

# Hydropower development in India: Untapped and in uncharted territory

By Gaurav Sharma

*Pic courtesy: THDC*





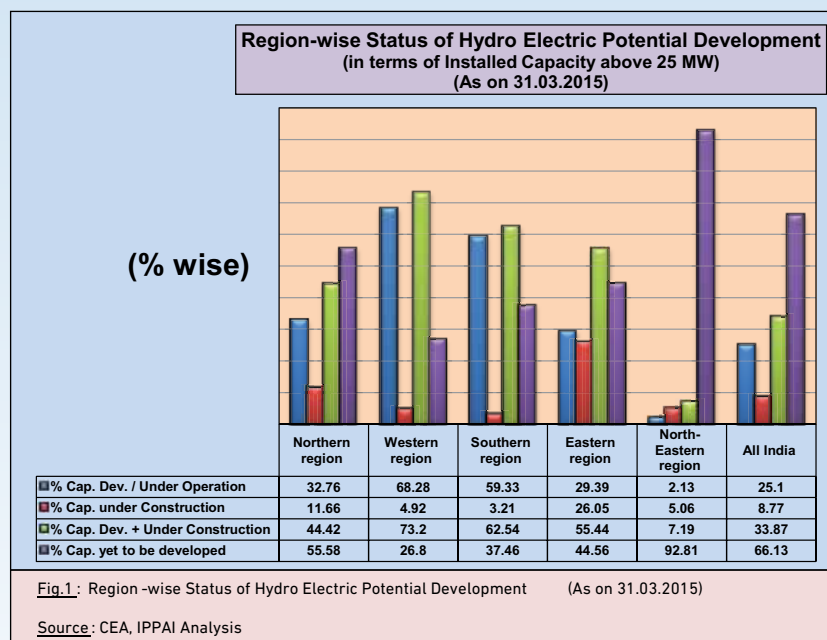
Clean power is the new buzzword in the Indian power sector. Keeping in mind India's global commitment towards climate change obligations and increase of renewables in the total energy mix of the country's installed capacity, several projects in solar and wind sectors have been planned over the course of the next seven years. Contrary to this, the share of hydropower in the country's energy mix is falling precipitously due to the rather slow pace of capacity addition.

The sustainable growth of the nation is dependent on exploitation of available energy resources to its fullest and in particular hydropower, as a clean, green and renewable source of energy, which is an emergent requirement of any developing nation, especially for one such as India. The share of hydro's installed capacity in the total installed capacity, currently at around 15%, has been on a downward trajectory for long and the government's target of adding 10,800 MW of hydro power capacity in the XII Plan may fall short by about 30 per cent. Currently, around 11,400 MW of projects are reeling under time and cost overruns. Poor geology, delays from contractors, local resistance and adverse weather conditions affecting logistics and operations are being cited as the main reasons for delays.

The absence of long-term competitive finance compounds all other problems, which largely are the long gestation period, high cost of access infrastructure to be built, and potential time and cost overrun due to unexpected geological faults. Up to the mid-1960s, the share of hydropower as a proportion of India's overall installed electricity generation capacity was 46 per cent, which meant that nearly one in two units powering

the country's electricity grid was a hydro unit. Half a century later, despite the advancement in civil engineering technology and increasing pressure on governments to reduce the country's carbon footprint by harnessing clean energy sources, hydropower's share has plummeted to just around 15 per cent, a record low.

### Untapped Potential



India ranks fifth in the world in terms of usable potential. However, less than 34% has been developed or taken up for development. Thus hydropower is one of the potential sources for meeting the growing energy needs of the country. A judicious mix of hydropower in the energy portfolio can also contribute to energy security, reduction of greenhouse gas emissions, meeting the peak demand and also increased flexibility in grid operation. Besides, projects may also be conceived as multi-purpose ones contributing not only to power but also to irrigation, flood control, navigation, etc.

India is endowed with rich hydropower potential to the tune of 148 GW (which would be able to meet a demand of 84 GW at 60% load factor) which makes it one of the most important potential sources to meet the energy security needs of the country. India has around 41,632 MW of installed hydropower capacity while an additional 13,000 MW is under construction. This puts the total capacity that has been tapped at around 33 per cent of the potential. Currently, over 93 per cent of the total potential in the north eastern region is yet to be tapped, primarily in parts of the Brahmaputra

river basin.

