

# Asian developments

WFP&DC presents a roundup of recent hydropower news from across Asia

**W**ith immense untapped potential for both large and small-scale hydropower, Asia is a key market for the hydropower industry. Multi-purpose hydropower development in the region can bring major benefits in terms of access to electricity, diversified energy options and managing water resources, a fact recognized by the World Bank, which states on its website that failure to include the hydropower option in development planning for both water and energy security has risks and costs that cannot be ignored.

Harnessing this hydropower potential has become a major focus for many companies within the industry. New offices are opening in the region, and international companies are helping to develop and supply both new and refurbishment projects. Below we take a look at some recent developments across the continent.

## China

The largest hydroelectricity producer in the world, China is undeniably a key country for the industry. In September last year, Alstom inaugurated its largest hydropower industrial site in Tianjin, in a move that will help the company further tap into China's increasing hydropower needs and grow its hydropower business throughout the region. The site includes an upgrade of the existing hydropower industrial facility and the construction of a new production area as well as a global technology centre (GTC). The new global technology centre will

hydroelectric project in the country began initial operations in the summer 2013, with the project's Unit 13 began supplying electricity to China's Southern Grid on 15 July.

Located on the Jinsha River, construction work on the project began back in 2005. All of the project's 18 units are expected to be operational in 2015.

The project features the most powerful generator-turbine unit ever built by Voith. With 784MW, the output of the generator-turbine unit in Xiluodu is higher than that of many of the world's largest hydropower plants and consequently sets new standards, says the company.

"This remarkable achievement is an important step towards the first one-gigawatt unit. Congratulations to the entire Voith team that has made a contribution to the largest ever single project at Voith Hydro," said Dr. Roland Münch, Chairman of the Management Board of Voith Hydro. At the same time he emphasized that Voith met the high test standard in China without any errors and that the machines are running with high precision.

Voith began equipping Xiluodu hydropower plant with components about five years ago. Each of the three Francis turbines supplied by Voith has an output of 784MW, each attached air-cooled generators is rated at 855.6MVA. With a weight of 1350 tons, the generator rotor has a diameter of 13.7 and a height of 4m.

The installation of the first machine unit in Xiluodu started approximately one and a half years ago in close cooperation between Voith Hydro in Shanghai and the global Voith research and development laboratory for water turbines and generators. The construction of the machines was officially completed with the finalization of the 72-hour test run, which was monitored round the clock by the Voith engineers.

When Xiluodu is fully connected to the grid in June 2014, it will have a nominal capacity of 13,863GW with its 18 machine units. This will make it the world's third largest hydropower plant.

## India

With almost 150GW of exploitable hydro potential, according to an assessment undertaken by Central Electricity Authority, India is another country that is seeing a number of new developments.

In January for example, it was announced that Hindustan Construction Company (HCC) has been awarded the EPC contract for civil and hydromechanical works for the 444MW Vishnugad Pipakoti hydroelectric project in the Chamoli district of Uttarakhand, India.

The works, which are expected to be complete in 54 months, include construction of a 65m high concrete gravity dam, coffer dam, de-silting chamber, 13.4km long 8.8m diameter head race tunnel, surge shaft, pressure shaft, underground power house and cavern, surge tank, tail race tunnel and installation of the penstock steel liner.

Around 12.5km of the headrace tunnel will be excavated using a tunnel boring machine. Vishnugad Pipakoti is a 4x111MW run of river scheme on the Alaknanda river, a major tributary of river Ganga.

HCC has recently completed three hydroelectric power projects in Jammu & Kashmir including URI stage II, Chutak HEP and Nimoo Bazgo HEP and is currently executing eight hydro projects, including two in Himachal Pradesh, two in Bhutan and one each in Arunachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand and West Bengal.

Alstom also recently won contracts for work on a new project in the country. GVK Power and Infrastructure Ltd contracted the company to equip the 850MW Ratle hydropower plant, which will be commissioned in 2017.

The contract includes the supply of four Francis turbines of 205MW each, and one Francis turbine of 30MW.

All equipment will be manufactured at Alstom's Vadodara facility in Gujarat, one of the company's largest hydro manufacturing hubs.

Located on the Chenab River, Ratle is Alstom's first major project in the Kishtwar district. This is also currently the largest power project being set up in the state of Jammu & Kashmir which faces an ever-increasing power demand.

## Vietnam

Recent news from Vietnam was that the World Bank's Carbon Partnership Facility (CPF) has agreed to purchase carbon credits generated through small hydropower developments in Vietnam under the Renewable Energy Development Project (REDP).

The Government of Vietnam and CPF signed the agreement – the first between the two parties – in late December. Under the terms of the deal, the CPF, with Sweden, Norway and Spain as Buyer Participants, will buy the first three million metric tons of carbon credits generated through small hydro plants under REDP, creating a revenue stream for the projects.

