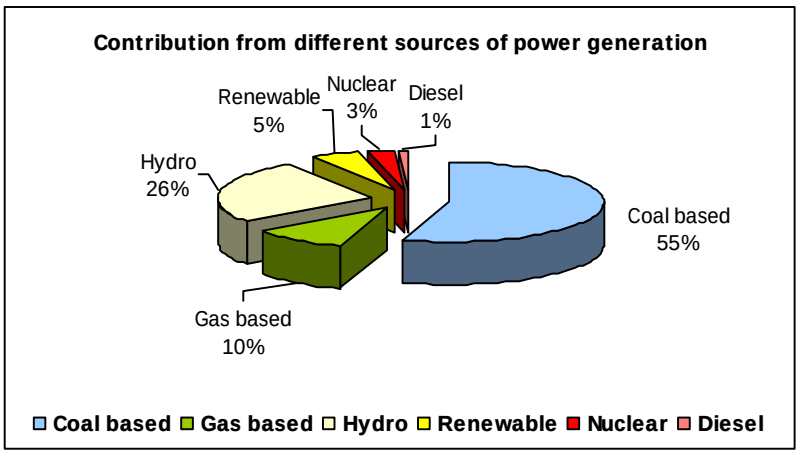
POWER AND ENERGY INDUSTRY IN INDIA

1. OVERVIEW OF INDIA'S POWER SECTOR

1.1 Background

India's power market is the fifth largest in the world. The power sector is high on India's priority as it offers tremendous potential for investing companies based on the sheer size of the market and the returns available on investment capital. The current installed capacity of power plants is 132329 MW (as on March 31, 2007).



Source: Ministry of Power, Government of India

Almost 55 per cent of this capacity is based on coal, about 10 per cent on gas, 26 per cent on hydro, approximately 5 per cent on renewable sources, about 3 per cent on nuclear and 1 per cent on diesel.

In the past five years, there has been a much greater emphasis on transmission and distribution reforms. The interregional transmission capacity has been increased to 9,500 MW. The National Grid Development Programme calls for 37,150 MW of interregional capacity by 2012.

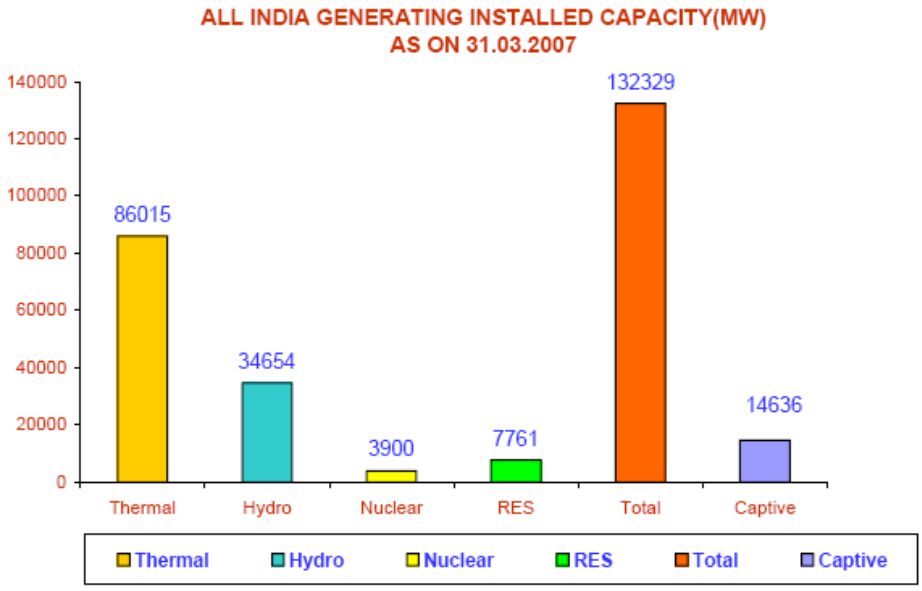
The government aims to provide "power to all" by 2012. To achieve that promise, it will have to add as much as 1,00,000 MW of generation capacity, cut AT&C losses substantially to below 20 per cent, rationalize tariffs and ensure that average revenue realization is greater than the cost of production. It will have to continue to push the process of reform and restructuring and ensure greater private participation, in every segment.

In the past few years, there has been considerable growth in power plants based on renewable sources of energy. The current installed capacity based on these sources is about 6,200 MW of total utility capacity. An initiative to add 50,000 MW of hydro capacity by 2017 was announced in 2003. The current installed capacity, at about 32,000 MW, utilizes just over one -fifth of 150,000 MW hydro potential.

The Plant Load Factor (PLF) of generating plants has improved consistently over the last 10 years. In 2005-06, the PLF of generating plants was almost 74 per cent, compared to 60 per cent in 1994-95. The following table shows the details of installed capacity (in MW) in India as on March 31, 2007:

Region	Hydro	Thermal				Nuclear	RES	Total
		Coal	Gas	Diesel	Total thermal			
Northern	1300.38	18027.50	3323.19	14.99	21365.68	1180	813.37	36359.43
Western	6918.83	22441.50	5820.72	17.48	28279.70	1840.0	1874.76	38913.29
Southern	11011.71	16172.50	3586.3	939.32	20698.12	880.0	4971.55	37561.38
Eastern	2496.53	14149.88	190.0	17.2	14357.08	0.0	46.76	16900.37
North Eastern	1221.07	330.0	771.5	142.74	1244.24	0.0	48.91	2514.22
Island	5.25	0.0	0.0	70.02	70.02	0.0	5.25	80.52
All-India	34653.77	71121.38	13691.71	1201.75	86014.84	3900.0	7760.60	132329.21
Source: Central Electricity Authority								

The share of thermal power as a proportion of total power generated has decreased from 71 per cent to 66.3 per cent in the last decade. The share of hydro has increased to 26 per cent from 25.7 per cent. The increasing price of oil, gas and coal in the international market has accentuated the significance and desirability of hydro power. An initiative to add 50,000 MW of hydro capacity by 2017 was launched in August 2003. The intent is to increase the share of hydro power generation from 26 per cent to 40 per cent.



Of the fossil fuel supplies, there is delivery constraint with respect to gas. A number of gas plants today are running at sub-optimal plant load factor (PLF) levels due to shortages. The government has decided not to embark on new projects that rely on gas. It is feared that supply shortages can disturb the capacity addition plans, reduce PLFs, as the rising crude prices have led to firmer naphtha and natural gas prices.

Emerging environmental concerns have led to an increasing interest in renewables. As per the Central Electricity Authority (CEA) reviews the cost-effective hydro potential of India is about 84,044 MW, but it contributes just 6,000 MW at present.

State Electricity Boards (SEBs) and the new state generation utilities have an installed capacity base of 70,224 MW that accounts for a share of 57 per cent. Sector-wise, the states contribute the maximum generation capacity. Power producers in the central sector, like NTPC, NHPC and DVC, account for 32.2 per cent of installed generation capacity.

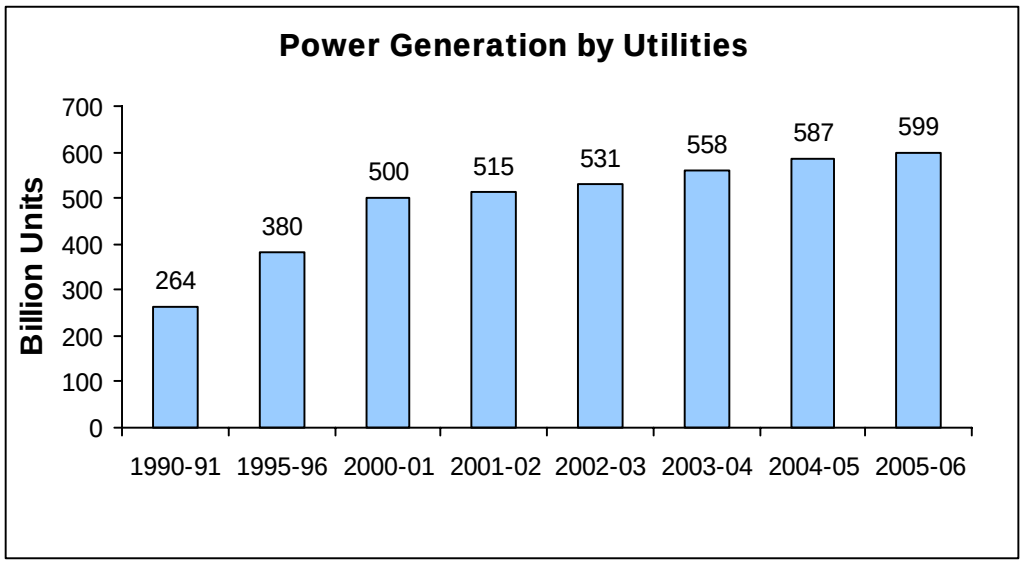
The contribution of the private sector was 11.3 per cent in 2005-06. Amongst the private players, Tata has the highest installed capacity, at 2,300 MW. In terms of actual generation, private contribution is 8.7 per cent. There is renewed interest in Independent Power Producers (IPPs) in the power sector. Private IPPs contributed 5,691 MW to installed generation capacity in March 2006.