There are at least 21 hydropower projects that are facing time overruns of five or more years, with those hanging fire for over 10 years. Recently, Power Minister Piyush Goyal admitted in the Lok Sabha that uncertainties in the hydropower sector were keeping investors away, despite the huge potential. "There is uncertainty over hydropower projects... Investors are not ready to make investments. Different projects are stuck due to different reasons," he said and cited politics, environmental issues and court rulings being among the various reasons, while assuring that the government would make efforts to start hydro projects once the "Uncertainty" is over.

### Private sector projects take a beating

From 1991 to 2012, the private sector has contributed to about 11.5% of the hydropower capacity addition. So far only about 2859 MW has been commissioned through the private route (as of May 2015), which constitutes less than 7% of the total installed hydropower capacity.

Though private participation in the hydropower sector has gained momentum in the recent past, it still faces impediments in the execution of projects across various stages of the project implementation cycle. The central and state governments need to create an enabling investment climate for increasing private participation by addressing issues related to safeguards, land acquisition, evacuation, law and order problems, technical challenges and non-appreciation of the risks involved in project development.

Under the present circumstances, where obtaining environmental clearances for hydro projects is a time consuming exercise and land acquisition is proving to be difficult, projects which have already obtained the clearances and acquired land should not be allowed to languish irrespective of their ownership, in the national interest.

### Small hydropower: An alternative?

According to a new study, small hydropower projects (SHPs) (projects up to 25 MW) are considered safer than big dams in India's quake-prone western Himalayas, but projects to build them get bogged down by administrative delays and other factors.

While India's total installed capacity for small hydro power (SHP) units reported a significant increase from 1,909 MW as in March 2006 to 4,055 MW (as of May 2015) thereby taking up SHP's share of the country's total installed renewable energy (RE) capacity to almost 12%, considerable potential still remains untapped across states with favourable SHP potential.



### Some Private sector projects facing severe delays:

Project Name / Developer	Project Capacity (MW)	Time Over -runs (in months)
Maheshwar HEP / Shree Maheshwar Hydel Power Corporation Ltd (SMHPCL)	400 MW (10x40 MW)	180
Teesta Stage III / Teesta Urja Limited	1200 MW (6x200 MW)	60
Teesta Stage VI / Lanco Energy Pvt. Ltd.	500 MW (4x125 MW)	72

Source: Various news articles, IPPAI Analysis

The low utilisation of the country's SHP potential is attributable to several factors including challenges in setting up plants in difficult and remote terrain, delays in acquiring land and obtaining statutory clearances, inadequate grid connectivity and high wheeling and Open Access charges in some states. The further development of small hydro projects has been hampered mainly by rising costs, with the construction costs of these projects increasing to Rs 8.5 crore to Rs 9.5 crore per MW from between Rs 5 crore and Rs 6 crore per MW a few years ago.

After unveiling its big plans for harnessing solar energy and wind energy, the government seems to have turned its focus to the small hydro sector with a draft mission document (National Mission on Small Hydro) already been prepared, with the aim of setting up 5000 MW of small hydro projects in the next five years.

National Mission on Small Hydro is essentially to address difficulties being faced by private developers. These require some policy changes and some fiscal facilitations more than direct financial benefits. However, some activities of Phase I of the Mission would require financial investments. It is assessed that the financial requirements of Phase I of the Mission, which is more of a preparatory to Phase II, can be met within the XII Plan allocations for the small hydro programme.

Funds required for Phase II will be worked out in the second year of Phase I and would be part of the XIII Plan budget for the small hydro programme. No direct subsidy to private sector projects is envisaged in Phase II of the Mission.

