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# Conclusions

India's power sector is poised to grow at a fast pace in the coming years. This is considered crucial to sustain the country's economic growth. The reform measures being implemented and policy initiatives taken by the Central and state governments, as discussed in the report, are expected to provide an enabling environment for this.

India has an assessed hydropower potential to the tune of 84,000 MW at 60% load factor; out of this only about 20% has been developed so far. Considering the large untapped potential and the intrinsic characteristics of hydropower in promoting the country's energy security and flexibility in system operation, the Government is giving a thrust to accelerate hydropower development.

In the past various factors such as dearth of adequately investigated projects, environmental concerns, R&R issues, land acquisition problems, regulatory issues, long clearance approval procedures, power evacuation problems, dearth of good contractors, and in some cases, inter-state issues and law and order problems have contributed to the slow pace of hydropower development. There has been large time and cost overruns in case of some projects due to geological surprises, R&R issues, etc.

The above concerns are being addressed through a number of legislative and policy initiatives at the Central and state level. As discussed in detail in the report, these include preparation of a shelf of well-investigated projects and streamlining of statutory clearances and approvals, establishment of independent regulatory commissions, provision for long-term financing for projects, increased flexibility in sale of power, etc. In May 2003, the Prime Minister of India launched a 50,000 MW hydro initiative. Under this scheme, DPRs are being prepared for 73 schemes, which have an indicative first year tariff below Rs2.50. This would provide a shelf of fairly well investigated low tariff projects to prospective developers. Risk perceptions in taking up the projects and the possibilities of time and cost overruns are also expected to get minimized. Of these schemes (total capacity 32,000 MW), 70 are located in the Brahmaputra, Indus and Ganga basins in the north and north-eastern part of the country. Most of these are run-of-river schemes.

The Government has formulated a number of measures to address the issues related to water shed management upstream and downstream. For example, in the case of multi-purpose schemes, Electricity Act 2003 requires that the state government and the generating company coordinate their activities with those other persons responsible for such scheme insofar as they are inter-related. Similarly, the TEC of CEA would look into the optimal development of the river or its tributaries consistent with other requirements. The MOEF clearance would look into the environmental impacts and social/community development aspects associated with the project and the developers would be required to deposit adequate funds for compensatory afforestation, catchment area treatment plan, wildlife management plans, biodiversity conservation plans, etc. The effective utilization of

this fund would be achieved through the recently constituted Compensatory Afforestation Fund Management and Planning Authority (CAMPA).

Private sector participation has been low in hydropower sector although the sector was opened up in 1991 since the investors looked at it a higher risk proposition compared to thermal projects. The Government has taken a number of policy measures to address the concerns of prospective developers. These include availability of fairly well investigated DPRs, formulation of transparent bidding procedures, provision of open access and trading, notification of tariff determination processes, joint venture initiatives, etc. At the State level also similar initiatives are forthcoming. For example, as discussed in Section VI, Himachal Pradesh, Uttaranchal and Sikkim, which have rich untapped potential, are vigorously pursuing private sector participation. The Government's objective is to achieve a balanced growth of public, private and joint venture projects.

It is necessary to ensure that a transmission system matching with the power evacuation requirements from the individual projects are planned and implemented well in time. In order to save right-of-way and minimize the transmission charges, power from different power stations, depending upon their location, could be pooled at appropriate pooling points and these pooling points connected to the national power grid. This would call for a staged development of the national power grid with high capacity corridors. The perspective transmission plan of CEA is expected to take care of the requirements in this regard.

The small hydro segment also offers considerable scope for both grid and off-grid applications. About 80% of the estimated potential remains untapped. MNES is presently providing support to the states for assessment of potential, preparation of DPR and project implementation.

India needs to mobilize large finances for implementation of its power program. While the Government has substantially stepped up its budgetary allocations to the hydro sector, support from international donor agencies and the private sector is also needed. In case of donor-funded projects, the developers however seem to have a perception that the appraisal processes are often long and this in turn could cause delays in taking up the project for implementation and consequential time and cost overruns. Hence they hold the view that in case of projects that are in a fairly mature state for taking up for implementation, it may be prudent to borrow from the market (especially when such funding can be accessed). Nevertheless, the developers consider that working with international donor agencies would provide some rich experience and also improve their credit rating with other financiers. Accordingly, they are of the view that projects for which DPRs are under preparation and those where there are minimum R&R issues, underground works, inter-state issues and law and order problems, are best suited for seeking funding from international donor agencies.

India has been cooperating with Bhutan and Nepal in hydropower development for over a decade. There are prospects of further enhancement for the benefit of all the countries and in the larger interest of energy security of the region. Some prospects of hydropower cooperation with Myanmar are also indicated.