Captive power plants (CPPs) also make a major contribution, which is more than one-fifth of the total installed capacity. In the last three years, captive capacity has grown at an average of 1,600 MW per year. The introduction of ABTs (Availability Based Tariffs) has changed the thinking of discoms. They have to pay huge prices as they have to source power from the grid during low frequency periods. During this time the CPP power comes in handy at a much lower tariff.

The reform process in the power sector continues. Thirteen states have unbundled SEBs into separate entities for transmission, distribution and generation. Two states have privatized distribution. Regulatory authorities have been set up in 24 states. These authorities are applying commercial principles to tariff setting, monitoring the performance of state utilities and paying attention to areas such as demand side management and grid discipline.

1.2 Generation

India's power generation capacity (excluding captive plants) stood at 1,277,752 MW in Dec 2006. Actual generation has grown at a compounded annual growth rate of about 5.82 per cent in the last decade from 350,490 MUs in 1995-96 to 617,382 MUs in 2005-06. The overall generation in the country has increased (Thermal + Nuclear + Hydro) in public utilities in the country over the years is as under:

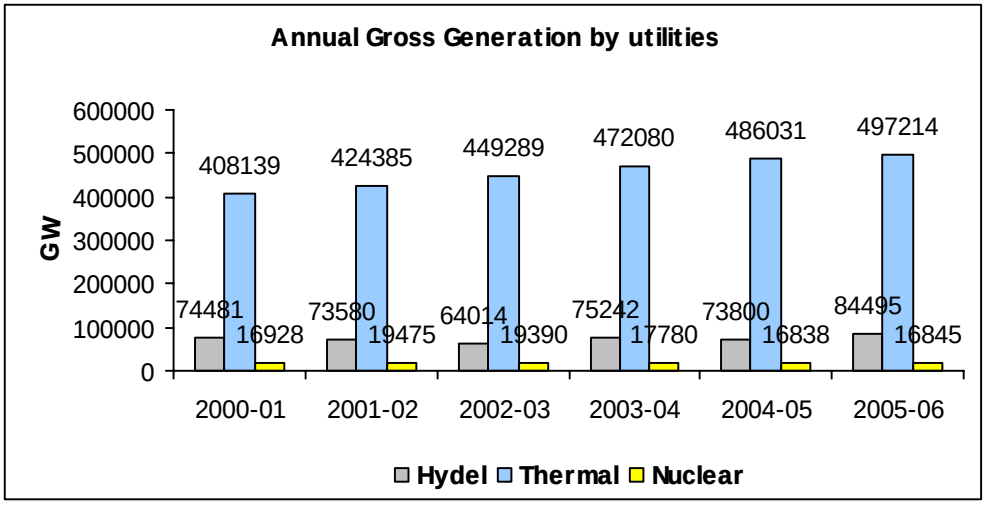


Source: Annual Report 2005-06, Ministry of Power

Over the years, the fuel mix has changed. The share of power from thermal sources decreased from 71 per cent in 1994-95 to 66.3 per cent in 2005-06. The share of hydro has increased from 25.7 per cent to 26 per cent. Growing environmental concerns have led to an interest in renewable sources of energy (comprising wind energy, solar photovoltaic energy, biomass power and mini hydro plants). But despite great potential, renewable sources contribute only a little over 6,000 MW at present.

The contribution of the private sector to installed generation capacity was 14, 139 MW or 11.3 per cent in 2005-06. Amongst the private players, Tata Power has the highest installed capacity at 2,300 MW. In terms of actual generation, private contribution is 8.7 per cent. There is renewed interest in IPPs in the power sector. Private IPPs contributed 5,961 MW to installed generation capacity in March 2006.

The PLF of generating plants has improved consistently over the last few years. The all India average PLF on March 2006 stood at 73.6 per cent compared to 60 per cent in 1994-95. The PLF of central plants in 2005-06 was 82.1 per cent while the average PLF of the state sector units was close to 67 per cent. The average PLF of the private sector was 85.4 per cent in 2005-06.



Source: Annual Report 2005-06, Ministry of Power

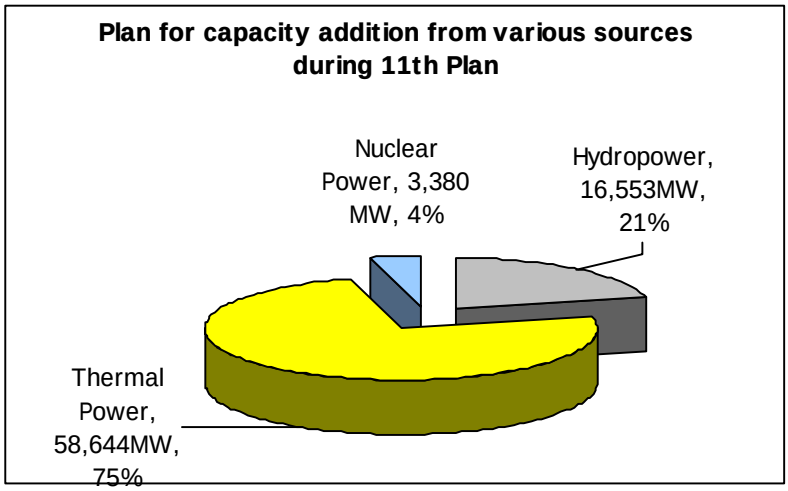
Over the next 10 years, the minimum capacity addition needed is estimated to be approximately 1,00,000 MW. At an average cost of US $ 1 million per MW, the investment called for is US $ 100 billion. If the investment required in transmission and distribution is taken into account, the total figure rises to US $ 200 billion. A majority of this amount will have to be funded by the private sector, both domestic and foreign.

2. FUTURE PLANS OF CAPACITY ADDITION

2.1 Plan for Capacity Addition during XIth Five Year Plan (2007-2012)

The power generation capacity added during the last five years is a lowly 21,280 Mw, which is about half the original target of 41,110 MW set for the Tenth Plan. This is also 2000 Mw less than the 23,250 Mw capacity addition projected by the government in last few days of Xth five year plan. (March 2007).

An ambitious target of 78,577 Mw has been set by the government for the eleventh plan period (2007 -2012). Of this, the hydropower's share would be 16,553 MW, the thermal power would constitute 58,644 MW and the nuclear power's share would be 3,380 MW. Capacity addition plan from different sources during XIth five year plan (2007-2012).



Year wise Capacity addition plan during XIth five year plan (2007-2012):

Year	Capacity addition (Mw)
Ist year (2007-08)	16,785
IInd year (2008-09)	7272
IIIrd year (2009-2010)	15,198
IVth year (2010 -2011)	16,970
Vth year (2011-2012)	22,352
Total capacity addition	**78577**

The orders for these capacity additions are likely to be placed by December 2007 so that they can be implemented during the Plan itself.

Policy for Additional Capacity Generation

Following is the policy for future power generation under the National Electricity Plan:

Inadequacy of generation has characterized power sector operation in India. To provide availability of over 1000 units of per capita electricity by year 2012 it had been estimated that need based capacity addition of more than 1,00,000 MW would be required during the period 2002-12.

Government of India has initiated several reform measures to create a favourable environment for addition of new generating capacity in the country. The Electricity Act 2003 has put in place a highly liberal framework for generation. There is no requirement of licensing for generation. The requirement of techno-economic clearance of CEA for thermal generation project is no longer there. For hydroelectric generation also, the limit of capital expenditure, above which concurrence of CEA is required, would be raised suitably from the present level. Captive generation has been freed from all controls.

In order to fully meet both energy and peak demand by 2012, there is a need to create adequate reserve capacity margin. In addition to enhancing the overall availability of installed capacity to 85per cent, a spinning reserve of at least 5per cent, at national level, would need to be created to ensure grid security and quality and reliability of power supply.

2.2.1 Non-conventional Energy Generation

The Ministry of Non-conventional Energy Sources is promoting development of small/mini hydro power projects. The potential of generation of power from small and mini hydel projects is estimated to be about 10,000 MW in the country.

Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass would also need to be exploited fully to create additional power generation capacity.

With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures.

2.2.2 Hydro Electricity Generation

Hydroelectricity is a clean and renewable source of energy. Maximum emphasis would be laid on the full development of the feasible hydro potential in the country. The 50,000 MW hydro initiatives have been already launched and are being vigorously pursued with DPRs for projects of 33,000 MW capacity already under preparation.

Harnessing hydro potential speedily will also facilitate economic development of States, particularly North-Eastern States, Sikkim, Uttaranchal, Himachal Pradesh and J&K, since a large proportion of our hydro power potential is located in these States. The States with hydro potential need to focus on the full development of these potentials at the earliest.

Hydel projects call for comparatively larger capital investment. Therefore, debt financing of longer tenure would need to be made available for hydro projects. Central Government is committed to policies that ensure financing of viable hydro projects.

State Governments need to review procedures for land acquisition, and other approvals/clearances for speedy implementation of hydroelectric projects.

The Central Government will support the State Governments for expeditious development of their hydroelectric projects by offering services of Central Public Sector Undertakings like National Hydroelectric Power Corporation (NHPC).

Proper implementation of National Policy on Rehabilitation and Resettlement (R&R) would be essential in this regard so as to ensure that the concerns of project-affected families are addressed adequately.

Adequate safeguards for environmental protection with suitable mechanism for monitoring of implementation of Environmental Action Plan and R&R Schemes will be put in place.

