Plans for Future Power Development

India is pursuing a centralized system for power planning. EA 2003 requires CEA to prepare a NEP in accordance with the National Electricity Policy notified by the Government and update it once every 5 years. The plan is to be finalized taking into account suggestions and objections from licensees, generating companies and the public. The plan is to be notified only after getting the approval of the Government. CEA has also to formulate a perspective transmission plan for inter-state and intra-state transmission systems. These plans would be continuously updated to take care of the revisions in load projections and generation scenarios. Further detailed planning by the Central and state transmission utilities has to conform to this plan.

A draft NEP was notified in 2005 which was based on an all-India generation capacity addition of around 40,000 MW during 2002–2007 and the demand projections shown in Table 1.

Table 1: Long-Term Forecasts of Electricity: All India (Public Utilities)

Region	Energy Requirement		(MW) Peak Load (MW)	
	2011-2012	2016-2017	2011-2012	2016-2017
Northern Region	308,528	429,480	49,674	69,178
Western Region	299,075	395,859	46,825	61,966
Southern Region	262,718	354,599	42,061	56,883
Eastern Region	90,396	117,248	15,664	20,416
North-Eastern Region	14,061	20,756	2,789	4,134
A&N Islands	374	591	77	122
Lakshadweep	44	111	17	26
All India	**975,222**	**1,318,644**	**157,107**	**212,725**

Source: 16th Electric Power Survey, report released January 2001.

The plan covered two scenarios of GDP growth rate; namely, 6.5% and 7.4% for working out generation capacity additions. Besides the likely impact of various factors such as limited indigenous coal availability–367 metric tons (MT) as compared to 419 MT in the base case–energy conservation (about 6.9%), peak reduction (5%), inter-regional diversity in demand (3.5%), accelerated rural electrification, and household modernization, spinning reserve requirement (5%), etc. and low hydro scenario (benefits of 5,000 MW of hydropower slipping from the 11th Plan to the 12th Plan) have also been studied. A summary of the results is shown in Table 2.

Table 2: Generation Capacity Requirement in 11th Plan

Scenario	Peak Demand	Installed Capacity	Capacity Addition 11th Plan
Scenario I			
Base case	157,107	204,234	60,896
Limited coal (Indigenous)	157,107	203,668	60,330
Energy conservation	146,243	190,343	47,005
Demand management	149,252	194,455	51,117
Diversity	150,721	196,575	53,237
Rural electrification	167,507	216,598	73,260
Low hydro development	157,107	204,386	61,048
Household modernization	163,723	212,523	69,185
Spinning reserve (5%)	157,107	212,056	68,718
Desirable plan*	155,520	202,453	59,115
Scenario II			
High GDP growth	181,941	235,168	91,830
Desirable plan (High GDP growth)	174,100	223,648	80,310

* Considers effect of increased demand on account of accelerated rural electrification program and household modernization along with demand reductions due to inter-regional diversity and energy conservation/efficiency improvement.

Source: Draft National Electricity Plan, 2005.

The base case studies indicated that reliability indices in terms of Loss of Load Probability (LOLP) would be 1.07% by end of the 11th Plan and 0.94% by end of the 12th Plan. The Energy Not Served index worked out to 0.0342% and 0.0294%, respectively, during this period. The hydropower capacity addition targets as per this plan are 22,420 MW during the 11th Plan and 34,500 MW during the 12th Plan. The draft NEP is being revised taking into account the latest projections of capacity additions during 2002-2007.[5] Discussions with CEA also indicate that, based on current status, the feasible addition in hydropower capacity may be only 17,000 MW in the 11th Plan and 20,000 MW in the 12th Plan.

As regards the fuel mix, coal is likely to be the mainstay in the near future with focus on clean coal technologies. However, India's coal reserves are limited. Further, investments in the coal sector have to rely on government budgeting. In the past the Government has not made adequate budgetary allocations for development of coal mines, and as a result demand has outstripped supply.[6] There are also problems of high ash content, processing and washing of coal, regulatory issues regarding transportation of coal and environmental issues, etc. As regards the option of natural gas, the supplies are very limited and there is a concern of price volatility. In case of liquefied natural gas (LNG), it has to be totally imported and the price being linked to the global price of crude oil, there will be a huge price risk in importing LNG. There is a renewed focus on nuclear power; however, very large capacity additions are not likely in the near future.[7] Also there are concerns of availability of uranium and costs related to its mining. In recent years the Government has been giving special emphasis to promotion of renewable sources of energy, but the contribution from these would be limited considering the large power requirements of the country.

5 The revised version of the document is still not in the public domain.

6 Currently, the Government is planning to import about 40 million tons of coal.

7 As per Government targets the nuclear capacity is likely to be 20,000 MW by 2020.

Under these circumstances power planners are giving special attention to accelerated development of hydropower as an important energy resource for ensuring the country's energy security. As is well known, hydropower has several advantages over other forms of energy sources.

- It is totally renewable and non-polluting and can also provide a more stable price regime over a long period of time.
- It has inherent capability for quick starting, stopping, load variations, etc. and is thus ideally suited for meeting the peaking demand.
- Generation cost is not only inflation free but it also reduces with time.
- Development of hydropower projects is also in many cases associated with irrigation, drinking water, flood control, navigation and tourism benefits.
- Pumped storage plants can effectively regulate the energy availability during the day by pumping up water into the reservoir during off-peak hours when there is surplus energy in the grid and generating power from this stored water when needed during peak hours. They can also quickly reverse their mode of operation from pumping to generating and vice versa. Thus pumped storage plants can play an important role in meeting the peak demand and also in improving the grid stability and load factor of thermal power stations.
- Small hydro plants have least environmental impacts and would be ideally suited for rural electrification particularly in remote areas. This assumes special importance in the context of achieving the target of 100% village electrification by 2007 and power for all by 2012.

Recently the Energy Coordination Committee (ECC), headed by the Prime Minister of India, approved establishment of five ultra-mega projects each of 4,000 MW capacity.[8] The ECC has also decided to set up a panel under the cabinet secretary to look into issues concerning hydropower plants for expediting approvals.

Special emphasis is also being given to plan and implement a transmission system matching with the additions to the generation capacity. In case of hydropower projects this assumes added importance in view of the fact that these are generally located far away from the load centers and the terrain often presents serious right-of-way problems. This calls for pooling of power from different projects, development of high capacity transmission corridors, staged development of the transmission system, use of new technologies, etc. The CEA is looking into these aspects while developing perspective transmission plans.[9] This has special relevance in case of hydropower development in Himachal Pradesh (HP), Sikkim, Uttaranchal and NER, where the local demands are low compared to the available power potential. The ground rules for connection of the generators to the transmission system and for planning and operation of the interconnected power systems

8 These would be coal-based independent power producers, located at pit heads and on the coast. Tentative allocation of power from four of these projects has already been done. MOP has also in the meantime firmed up the payment security mechanism for the projects (which, it is proposed, will consist of an irrevocable letter of credit and irrevocable arrangement of escrow account having claims on receivables). In the event of a default, the developers will have the right to sell power to any other distribution companies or high-tension consumers.

9 A draft perspective transmission plan was notified in July 2005.