### Achievement of Capacity Addition (Hydro) during XII Plan (Total & Private sector)

■ Target ■ Achieved (As on May, 2015)

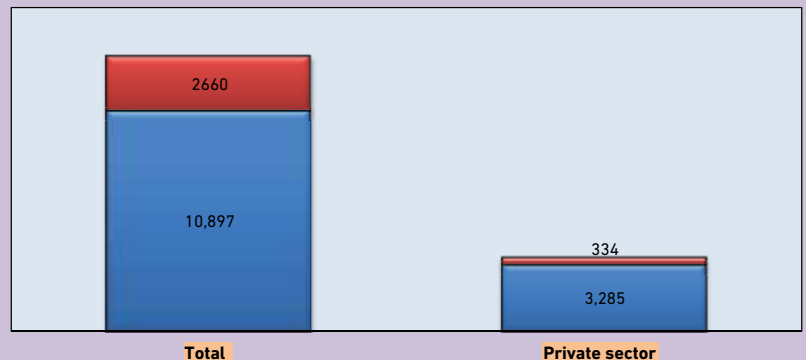


Fig.2: Achievement of Capacity Addition (Hydro) during XII Plan (Total & Private sector)

Source: CEA, IPPAI Analysis



### Conclusion

There is a large gap between demand and supply of electricity, which can be filled by developing large and small hydropower projects. There is large potential available in this sector which needs to be tapped. During peak time, hydro power stations, which accept and reject load almost instantaneously, can meet peaking power demand in no time and provide quick control of frequency by load-generation balance and thus maintain proper frequency. Conventional hydro plants with pondage/storage provide peaking power and pumped storage schemes provide load during off peak hours and generate peaking power. Therefore, to meet the country's energy demand at a faster pace, development of mega hydropower projects are required, which warrants the need of innovative practices in construction aspects integrating project management, engineering and quality management tools and techniques along with imbibing suitable mitigation measures addressing the flip side of hydro sector, as key to success for making up the past generation loss, as far as possible. Climate change and other negative effects of using fossil fuels for power generation along with growing concerns over energy security are driving the expansion of hydropower around the world. It's time India does that too and the test, though, is to salvage the under-construction projects as a first-step towards overturning the overtly negative investment sentiment towards hydro projects.

### Suggestions

Given power distribution companies' reluctance to sign long-term contracts for procurement of electricity from hydel projects, expediting development of hydropower potential could prove a tough challenge for the Centre. Hydro Purchase Obligation (HPO) was mooted by the Ministry of Power but no progress has been made on it. It is high time that, HPO is being considered on the lines of the Renewable Purchase Obligation (RPO) or Renewable Energy Certificates (RECs) used for renewable energy development. Government needs to ensure that there is an HPO on each obligated entity to ensure long-term stability of electricity prices which would insulate the consumer from the variable price volatility that is now being experienced through the import of fossil fuels which is due to forex and price fluctuations both for fuel and transportation. In addition, it would also boost the hydropower sector which is having difficulty getting financing for various reasons including the uncertainty due to absence of credible long-term buyers of such power.

- Hydro Power Obligation (HPO) for discoms should be introduced and enforced.

## Provisions for HPO

Provisions for Hydro Purchase Obligation (HPO) needs to be added in the Tariff Policy and amendments to the Electricity Act (2003) in order to promote hydropower and market mechanisms also need to be created for trading of HPO certificates. The factors affecting development of hydropower are delays in getting clearances, uncertainties created due to long gestation period and uncertainty on what will be the price of power due to the delays. If HPO becomes mandatory like the RPO as proposed in the EA amendments then there will be a possibility of organisations signing long term PPAs which will then result in getting the bank to finance these projects, which is currently a challenge.

- Investment attracting concession agreements to attract big private players in hydropower development.
- A clear road map for encouragement of public private partnership (PPP).
- Exclusion of cost of access roads from project cost, as development of hydro projects triggers economic and commercial activities around the project site and results in economic benefit to the state.
- Cost of security may be borne by the State/Centre in troubled areas and infested by militancy and terrorist activities.
- Exemption of royalty on construction material, since hydroelectric projects provide 12% free power to state.
- Relaxation in customs duty for imported equipment and machinery for mega projects.
- Clearance process should be streamlined and the government should consult all stakeholders before vetting any project, so that there is no delay starting right from zero date to actual commissioning of the project.

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