Scheme for Pre-Feasibility Reports for Hydel Projects

The Ministry of Power has sanctioned a scheme to prepare Pre-feasibility Reports for 162 Hydro-electric Schemes in the country having an aggregate installed capacity of 50,650 MW. Of this12 schemes of 3,750 MW are in Himachal Pradesh.

The Central Electricity Authority has identified a hydro power potential of approximately 18,820 MW in Himachal Pradesh. Eighteen hydel projects with an installed capacity of 3,978 MW have already been developed and ten projects of 4,054 MW installed capacity are under development. Twelve schemes with installed capacity of 2,513 MW are under different stages of Survey and Investigation in Himachal Pradesh.

2.2.3 Small Hydropower Plants

The Electricity Act 2003 is the catalyzing and facilitating factor for the Power revolution in India. The concern that no households be left out from being electrified, is being aptly addressed by the Union and state Governments. Impetus is being given to Rural Electrification. In order to achieve this objective, synergy is to be evolved where distributed Power Generation supplements (or makes up for the limitation) of electric supply through grid. Besides this mission, initiatives for environmental conservation are propelling utilities to generate more of Green Power

Decentralised Power Generation and Distribution has the power to adequately make up for the limitation of the Electric supply through Grid, and is considered a potential means to provide **"Power to all by 2012"** DPG technologies such as Small Hydro Power help in producing power at the point of consumption.

Hence there have been efforts to generate power, at the source of energy and at the place of consumption, using the Small Hydro Potential available nearby. This can be a motivating

factor for the local populace so that the pace of electrification can be increased. India has a small hydro Potential of 15000 MW upto the capacity of 25 MW. Till December 31, 2004, 514 SHP projects with an aggregate installed capacity of 1693 MW have been installed.

At the end of the 9th Plan the total installed capacity of SHP projects upto 25 MW station capacity was 1438.89 MW. A capacity of 80.39 MW was added during 2002- 03. SHP projects with a total capacity of 84.04 MW were commissioned during the year 2003- 04, taking the total installed capacity to 1603MW from 496 projects. In 2004- 05, 90 MW capacity from 18 projects was commissioned till December 2004. Besides these, 159 SHP projects with an installed capacity of 488 MW are under implementation. A database has been created for most potential sites by collecting information from various sources and the State Governments. It is proposed to further strengthen the identification of new sites during the 10th Plan period and give thrust on the development of SHPs in Hilly region. At present the country has an installed capacity of 1705MW of small hydro power plants. The 130 kW plant at Darjeeling in the year 1897 was the first shp installation in the country. A few other power houses belonging to that period such as Shivasundaram in Mysore (2 mw, 1902), GalGovernment of India in Mussoorie (3 MW, 1907), and Chaba (1.75 MW, 1914) and Jubbal (50 KW, 1930) near Shimla are reported to be still functioning properly.

In India, small hydro schemes are further classified by the Central Electric Authority as follows:

Type	Station Capacity	Unit rating
Micro	Upto 100 KW	Upto 100 KW
Mini	101 KW to 2000 KW	101 KW to 1000 KW
Small	2001 KW to 25000 KW	1001 KW to 5000 KW

The targeted capacity addition by the end of tenth plan is 600MW and by the end of eleventh plan is 2000MW.
Rajeev Gandhi Grameen Vidyutikaran Yojana (RGGVY) sets the context of Decentralised distributed generation and distribution as a major instrument of remote rural electrification.

2.2.4Thermal Generation

Even with full development of the feasible hydro potential in the country, coal would necessarily continue to remain the primary fuel for meeting future electricity demand.

Imported coal based thermal power stations, particularly at coastal locations, would be encouraged based on their economic viability. Use of low ash content coal would also help in reducing the problem of fly ash emissions.

Significant Lignite resources in the country are located in Tamil Nadu, Gujarat and Rajasthan and these should be increasingly utilized for power generation. Lignite mining technology needs to be improved to reduce costs.

Use of gas as a fuel for power generation would depend upon its availability at reasonable prices. Natural gas is being used in Gas Turbine /Combined Cycle Gas Turbine

(GT/CCGT) stations, which currently accounts for about 10 per cent of total capacity. Power sector consumes about 40per cent of the total gas in the country. New power generation capacity could come up based on indigenous gas findings, which can emerge as a major source of power generation if prices are reasonable. A national gas grid covering various parts of the country could facilitate development of such capacities.

Imported LNG based power plants are also a potential source of electricity and the pace of their development would depend on their commercial viability. The existing power plants using liquid fuels should shift to use of Natural Gas/LNG at the earliest to reduce the cost of generation.

For thermal power, economics of generation and supply of electricity should be the basis for choice of fuel from among the options available. It would be economical for new generating stations to be located either near the fuel sources e.g. pithead locations or load centres.

Generating companies may enter into medium to long-term fuel supply agreements specially with respect to imported fuels for commercial viability and security of supply.

2.2.5 Nuclear Power

Nuclear power is an established source of energy to meet base load demand. Nuclear power plants are being set up at locations away from coalmines. Share of nuclear power in the overall capacity profile will need to be increased significantly. Economics of generation and resultant tariff will be, among others, important considerations. Public sector investments to create nuclear generation capacity will need to be stepped up. Private sector partnership would also be facilitated to see that not only targets are achieved but exceeded.

Nuclear Power Capacity Addition Plan:

Nuclear power is seeing a renaissance. Power-starved India, which has the largest number of reactors under construction, is at the forefront of this revival of interest in nuclear power.

India is building seven of the 30 reactors under construction around the world. This is likely to increase significantly once the India-US agreement on nuclear cooperation is accepted by the rest of the world.

India will add about 3,400 MW generation capacities through these seven reactors. The largest of these reactors is of 1,000 MW capacities, as the country has generally been more comfortable with smaller reactors, given the constrained capacity of the grids.

The NPCIL and the Bharatiya Nabhikiya Vidyut Nigam Ltd (Bhavini) are the only companies authorised to build nuclear reactors in the country.

India's current nuclear power generation capacity of 3,900 Mw is dominated by boiling water reactors (BWRs) and pressurised heavy water reactors (PHWRs). Of the plants under construction, four are PHWRs, two are light water reactors and one is fast breeder reactors (FBRs).

The nuclear revival can be traced to two key factors – it is cheap and there are no messy carbon emissions that are responsible for the global warming. However, there is the problem of reprocessing or disposing off highly radioactive spent fuel.

According to a recent study quoted by the Finnish Company TVO (Teollisuuden Voima Oy), which is constructing Finland's fifth nuclear plant based on the EPR reactor, the power generation cost per megawatt of nuclear power is about 25 euros, which is about half the cost of power generated from other fuels. The fuel cost is a small slice (3 per cent) of the overall cost and is largely predictable.

Not surprisingly, therefore, India plans to increase nuclear generation capacity at least five-fold to 20,000 Mw by 2020. If it gets access to other reactors through the India-US deal, the capacity could go up to 40,000 Mw by 2020.

India has been commissioning nuclear reactors in record time of less than five years. The capital cost per megawatt in the case of nuclear plant is Rs 50 million, which is higher than the average cost of the thermal plants (Rs 40 million or less). However, with the fuel cost being much lower than the thermal plants, nuclear power becomes an appealing option.

2.2.6 Captive Generation

The liberal provision in the Electricity Act, 2003 with respect to setting up of captive power plant has been made with a view to not only securing reliable, quality and cost effective power but also to facilitate creation of employment opportunities through speedy and efficient growth of industry. The provision relating to captive power plants to be set up by group of consumers is primarily aimed at enabling small and medium industries or other consumers that may not individually be in a position to set up plant of optimal size in a cost effective manner. It needs to be noted that efficient expansion of small and medium industries across the country would lead to creation of enormous employment opportunities.

A large number of captive and standby generating stations in India have surplus capacity that could be supplied to the grid continuously or during certain time periods. These plants offer a sizeable and potentially competitive capacity that could be harnessed for meeting demand for power. Under the Act, captive generators have access to licensees and would get access to consumers who are allowed open access. Grid inter-connections for captive generators shall be facilitated as per section 30 of the Act. This should be done on priority basis to enable captive generation to become available as distributed generation along the grid. Towards this end, non-conventional energy sources including co-generation could also play a role. Appropriate commercial arrangements would need to be instituted between licensees and the captive generators for harnessing of spare capacity energy from captive power plants. The appropriate Regulatory Commission shall exercise regulatory oversight on such commercial arrangements between captive generators and licensees and determine tariffs when a licensee is the off-taker of power from captive plant.

