Rising with small

Exploring potential and opportunities out of small hydro power projects

According to MNRE, the estimated potential of Small Hydro Power (SHP) projects (up to 25 MW station capacity) in India is about 20,000 MW of which about 3,632 MW has been exploited. The government has turned its focus towards small hydro sector, finalising a national mission that will aim at setting up 5,000 MW of SHP projects in the next five years. This will provide immense opportunities in small hydro sector.

Sudhir Dembi, General Manager - Plant Solutions, Schneider Electric India points out that, India has enough of water resources which can be used to generate power. Also, India has a wide base of manufacturers of equipment for small hydro power projects. State-of-the-art equipment are available indigenously. He said, "With the constant efforts of the government and techno-economic viability with some preferential treatment, small hydro has emerged as a viable business option over these years. "

Dembi adds, "Efforts are being made to strengthen hydrological data base, provide strong mechanism and identify new potential sites on one side and evacuation facilities on the other for effectively harnessing small hydro potential in the country."

About 50 per cent of the small hydro potential lies in the Himalayan states of Arunachal Pradesh, Uttarakhand, Jammu and Kashmir and Himachal Pradesh and significant potential has been identified in the regions of Maharashtra, Chhattisgarh and Karnataka. "Small hydro projects can play a crucial role in improving the overall energy scenario of the country and in particular for remote and inaccessible areas. These projects have proved out to be economically workable and private companies are showing lot of interest to investing in small hydro plant projects. The estimated potential for power generation in the country from small hydro plants is about 20,000 MW," says Anil Sardana, CEO and MD, Tata Power.

K. Ramanathan, Distinguished Fellow, The Energy & Resources Institute (TERI) observes that the entire RE sector in the country is poised for a big boost in the context of the commitments made in the INDC to UNFCCC. He said, "Opportunities for SHP sector, which has untapped capacity of over 80 per cent, appear bright in this context."

Ramanathan adds, "SHP also offers several other advantages like proven technology, minimal environmental and social impacts, relatively less implementation time etc. Besides, it can be a techno-economically viable option for electrifying remote areas in varied geographic terrains and thus help meet the national goal 24/7 power for all."

However, Dr. Rajib K Mishra, Director (Marketing & BD), PTC India observes, "In India the hydro power

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Dr. Rajib K Mishra, Director (Marketing & BD), PTC India Limited

projects particularly small hydro are yet to achieve the full potential in the Northern Himalayan states such as Uttarakhand, J&K, Himachal, Arunachal and Sikkim."

Small hydro without dams are environment friendly and contribute towards green attributes along with source of energy. It can work as distributed source of generation for far flung hilly states and also for some of the states in the mainland. "In the present scenario where environmental activities are very active it would be prudent to focus on small hydro and run of the river scheme rather than large hydro, opines Mishra.

Neelav Samrat De, Asst. General Manager (Marketing), ANDRITZ India Pvt. Ltd believes that the sector is not growing as expected. He said, "India continued to show no results in its hydro sector for the third year in succession. We did not witness any major policy announcements nor saw any new projects coming up while the investors continued to shy away from the sector. The IPPs have almost become non-existent in this market while central and state utilities have not moved on any of their projects. In spite of the government's national mission to add 5,000 MW through small hydro schemes in the next 5 years, there isn't much thrust on ground."

Further, under the directive issued by MNRE, all will-full defaulters and loss making organisations will not be provided any further loan to implement their projects. This step has primarily been taken to curb rising non-performing assets in the power sector, noted De. He said, "We see this as a retardant to the segment which has been ailing for some time now. There are also no incentives for the private sector for small hydro schemes."

Challenges

Almost 17 per cent of India's installed capacity is hydropower. As India continues to expand its generation capacity across energy sources, there are several challenges to set up hydro projects in the country. "Some of the typical challenges that a private developer faces in setting up a hydroelectric plant are long gestation period of construction on account of various reasons, namely environmental issues, rehabilitation and resettlement (R&R) problems, gap between investigations and field realities, etc. We do have a number of successful stories on the hydroelectric projects but we also have large projects which have taken several years to get completed. Moreover, due to the capital intensive nature of hydro power projects there is a challenge finding a balance between bankability and affordability," states Sardana while discussing upon the challenges the sector faces.

"It is advisable to engage in detail with stakeholder communities in advance of setting up a project towards successful R&R. It might also be advisable for the government to look into the R&R directly and inform the developers of what is required of them in advance of the bid for the project. This might help in reducing delays while ensure successful R&R," Sardana advises.