To date, the Vietnam Ministry of Industry/Trade has received around 20 applications to develop small hydropower projects under the REDP. The REDP is expected to add 250MW installed capacity of renewable energy to the grid, with a total of 965GWh of electricity per year and also expand local employment opportunities and increase reliability of the electricity supply especially in rural areas.

## Nepal

New construction is also on the cards for Nepal. The European Investment Bank (EIB) recently granted a EUR55M loan – its first in the country – to finance the construction and operation of the 140MW Tanahu hydropower plant.

The Tanahu plant will be built on the Upper Seti River, Tanahu District, in the central part of Nepal. The project will contribute to meet peak

electricity demand in Nepal during the dry winter season when the shortages are more acute and will operate as a base load power plant during the remaining period of the year. It will also generate significant economic benefits by providing a clean and reliable supply of electricity and will contribute to reduce the adverse impacts of climate change by displacing more polluting energy sources.

In addition, the project ensures that environmental and social impacts are addressed. The project includes a programme of rural electrification to supply power to 17 villages in the vicinity of the plant. A Community Development programme will be implemented for people living in the area, addressing education, health, gender development, social inclusion, economic development and livelihood activities.

The project will be co-financed by the Asian Development Bank (ADB), the Japan International Cooperation Agency (JICA) and the Abu Dhabi Fund for Development. The EIB funding represents 15% of the total cost of the project.

Also being planned is the 45.5MW Upper Rahnghat hydropower project in Nepal's central Myagdi district. The country's Industrial Promotion Board (IPB) recently awarded a permit to the developer, Tudi Power Company, to pursue foreign investment for the project.

## Pakistan

In Pakistan, new projects are coming online and funding has been approved for planned schemes. The 130MW Duber Khyar project in the Khyber Pakhtoon-khwa province recently began supplying power, the Water and Power Development Authority (WAPDA) announced, following testing of the first Andritz supplied Pelton turbine. The second 65MW turbine is expected online soon at the project – which was built over an eight month period.

Additional funding has been allocated to the 106MW Golen Gol hydropower project in the Chitral District, Khyber Pakhtunkhwa, to ensure the project is completed by August 2015. According to WAPDA, the Saudi Fund for Development is to provide another US\$57M for the project, on top of the \$40M previously supplied for civil works. Works at the project are over 50% complete.

Hydropower is key for the country, and this is highlighted by news that a hydropower training institute is to receive funding from France, in collaboration with the European Union. The Pakistan Hydropower Training Institute (HPTI) at Mangla is to be transformed into a "centre of excellence for hydropower" in order to increase the capacity of both public & private hydropower operators.

The HPTI is expected to integrate the latest international standards by:

- Ensuring adaptation of large dam infrastructures to climate change (droughts and floods);

- Improving the resilience, safety and profitability of hydropower projects;
- Benefiting from carbon finance by presenting eligible projects under Clean Development Mechanism (CDM);

- Selecting projects in line with the best environmental and social practices, therefore attracting international funding more easily.

Besides the grant of EUR 2.5M provided to the Government of Pakistan, France, through the AFD, is a major contributor to the energy sector in the country.

To reduce the power demand and improve energy efficiency, the AFD is co-financing with the Asian Development Bank a programme on energy efficiency in the domestic and industrial sectors. In addition, the AFD is supporting the development of renewable energies in order to improve the power supply in Pakistan. There are three projects currently being developed: 48MW Jagran II hydropower project; Munda / Mohmand hydropower project; and Harpo hydropower project in the Gilgit-Baltistan Skardu region (EUR50M).

In the future, the AFD said it will explore additional potential to fund the rehabilitation or extension of hydropower plants in various places in association with WAPDA and provincial operators.

## Indonesia

In Indonesia the demand for electricity is increasing by around 10% every year and is estimated to triple by 2030. Simultaneously, less than two-thirds of the inhabitants of the world's fourth most populous country have constant access to the grid. The government of Indonesia sees shortfalls in electricity supply as a major obstacle to further economic expansion. The country, thus, strongly invests in the expansion of its energy sector and aims at realizing a share of 25% in electricity produced from renewable energies by 2025.

To reach these goals hydropower offers significant prospects for expansion in Indonesia: today, only around 6% of the technically feasible hydropower potential of approximately 75,000MW is being utilized in the country. A number of projects are being planned and in development to exploit this potential. Among these are two small hydro plants to be installed in the province of West Java.

The Pusaka I and III plants, with capacities of 8.8MW and 3MW, are being developed by PT Penbangkitan Puseka Parahiang, a subsidiary of the Indonesian energy producer PT Medco Power. Voith is to deliver the complete electromechanical equipment for the plants including the four turbines and generators, the automation systems as well as other balance-of-plant equipment. The turbines will be manufactured by Voith Hydro in India at their state-of-the-art small hydro manufacturing facility in Vadodara, Gujarat. ■