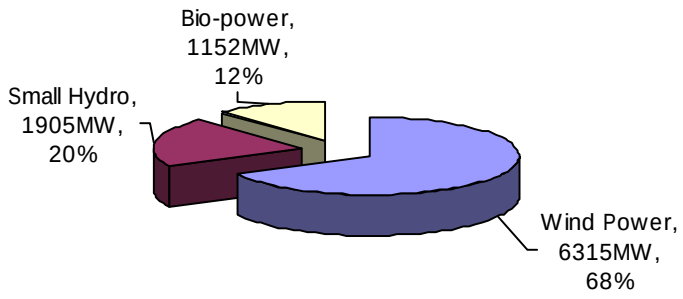
3. PROSPECTS OF RENEWABLE ENERGY

3.1 Current Scenario

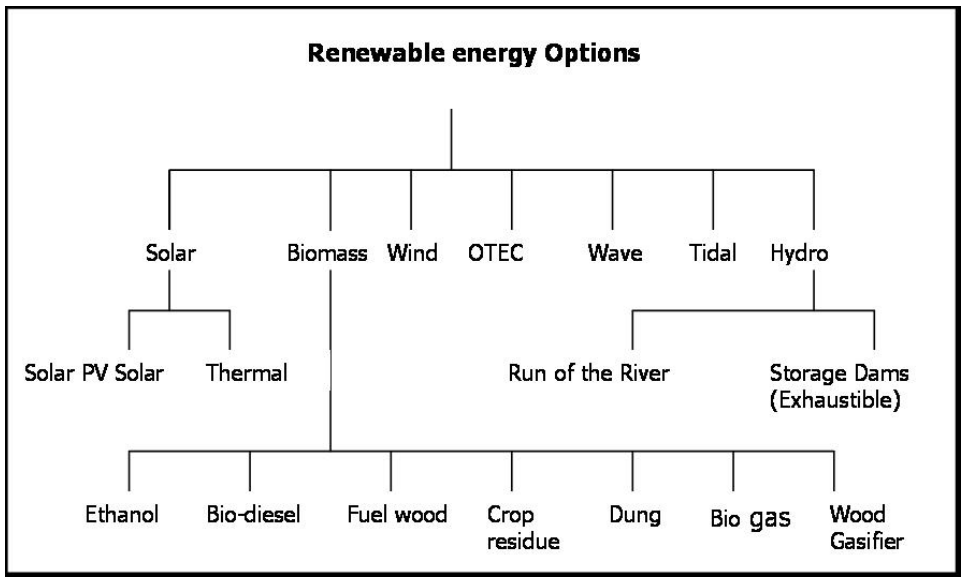
The Progress of renewable energy generation has been encouraging as the country is today one among the top rankers in grid-interactive renewable power installations which aggregate 9373 MW, corresponding to over 7.0 per cent of the total power generating installed capacity in the country in the year 2005-06.

6315 MW is the share of wind power placing the country at 4th rank world-wide, 1905 MW of small-hydro power and 1152 MW of bio-power

Renewable Energy Generation 2005-06



Adverse local environmental impacts (SOx, NOx, SPM) and global environmental impacts (green house gas emissions mainly due to carbon dioxide) associated with fossil fuel use have resulted in an increased emphasis on renewables.



Estimated potential and cumulative achievements as on January 31, 2007

No.	Sources / Systems	Estimated Potential	Cumulative Achievements
I. Power From Renewables			
A. Grid-interactive renewable power			
1	Bio Power (Agro residues)	16,8811 MWe	510.00 MW
2	Wind Power	45,1952 MWe	6315.00 MW
3	Small Hydro Power (up to 25 MW)	15,0003 MWe	1905.00 MW
4	Cogeneration-bagasse	5,0004 MWe	602.00 MW
5	Waste to Energy	2,7005 MWe	40.95 MW
	Sub Total (in MW) (A)	84,7766 MWe	9372.95 MW
B. Distributed renewable power			
6	Solar Power	-	2.92 MW
7	Biomass Power / Cogen.(non-bagasse)	-	34.30 MW
8	Biomass Gasifier	-	75.85 MW
9	Waste-to- Energy	-	11.03 MW
	Sub Total (B)	-	124.10 MW
	Total (A + B)	-	9497.05 MW
II. Decentralised Energy Systems			
10	Family Type Biogas Plants	12 million	3.9 million
11	Solar Photovoltaic Programme	20 MW/sq.km.	
	i. Solar Street Lighting System	-	54659 nos.
	ii. Home Lighting System	-	301603 nos.
	iii. Solar Lantern	-	463058 nos.
	iv. Solar Power Plants	-	1859.80 kWp
12	Solar Thermal Programme	-	
	i. Solar Water Heating Systems	-	1.66 million sq.m. collector area
	ii. Solar Cookers	-	6.03 lakh
13	Wind Pumps	-	1141 nos.
14	Aero-generator /Hybrid Systems	-	572 kW
15	Solar Photovoltaic Pumps	-	7068 nos.
MWe = Megawatt equivalent; MW = Megawatt; kW = kilowatt; kWp = kilowatt peak; sq. m. = square meter			

As the country is short of energy resources the need to develop all energy sources including renewable options is paramount. Our efforts in the past have not been as successful as we would have liked. Many renewable have high initial costs. Often development efforts have been sub-critical and subsidy driven growth has not provided incentives for technical improvements or cost reduction. There are also externalities of the use of renewables, the benefits of which do not accrue to the user.

3.2 Capital Costs and the Typical Cost of Generated Electricity from renewable options

S.No.	Source	Capital Cost (Million of Rs./MW)	Estimated Cost of generation per Unit (Rs./Unit)	Total Installed Capacity(MW) (upto 31.12.2005)
1.	Small (<25) MW Hydro-Power	50-60	2.50-3.50	1748
2.	Wind Power	40-50	3.00-4.00	4434
3.	Biomass Power	40	3.00-4.00	377
4.	Bagasse Cogeneration	30-35	2.00-3.00	491
5.	Biomass Gasifier	25-30	3.00-4.00	71
6.	Solar Photovoltaic	250-300	15.00-20.00	3
7.	Energy from Waste	50-100	4.00-7.50	46

4. REGULATORY ENVIRONMENT

4.1 Institutional Framework

The Ministry of Power is primarily responsible for the development of the Indian power sector. It is concerned with perspective planning and policy formulation in the sector.

The State Electricity Boards (SEBs) generate, transmit and distribute electricity in coordination with private/centrally owned generating companies or any other relevant agency.

The Central Electricity Authority (CEA) is a body constituted under the Electricity Supply Act, which is responsible for developing a sound, adequate, and uniform policy for the control and utilisation of national power resources. It is also responsible for the techno-economic appraisal of the project reports for the proposed power plants, including those in the private sector.

Subsequent to enactment of the Legislation on establishment of a regulatory authority, an institution called the Central Electricity Regulatory Commission (CERC) has been set up for rationalisation of bulk and retail tariff for generation and transmission utilities involved in inter-state operations. It also regulates at intra-state level. Each state has set up a State Electricity Regulatory Commission.

4.2 The Electricity Act 2003

The Electricity Act 2003 has been enacted by the Parliament in June, 2003. The salient positive features of this legislation are:

- Removal of a number of restrictive barriers to the flow of power in a competitive market scenario by opening access to transmission (from the outset) and distribution.
- Freeing up of generation and captive power plants from licenses and techno-economic approvals.
- The recognition to trading as a distinct activity that would help ushering in a market environment.
- The formation of an expert Appellate Tribunal to hear appeals against State and Central Electricity Regulatory Commission orders.
- Transferring the full range of regulatory and licensing functions to the Central and State Regulatory Commissions.
- Deregulating tariffs in certain situations e.g. in case of agreements between consumers and generating companies.
- The distancing of Government from the functioning of the sector after giving broad directions via the National Electricity Policy and the National Tariff Policy.
- The conversion of the remaining State Electricity Boards into State Transmission Utilities and deemed licensees with the freedom (but not compulsion) to restructure and progress down the road to corporatisation and privatization.

- The Energy Conservation Act, 2001 has been enacted and consequently Bureau of Energy Efficiency (BEE) has already been set up.

4.3 Reforms So Far

- 26 states have signed Memorandum of Understanding (MoU) with the Government of India to undertake reforms.
- 20 states have constituted State Electricity Regulatory Commissions and are functional. Tripura and Jharkhand have notified the constitution of SERC.
- 18 State Electricity Regulatory Commissions have issued tariff orders.
- 11 States have unbundled/corporatised.
- State of Orissa and Delhi have privatised distribution of electricity.

4.4 Major Policies Notified Under the Electricity Act During 2006

4.4.1 Tariff Policy

The Tariff Policy has been notified by Government of India on6 January, 2006 under the provisions of section 3 of the Electricity Act, 2003.

The objectives of the tariff policy are to:

- Ensure availability of electricity to consumers at reasonable and Competitive rates
- Ensure financial viability of the sector and attract investments
- Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimise perceptions of regulatory risks
- Promote competition, efficiency in operations and improvement in quality of supply.

4.4.2 Guidelines for procurement of electricity

In compliance with section 63 of the Electricity Act, 2003, the Central Government had notified guidelines for procurement of power by Distribution Licensees through competitive bidding. Central Government has also issued the standard bid documents containing RFQ, RFP and model PPA for long term procurement of power from projects having specified site and location.

Amendment to these guidelines has been issued on 30th March, 2006 and 18th August, 2006.

4.4.3 Rural Electrification Policy

Rural Electrification Policy, in compliance with section 4 and 5 of the Electricity Act 2003, was notified on 23rd August, 2006.

Overall approach enunciated in the Policy highlights grid connectivity to be normal way of electrification of villages. For villages / habitations where grid connectivity is not

feasible or not cost effective of grid solutions based on stand alone systems may be taken up. De-centralized distribution generation facilities together with local distribution network may be based on either conventional or non-conventional method of electricity generation. The State Governments should within six months prepare and notify a Rural Electricity Plan to achieve the goal of providing access to all households.