Cost and time are very important part of any project. According to Mishra better tarrif and project management would make hydro projects feasible. He says, "The percentage share, contribution of hydro power generation is on decline since past 7-8 years (less than 17 per cent as on date). Larger hydro projects are struck up due to ROW issues and environment clearance." The capital expenditure is higher because of the time overrun and longer gestation period. For some of the new projects per unit cost exceeded even tariff of ₹ 6.00 per unit, causing unviability for power off-take. "To make these projects viable hydro projects needs to be completed within the estimated cost and time. Innovative tariff structure and better project management would be key for making hydro viable," he suggests.

Approval is one of the time consuming procedures. Every project that one does has to take multiple approvals. If the approvals are not done on time the project can be delayed for months which ultimately results in delay in the project completion. Dembi considers that delays in approval is the major challenge small hydro sector is facing. Pointing out the challenges he says, "One of the major challenges is that these projects need multiple approvals right from start till the execution. Due to this project cycle normally exceeds to around 1 and a half to 2 years."

Another major challenge is to figure out ways to improve the performance of SHP plants. "It is very important to devise mechanisms to minimise generation system failures, to ensure high plant availability, to maintain the highest levels of power quality, and reduce hydro operators' investment and operating costs. It is also important to improve operational energy efficiency and reduce environmental impact," he suggests.

Despite the promising opportunities, the progress of the sector would ultimately depend on how we address the manifold

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challenges holistically and with political will. "The challenges are technical, procedural and cost-related in nature and include access to remote area, risks in transportation of heavy equipment to sites, evacuation issues, ready availability of reliable hydrological data, procedures for getting clearances from multiple agencies, easy access to financing, inconsistencies in state level policies, pro-active engagement with local communities, lack of skilled labour, etc, states Ramanathan.

Major contributors

TERI has been working on different RE technologies from technology, policy and regulatory aspects. One of the key goals had been increasing access and promotion of benign energy options. "In the small hydro power area TERI's involvement had been mostly in resource and technology assessment and feasibility studies, policy advice and support to Electricity Regulatory Commissions on tariff determination," informs Ramanathan.

Tata Power's use of renewable sources of energy dates back to 1915, when it had set up a 12-MW hydropower project in Khopoli, Maharashtra. "From sharing technical know-how to helping in setting up and ensuring optimal generation of power, we have shared our knowledge and resources in the development of this sector that has now gaining importance in the eyes of the government," shares Sardana on Tata's contribution in the sector.

PTC India is handling more than 40 per cent of its energy portfolio through hydro sources and has successfully handled the 1,434 MW of power from Bhutan at a reasonable rate for the past 14 years. PTC has supported some of the stressed projects in hydro through restructuring and assisting management to evolve an effective road map for commissioning.

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Schneider Electric looks after complete management and control of the small hydro power plant generation process. Its solutions and products include turbine control (multiple turbine-generator groups) which takes care of start and stop sequencing, speed regulation, security alarms, generator control, synchronisation, protection and voltage regulation. It has auxiliary equipment control for dams, penstocks, valves and gates. "We have Programmable Automation Controller (PAC) based automated grid control integrated with supervision and control, for multi-plant management. We also offer software solutions (Remote SCADA, Asset management, MES) for multiple hydro power plants which improves operational reliability and multi-site management. All these solutions contribute in reducing maintenance costs of up to 30 per cent," informs Dembi.

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Neelav Samrat De, AGM (Marketing), ANDRITZ India

Key projects accomplished

While speaking about the PTC's key projects accomplished so far Mishra says, "We have successfully been associated as trading partner with largest hydro projects in the country such as Karcham Wangtoo (1,000 MW), Malana HEP (86 MW), Nikachhu, Tala, Kurichhu and Chukha in Bhutan, commissioned projects of OTPC and Meenakshi power and many more." PTC as a group has not only provided the power off-take and sale arrangement for these hydro projects but also provided requisite seed equity and loan from its subsidiary company, PTC India Financial Services Ltd. PTC India is supporting small renewable hydro projects in Himachal, Uttarakhand and Sikkim.

ANDRITZ Hydro is currently executing 8 SHP plants in India aggregating to a total of 28 MW through 16 units. The equipment are being manufactured and supplied from its state-of-the-art locations in Bhopal and Prithla. Most of these projects are being implemented in Himachal Pradesh and Uttaranchal, informs De.

Tata Power has an installed hydro capacity of 573 MW. Tata Power and Norway-based SN Power entered into an exclusive partnership to develop hydro power projects in India and Nepal. The consortium bagged the 240 MW Dugar Hydro Electric Project in Chenab valley in Himachal Pradesh. Tata Power has a joint venture with the Government of Bhutan under which it has commissioned a 126 MW Dagachhu Hydro Project with Druk Green Power Company in March 2015. Tata Power, through its subsidiary Tata Power International Pvt Ltd, has signed an agreement with Clean Energy AS (Clean Energy) and IFC Infra Ventures for developing hydro projects of an aggregate capacity of 400 MW in Georgia.