4.4.4 New Hydro-Policy

Section 63 of the Electricity Act provides for development of projects on the basis of competitive bidding for tariff. Sections 61 and 62 allow such projects developed on the basis of tariff to be fixed by the Regulator on the basis of capital cost and norms. In fact, the Electricity Tariff Policy notified in January 2006 also allows a special dispensation for project development by State and Central PSUs on the basis of capital cost and normbased tariff to be determined by the Regulatory Commission. This dispensation, allowed for PSUs, is now proposed to be made available for the same period of 5 years to promote hydro-power development even through the private sector route. The State would be required to follow a transparent process for selection of the developer.

This arrangement would have several advantages. While the initiative for allocation of the project would remain with the State Government (subject to the requirement of transparency in the allocation), the scrutiny of the regulator and the CEA would ensure that the project is being designed and built in the most optimal and economic manner, and that the interest of the consumers is adequately protected. From the point of view of the developer, this procedure would reduce numerous risks associated with the construction and operation and maintenance (O&M) of hydro projects.

New Hydel Policy announced with an objective of making investment in hydro projects more attractive. The government has prepared plan for creation of National Grid by 2012 and infrastructure to facilitate inter-regional exchange of 30,000 MW of electricity by 2012.

4.4.5 Ultra-Mega Power Projects (UMPPs)

The Ministry of Power, Government of India has launched an initiative for development of coal-based Ultra-Mega Power Projects (UMPPs) in India, each with a capacity of 4,000 MW or above. These projects will be awarded to developers on the basis of tariff-based competitive bidding. To facilitate tie-ups of inputs and clearances, project-specific shell companies have been set up as wholly owned subsidiaries of the Power Finance Corporation (PFC) Ltd. These companies will undertake preliminary studies and obtain necessary clearances including water, land, fuel, power selling tie-up etc. prior to award of the project to the successful bidder.

Nine sites have been identified by CEA in nine States for the proposed UMPPs. These include four pithead sites, one each in Chhattisgarh, Jharkhand, Madhya Pradesh and Orissa, and five coastal sites, one each in Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu. It is proposed to set up pithead projects as integrated proposals with corresponding captive coal mines. On the request of Ministry of Power,

Ministry of Coal has already allocated captive coal mining block for Sasan UMPP in Madhya Pradesh and earmarked captive coal mining block for Orissa UMPP. For the coastal projects, imported coal shall be used. The projects are to be developed with a view to lower the cost of power to the consumers. These projects, adopting supercritical technology to reduce emissions, would be environment-friendly.

A time bound action plan for preparation of project report, tie-up of various inputs/ clearances, appointment of consultants, preparation of RFQ/RFP have been prepared.

Lanco Infrastructure has bagged the Sasan Project at Rs. 1.19 per unit whereas Tata Power has been awarded the Mundra project at Rs. 2.26 per unit. The encouraging results achieved in these two cases has shown the way forward for capacity addition with most competitive tariff. Developers for Krishnapatnam UMPP (Andhra Pradesh) and Tilaiya (Jharkhand) UMPP are expected to be selected by April, 2007 and July 2007 respectively. Once the developers are selected, the ownership of the shell companies shall be transferred to the successful bidders

4.4.6 Development of Merchant Power Plants

To facilitate the development of the electricity market, the Ministry of Power has issued the approach and guidelines on development of merchant power plants (MPPs). Unlike traditional utilities, MPPs compete for customers and absorb the full market risk. There is no guarantee regarding minimum off-take of their output. Typically the risk of a MPP is carried on the balance sheet of the promoter. MPPs can provide the additional generating reserves that India needs now and will need in the future. They are a modern, market-based answer – at least in part – to the energy challenges faced by the country. MPPs are a product of the restructuring of the electricity industry and they fill different niches in the market; some provide steady supplies to a power grid, while others fire up only when demand is at the highest and meet peak loads. Merchant power plants operating competitively help assure that power is produced with efficiency and supplied to locations where it is needed most. MPPs up to a capacity of 1,000 MW would be provided coal linkage, and captive coal blocks may also be provided to merchant power plants in the range of 500–1000 MW.

It would be essential that certain normative criteria are laid down for eligibility for coal blocks allotment, particularly to IPPs and merchant plans. These criteria could relate to net worth of the company, their internal resource generation and annual turn-over. The agencies being allotted the coal blocks may also be required to put in place bank guarantee of a reasonable amount which should be liable to be encashed if important milestones for development of coal mines are not achieved. The intermediate milestones may also include indicators concerning the development of power projects, such as award of Engineering Procurement and Construction (EPC) contracts, and commencement of construction. Success of this scheme would, to a great extent, depend on availability of reliable data and information for plant sites and other inputs in this capacity range so that developers then can take further appropriate action.

4.4.7 Private Participation in Transmission

Private investment has been allowed in power transmission either through 100per cent equity or joint venture with PGCIL. In case of latter, the PGCIL will hold only 26per cent stake and private party would hold the rest.

Private sector participation in transmission has been limited to construction and maintenance of transmission lines on BOOT (build-own-operate-transfer) basis under the control of PGCIL.

Policy initiatives for encouraging competition in development of transmission projects

- Promote competitive procurement of transmission services.
- Encourage private investment in transmission lines.
- Facilitate transparency and fairness in procurement processes.
- Facilitate reduction 'of information asymmetries for various bidders'. Protect consumer interests by facilitating competitive conditions in procurement of transmission services of electricity.
- Enhance standardization and reduce ambiguity and hence time for materialization of projects.
- Ensure compliance with standards, norms and codes for transmission lines while allowing flexibility in operation to the transmission service providers.

4.4.8 Development of Transmission Projects through Competitive Bidding

An Empowered Committee has identified 14 projects to be developed through competitive bidding route. Expression of Interest in respect of 4 projects has already been published. Power Finance Corporation and Rural Electrification Corporation have been identified as nodal agency for this initiative.

Details of projects for which EoI (Expression of interest) has been published is given below:

1. Evacuation System for North Karanpura (1980 MW)
2. Talcher Augmentation System
3. Evacuation System for Maithon RB (1000 MW), Koderma (1000 MW) and Bokaro Extension (500 MW)
4. Scheme for enabling import of NER / ER surplus by Northern Region

4.4.9 Multilateral / Bilateral external assistance arranged for power sector during 2006

In comparison to 2005 during which 3 power projects aggregating Rs.18.4 million of external assistance were sanctioned, in 2006 there has been substantial increase and in the year five power projects have been sanctioned by various multilateral / bilateral funding agencies.

An assistance of equated Rs.64.9 billion has been committed, details of which are given below:

S. No.	Name of Project	Executing Agency	Funding Agency	Loan Amount Foreign Currency (Million)
1.	Power Transmission (Sector) Project –III	PGCIL	ADB	USD 400
2.	Uttaranchal Power Development Project (Multi-Tranche Finance Facility)	Govt. of Uttaranchal	ADB	USD 300
3.	Power grid System Development Project-III	PGCIL	World Bank	USD 400
4.	Purulia Pump Storage Project Tranche-III	WBSEB	JBIC	JY 17963
5.	Rural Electrification Project	REC	JBIC	JY20439

4.4.10 Rural Electrifiction: Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY)

This scheme of Rural Electricity Infrastructure and Household Electrification was introduced in April, 2005 for achieving the NCMP objective of providing access to electricity to all rural households over a period of four years. At present, only 44 per cent of the rural households have access to electricity. REC is the nodal agency for the programme. The services of CPSUs have been offered to the State for assisting them in the execution of rural electrification projects has per their willingness and requirement.

The management of rural distribution has been envisaged through franchisees to nongovernmental organizations (NGOs), users' associations, cooperatives or individual entrepreneurs. Panchayat institutions would be associated with the management. The progress of implementation of RGGVY until February 9, 2007 was as follows:

- 28,241 villages have been electrified and 5,04,141 connections to below poverty line (BPL) households have been released
- 27 states and their utilities have signed Memorandum of Agreement agreeing to the conditionalities for implementation of the programme as envisaged under RGGVY
- So far 317 projects for 316 districts have been sanctioned for 27 states at the cost of Rs.11,5.14 billion covering 69,534 un-electrified villages and 10.8 million BPL households and 1,65,124 electrified villages have been covered for intensive electrification
- Tenders have been issued for 273 projects covering 272 districts, 69,239 un-electrified villages and 92,02,889 BPL households
- Contracts have been placed for 200 projects covering 175 districts to electrify 61,012 un-electrified villages and 71,06,387 households

- Four CPSUs — Power Grid Corporation (India) Ltd. (PGCIL), National Thermal Power Corporation (NTPC), National Hydro-electric Power Corporation (NHPC), Damodar
- Valley Corporation (DVC) — are working in 134 districts of Assam, Bihar, Chattishgarh, Gujarat, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Tripura, Uttar Pradesh, and West Bengal.

5. PROFILE OF MAJOR PLAYERS

5.1 Tata Power

A pioneer in the Indian power sector, Tata Power (TPL) is one of India's largest energy utilities. Started as the Tata Hydroelectric Power Supply Company in 1911, it is an amalgamation of two entities: Tata Hydroelectric Power Supply Company, Andhra Valley Power Supply Company (1916).

TPL provides services in power generation, distribution and transmission; oil and gas; and broadband and communications. The company has big overseas power projects in a number of countries, including the UAE, Malaysia, Saudi Arabia, Kuwait and Algeria. It has also undertaken projects in power plant / utility operations and management in Saudi Arabia, Liberia, Iran, Sierra Leone and Algeria.

Power expertise services

- Setting up independent power plants (lPPs) and captive power plants (CPPs), and executing power transmission and distribution projects.
- Operation and maintenance services.
- 'Remnant life assessment' and 'performance evaluation services' of power plant equipment.
- In overseas projects, erection, testing, commissioning and trial operations.
- In power plant / utility operations, management and plant operators' training projects (in India and abroad).

Financials

	Year 2005-06	Year 2004-05
Turnover (Rs. Million)	45627.9	39304.4
Net Profit (Rs. Million)	6105.4	5513.6

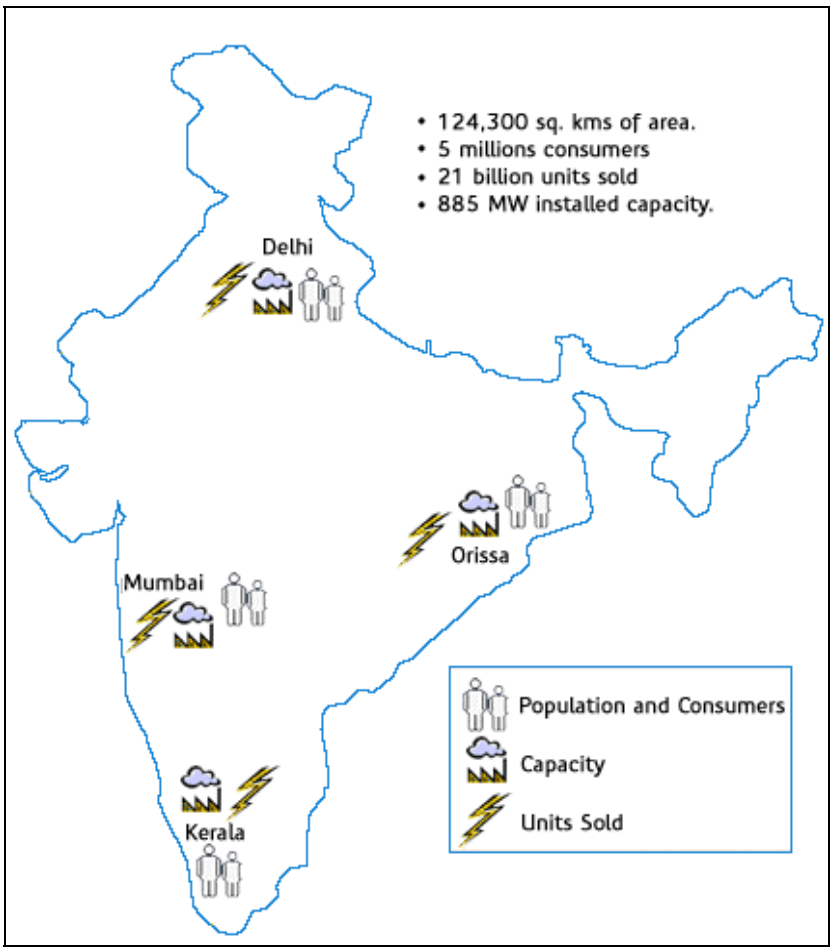
TPL owns, operates and maintains a unique mix of thermal and hydroelectric power plants. The hydroelectric plants are in Khopoli, Bhivpuri and Bhira (all in Maharashtra), and the thermal power plants are in Trombay (Maharashtra), Wadi and Belgaum (Karnataka), and Jojobera (Jharkhand).

5.2 Reliance Energy Ltd. (REL)

Reliance Energy Ltd is India's leading integrated power utility company in the private sector. It has a significant presence in generation, transmission and distribution of power in Maharashtra, Goa and Andhra Pradesh. Reliance's gas finds in KG-D6 block in Krishna Godavari basin constitutes 60 per cent of India's present total gas production.

REL and its affiliate power companies rank among the top 25 listed private sector companies on major financial parameters. REL is part of the Reliance industries-India's

private sector company ranked among the world's 175 largest companies in terms of net profit and the 500 largest companies in terms of sales.



REL is committed to creating superior value for all its stakeholders and be amongst the most admired and trusted utility companies in the world by setting new benchmarks in standards of corporate governance, operational and financial excellence, responsible corporate citizenship and profitable growth.

EPC Division (Engineering, Procurement and Construction Division)

REL has significant presence in the field of execution of the Power projects on EPC basis with a strong track record of the execution and commissioning of projects on time. REL has received wide acclaim for the initiatives in corporate governance. These awards and recognition's greatly motivates and encourage the REL team to set fresh benchmarks in corporate governance, particularly in the Indian Power Sector.

Reliance Energy with its affiliates and sister companies in the Reliance group, own and operate over 2,000 MW of Generating capacity in the country. These comprise conventional thermal plants, gas turbine based combined cycle power plants,

Cogeneration plants and wind electric generators. Most of its Projects have been executed by Reliance Energy through its EPC division.

The EPC division of REL was set up in 1966 and was undertaking engineering, procurement and construction contracts on a turnkey basis and other value added services for major public and private sector projects both in India and Abroad. The Division has 10 regional offices in major cities of India and Overseas offices in Dubai, Nepal and Bhutan. The Division has to-date undertaken the total engineering, supply of electrical and mechanical equipment, installation and commissioning services and civil works for the following range of projects:

- thermal, hydro, Co-generation and gas based power generating stations;
- 400/132 KV transmission lines and switch yards;
- overhead and underground electrical networks;
- industrial electrification works for petrochemicals, fertilizers, steel, cement plants, refineries, ports and hotels;
- indoor and outdoor illumination works;
- pre-moulded accessories for extra high voltage electrical cables;
- Renovation and Modernization of Delhi distribution network; and
- Other civil works

Experience and Achievements of EPC Division:
EPC division has undertaken and successfully commissioned the following major projects:

- Its first ever IPP, 2 x 250 MW Coal based Thermal Power Station at Dahanu, Maharastra
- Reliance Energy Limited-Samalkot Power Station: 220 MW Dual Fuel based (Natural gas & Liquid Fuel) Combined Cycle Power Plant at Samalkot, Andhra Pradesh. The Power Plant is already operational and supplying power to the State Grid of Andhra Pradesh.
- 165 MW liquid-fuel based combined cycle power project for its subsidiary, Reliance Energy Limited - Kochi Power Station at Kochi in Kerala with an aero-derivative unit of 40 MW along GE's LM6000 module, completed on 15 June 2001. .
- 106 MW Combined Cycle Power Plant of Gujarat State Electricity Corporation Ltd. at Dhuvaran, Gujarat
- 24 MW Bagassed based Co-generation Power Plant for Godavari Sugar Mills Limited at Sameerwadi, Karnataka.
- 20 MW Diesel based D.G.Sets for Surya Chakra Power Ltd. at Islands of Andaman and Nicobar.
- 12.5 MW Lignite Based Power Project for Grasim Industries Limited at Ariyalur, Tamil Nadu
- 10.5 MW (5 x 2 MW + 1 x 0.5 MW) Diesel based captive power project for IT-Park for TIDEL- Chennai.
- 7.5 MW Thermal Power Plant for Monnet Power Ltd. at Raipur, Madhya Pradesh.

- 3 x 2.5 M DG based Power Plant for National Institute of Biologicals, Noida.
- 5 MW Bagasse based Thermal Power Plant for Global Energy Ltd., Belgundi, Karnataka,
- 3 MW Captive Power Project for Alok Industries Limited at Vapi, Gujarat.
- 2.5 MW D.G. set based Captive Power Plant for ITC, Bangalore.
- 2 x 250 MW Tau Devilal Thermal Power Station for Haryana Power Generation Corporation Limited at Panipat, Haryana.
- (Unit - 8 of Tau Devilal Thermal Power Project of HPGCL has been awarded the "Best executed 250 MW Thermal Power Project " of the Year 2004-05)

Projects under Commissioning /Execution

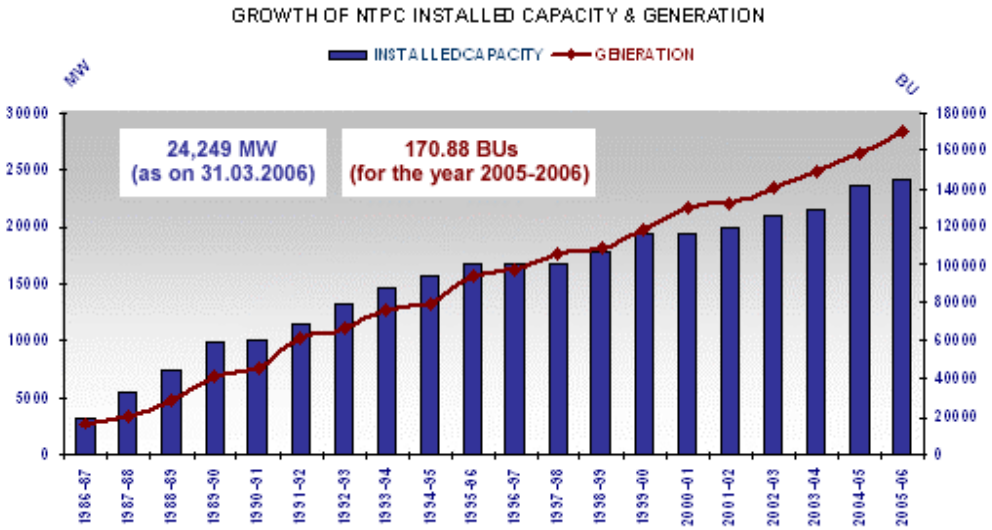
- 2 x 300 MW Yamunanagar Thermal Power Station for Haryana power eneratuion Corporation.
- More than 7000 Village Electrification, commissioning of new 52 GSS & augmentation of 82 GSS under RGGVY - UPRE Project
- 4 x 70 MW Urthing Sobla Hydro Electric Project in Uttaranchal
- 2 x 210 MW Parichha Thermal Power Station for Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited at Parichha, U.P.
- Main Electrical System Packages for 2 x 220 MW Nuclear Power Plant at Kaiga, Karnataka and 2 x 220 MW Nuclear Power Plant at Kota, Rajasthan for Nuclear Power Corporation of India Limited.
- Changeover from overhead to underground Transmission Lines under Ranchi beautification scheme for Jharkhand State Electricity Board
- 110 KV Switchyard and Revamping of Electrical System in the State of Tamil Nadu for Chennai Petroleum Corporation.
- 220 kV d/c transmission lines Project from Panarsa to Nalagarh for AD Hydro Power Ltd.

Financials

	Year 2005-06	**Year 2004-05**
Turnover (Rs. Million)	40190.7	41306.7
Net Profit (Rs. Million)	6503.4	5202.9

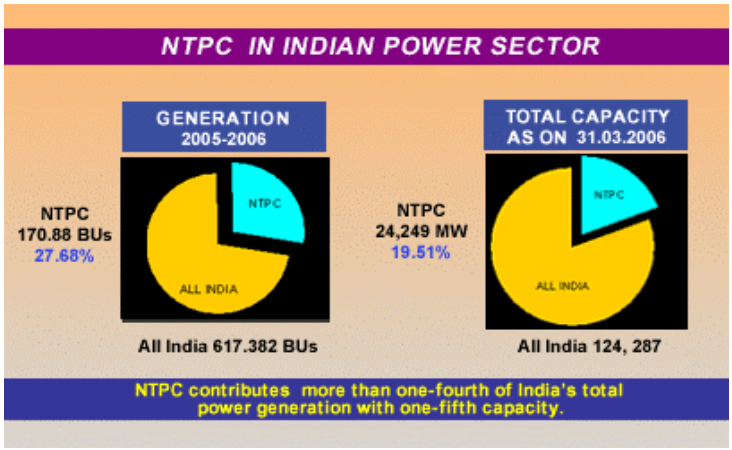
5.3 National Thermal Power Corporation (NTPC)

NTPC Limited is the largest thermal power generating company of India. A public sector company, it was incorporated in the year 1975 to accelerate power development in the country as a wholly owned company of the Government of India. At present, Government of India holds 89.5per cent of the total equity shares of the company and the balance 10.5per cent is held by FIIs, Domestic Banks, Public and others. Within a span of 31 years, NTPC has emerged as a truly national power company, with power generating facilities in all the major regions of the country.



Business Activities

NTPC's core business is engineering, construction and operation of power generating plants. It also provides consultancy in the area of power plant constructions and power generation to companies in India and abroad. As on date the installed capacity of NTPC is 27,404 MW through its 14 coal based (22,395 MW), 7 gas based (3,955 MW) and 4 Joint Venture Projects (1,054 MW). NTPC acquired 50per cent equity of the SAIL Power Supply Corporation Ltd. (SPSCL). This JV company operates the captive power plants of Durgapur (120 MW), Rourkela (120 MW) and Bhilai (74 MW). NTPC also has 28.33per cent stake in Ratnagiri Gas & Power Private Limited (RGPPL) a joint venture company between NTPC, GAIL, Indian Financial Institutions and Maharashtra SEB Holding Co. Ltd. The present capacity of RGPPL is 740 MW.



NTPC's share on 31 Mar 2006 in the total installed capacity of the country was 19.51per cent and it contributed 27.68per cent of the total power generation of the country during 2005-06.

NTPC has set new benchmarks for the power industry both in the area of power plant construction and operations. It is providing power at the cheapest average tariff in the country. With its experience and expertise in the power sector, NTPC is extending consultancy services to various organisations in the power business.

NTPC is committed to the environment, generating power at minimal environmental cost and preserving the ecology in the vicinity of the plants. NTPC has undertaken massive afforestation in the vicinity of its plants.

Recognising its excellent performance and vast potential, Government of the India has identified NTPC as one of the jewels of Public Sector 'Navratnas'- a potential global giant.

Installed capacity

Projects	**No. of Projects**	**Commissioned Capacity (MW)**
NTPC OWNED		
COAL	14	22,395
GAS/LIQ. FUEL	07	3,955
TOTAL	21	26,350
OWNED BY JVCs		
Coal	3	314*
Gas/LIQ. FUEL	1	740**
GRAND TOTAL	25	27,404
* Captive Power Plant under JVs with SAIL ** Power Plant under JV with GAIL, FIs & MSEB		

Financials

	Year 2005-06	**Year 2004-05**
Turnover (Rs. Million)	261429	225650
Net Profit (Rs. Million)	58202	58070

5.4 Andhra Pradesh Power Generation Corporation Limited (APGENCO)

Andhra Pradesh Power Generation Corporation Limited is one of the pivotal organizations of Andhra Pradesh, engaged in the business of Power generation. Apart from operation & Maintenance of the power plants it has undertaken the execution of the onGovernment of India ng & new power projects scheduled under capacity addition

programme and is taking up renovation & modernization works of the old power stations.

APGENCO started operations in 1999. This was a sequel to Government's reforms in Power Sector to unbundle the activities relating to Generation, Transmission and Distribution of Power. All the Generating Stations owned by erstwhile Andhra Pradesh State electricity Board (APSEB) were transferred to the control of APGENCO.

The installed capacity of APGENCO as on 31st March, 2007 is 6760.9 MW comprising 3172.50 MW Thermal, 3586.4 MW Hydro and 2 MW Wind power stations, and contributes about half the total Energy Requirement of Andhra Pradesh. APGENCO is third largest power generating utilitiy in the India. It's installed Hydro capacity of 3586.4 MW is the highest among the Country.

Their power plants meet more than half the total Energy Requirement of Andhra Pradesh. As on 06-03-2007 APGENCO Owns, Operates and Maintains five Thermal Plants with an installed capacity of 3172.5 MW, 17 Hydel Plants (including 3 Mini Hydel Plants) with an installed capacity of 3586.4 MW, among them, Tungabadhra HES is joint project (80:20) with Govt. of Karnataka and Machkund Power Utility (70:30) with Orissa Goverment, and 2 MW Ramagiri Wind Power Plant.

APGENCO has also under taken Operation and Maintainance of Gas Power Plant at Vijjeswaram owned by APGPCL

Power Plant Capacities	
Source	**Installed Capacity(MW)**
Thermal	3172.50
Hydel	3586.40
Others	2.00
Total	**6760.90**

Landmarks

- APGENCO is the third Largest Power utility in the country in terms of Installed Capacity - 6760.9 MW
- Hydro Installed Capacity 3586.4 MW is highest in the country.
- Availability of thermal plants has been (over a decade) well above the national average
- Recently Srisailam Left Bank Power House, a unique complete under ground powerhouse is successfully commissioned and being operated. This is the first such one in southern region.

- AMRP LIFT IRRIGATION Scheme is taken up and completed well below the stipulated time & budget .In that, the pumping station commissioned (18 MW) is first such one in India where water is lifted to the height of 100Mts.

- Srisailam complex is the largest hydro power station with installed capacity 1670 MW in the country.

- Nagarjuna Sagar Left canal Power House is the first hydro station in the country to use SCDCA for operation of the units from control room besides enhancing the Excitation and Governor systems with microprocessor controls.

- Pochampad Hydro electric Scheme is the first hydro power station to use microprocessor controls in the powerhouse

- Thermal generation during 2004-05 - 23360 MU - is highest ever achieved by APGENCO

- The average PLF of 89.7 per cent during 2004-05 is the highest ever achieved and highest in the country when compared with the utilities having comparable installed capacity and vintage.

- Since 1994-95 VTPS and RTPP are occupying top two positions in terms of PLF rankings, except in the year 1999-00 in which RTPP stood second. VTPS stood FIRST in the country during 1994-95, 1995-96, 1996-97, 1997-98, and 2001-02 and RTPP stood first in the country during 1998-99, 2000-01, 2002-03 and 2003-04.

- VTPS has been receiving Meritorious Productivity Award for last twenty consecutive years and bagged Gold Medal 9 times in a row since 1994-95.

- RTPP has been receiving Meritorious Productivity Award for last six consecutive years and bagged Gold Medal five years in a row since 1998-99.

- KTPS V Stage has been receiving Meritorious Productivity Award for last four consecutive years and bagged Gold Medal four times in a row since 1999-00.

5.5 National Hydroelectric Power Corporation Limited (NHPC)

National Hydroelectric Power Corporation Limited (NHPC), A Govt. of India Enterprise, was incorporated in the year 1975 with an authorised capital of Rs. 2000 million and with an objective to plan, promote and organise an integrated and efficient development of hydroelectric power in all aspects. Later on NHPC expanded its objects to include other sources of energy like Geothermal, Tidal, Wind etc.

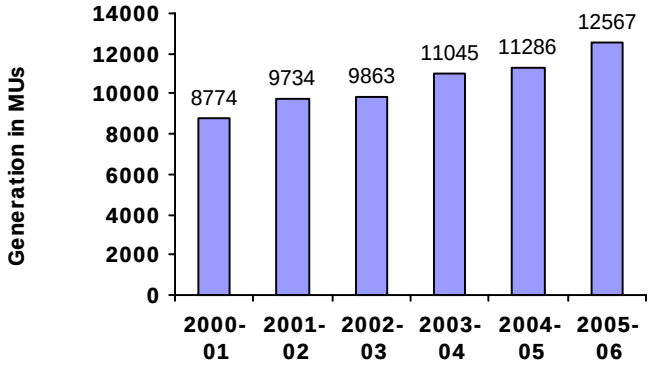
At present, NHPC is a schedule 'A' Enterprise of the Govt. of India with an authorised share capital of Rs. 1,50,000 Million . With an investment base of over Rs. 2,20,000

Million approx. , NHPC is among the TOP TEN companies in the country in terms of investment.

Initially, on incorporation, NHPC took over the execution of Salal Stage-I, Bairasiul and Loktak Hydro-electric Projects from Central Hydroelectric Projects Control Board. Since then, it has executed 12 projects with an installed capacity of 4145 MW on ownership basis including projects taken up in joint venture. NHPC has also executed 5 projects with an installed capacity of 89.35 MW on turnkey basis. Two of these projects have been commissioned in neighbouring countries i.e. Nepal and Bhutan.

During the financial year 2005-2006 , NHPC Power Stations achieved the highest ever generation of 12567 MU.

Generation



During the period 2005-2006, NHPC had a sales turnover of Rs 18340 Million with a Net Profit of Rs 7427 Million.

Presently NHPC is engaged in the construction of 12 projects aggregating to a total installed capacity of 5322 MW including 520 MW under implementation by NHDC. NHPC has added 1970 MW during the 10th Plan period and planned to add 5233 MW during 11th Plan period. 6 projects of 5111 MW are awaiting clearances/Government approval for their implementation. Detailed Projects report are being prepared for 10 projects of 5030 MW and 2 project of 750 MW are being implemented by NHPC which were initially being developed by state governments.

Since its inception in 1975, NHPC has grown to become one of the largest organisation in the field of hydro power development in the country. With its present capabilities, NHPC can undertake all activities from concept to commissioning of Hydroelectric Projects.

Projects – Capacity

As on date NHPC has become the largest organisation for hydropower development in India, with capabilities to undertake all the activities from conceptualisation to commissioning in relation to setting up of hydro projects. NHPC is also planning to take Wind and Tidal wave projects in the country.

NHPC presently has an installation base of 4145 MW from 12 hydropower stations on ownership basis including projects taken up in Joint Venture. Considering the impediments faced during execution of these projects such as unfavourable geological conditions, difficult law and order problems, inaccessible and remote locations, the achievement so far is commendable. The generation performance of these stations has been outstanding.

NHPC is presently engaged in the construction of 12 projects aggregating to a total installed capacity of 5322 MW including projects under Joint Venture. Given the renewed thrust on development of hydro power in the country, NHPC has drawn up a massive plan to add over 10,000 MW of hydropower capacity by the end of XIIth plan (year 2017).

Projects Completed	12 Nos. (4145 MW)
Projects Under Construction	12 Nos. (5322 MW)
Projects Under Survey and Investigation Stage	10 Nos. (5030 MW)
Projects Initially Developed by State Governments	2 Nos. (750 MW)
Joint Venture Projects	4 Nos. (4586 MW)
Projects on Turnkey Basis	5 Nos. (89.35 MW

Financial

	2005 - 06	**2004-05**
Sales Turnover	16141.1 million	14499.8 million
Net Profit	7427 Million	6845.8

5.6 Suzlon Energy

Established in 1995, Suzlon Energy began its journey to the forefront of the wind energy industry with a small but significant project to supply wind turbine generators for a 3.34 MW windfarm project in Gujarat, India. In little over a decade, Suzlon has grown to rank as the world's 5th leading, and India's and Asia's leading manufacturer of wind turbines, with over 2,000 MW of wind turbine capacity supplied in India and across the world. The company registered revenues of USD 867 million, and a net worth of USD 617 million, CFS FY 2006, with a current order book exceeding USD 1.7 billion.

Technology

Suzlon today develops and manufactures technologically advanced, high-performance and cost-efficient wind turbines, to meet the diverse needs of customers all around the world. In India, Suzlon offers customers' end-to-end wind energy solutions, including wind resource mapping, site identification, site development and installation, and finally operations & maintenance services. This allows Suzlon to offer Indian customers economies of scale, and eliminates the need for customer involvement in the complex process of windfarm development.

Research & Development

Suzlon has driven a focused research and development strategy over the years, developing a comprehensive range of wind turbine generators customized to meet the diverse needs of global customers, designing products that will deliver in variable and sometimes extreme environmental conditions wind turbines operations.

The company's sophisticated in-house design and technology capabilities have led to the development of the highly successful Megawatt and Multi-Megawatt series of wind turbines. Suzlon's product range consists of wind turbines in capacities ranging from 350 kW to 2.10 MW, and the company is among the first in Asia to manufacture WTGs of MW and above capacity range.

New Products

Suzlon aims to drive global market share growth through expanding its product line with models customized to meet customer needs as well as specific wind regimes, as seen in the new S52 600 kW and S82 1.5 MW wind turbine models. Suzlon also aims to improve the cost efficiency of generating power from wind through technology enhancements, and optimizing locations and siting, to the end result of maximizing power generation while driving down the cost of power generated from the wind.

Technology Integration

Suzlon, as an integrated developer of WTGs has developed design, development and manufacturing capability for all major components, development and manufacture of rotor blades, tubular towers, control equipment and nacelle covers. The company has implemented a far reaching backward-integration strategy that has brought the manufacture of all critical components in-house. Today the company, in association with subsidiaries, manufactures rotor blades, towers, nacelle covers, generators, gearboxes and all other critical components in its value chain.

Global Reach

The company is pursuing a distributed manufacturing strategy with dedicated manufacturing facilities set up at key locations across the world to supply and service international high growth markets. Today, Suzlon has facilities in Belgium, China, India

and the United States manufacturing everything from components that go into turbines, to complete wind turbine generators, and supply markets around the world.

Quality

Suzlon's design, manufacture, operations and maintenance services are certified to ISO 9001:2000 standards by Det Norske Veritas, and all wind turbine models are accredited with type certifications by either Germanischer Lloyd or the Centre for Wind Energy Technology.

Suzlon has implemented a SAP Enterprise Resource Planning solution firm-wide. This initiative has established an integrated information system for Suzlon and associated companies, to enable the organization to have a 360-degree view of the business, and to enable the firm to think, plan and act in a collaborative fashion.

Ranking

Suzlon has registered steady growth on the global renewable energy stage, rising to rank as the fifth leading wind turbine manufacturer in the world with over 6per cent of market share. Suzlon's existing market leadership in India, with over 50per cent of market share, and customer relationships make Suzlon the first choice to lead future growth in the domestic wind market. In international markets, Suzlon focuses primarily on the key international markets of China, India, emerging Europe and North America.

Suzlon is today a major force in the global wind industry, from humble beginnings in 1995, to ranking 5th worldwide, over 6per cent of the global market share in just over a decade. Already among the top five, Suzlon aims to rank amongst the top three wind power companies in the world by leveraging technological leadership and commercial acumen to exceed customer expectations. With its people strength, aggressive vertical integration strategy, strong R&D program, expanding manufacturing capability and a clear focus on global high growth markets, Suzlon is poised for continue its story of breathtaking growth the world over.

Major projects undertaken by Suzlon

Dhulia, Maharashtra: This site is being developed as one of the largest windfarms of its kind in the world. With over 550 MW already installed, the facility has a planned capacity of over 1,000 MW once complete.

Sanganeri, Tamil Nadu: With a planned capacity of over 500 MW and is home to over 250 wind turbines totaling ~350 MW of installed capacity, the windfarm ranks among the largest of its kind in Asia.

Vankusavade, Maharashtra: Stretched over 29 km of rugged mountainous terrain averaging over 1,000 meters above sea level, this windfarm is home to 566 WTGs with an installed capacity of over 205 MW. It was this project that successfully demonstrated the viability of large, utility-scale windfarms in India.

Internationally, Suzlon has a major presence in all key markets. United States, the largest market for wind energy worldwide forms Suzlon's largest market outside of India. In addition, Suzlon has secured several major orders from Australia, Brazil, China, Italy, Portugal and South Korea making for a significant Suzlon presence on all major wind energy Continents

Financial

	FY 2006	**FY 2005**
Turnover	38213.30	33709.20
Profit	8211.90	3614.60