

GREEN ENERGY FOR 60 MILLION PEOPLE

A mammoth project successfully completed – With the commissioning of its 18th and last turbine, the Belo Monte hydropower plant on the Xingu River in the Pará state of Brazil was officially inaugurated on November 27, 2019.

Belo Monte, the largest 100% Brazilian hydropower plant, has a capacity of 11,233 MW and is ranked as the third largest hydropower plant in the world. The complex has 18 vertical Francis units located in the main powerhouse at Belo Monte and a further six Bulb units located in the complementary powerhouse at Pimental.

This major undertaking achieved a number of impressive milestones, including the installation of about 100,000 tonnes of electro-mechanical equipment engaging over 30,000 employees at peak times. The three million m³ of concrete and the more than 160,000 tonnes of steel used to make this giant of the electricity sector a reality are equivalent to the construction of 37 Maracanã stadiums and 22 Eiffel Towers.

Belo Monte provides enough clean and renewable energy for about 60 million people or about 10% of total national demand.

A GIANT PROJECT

Belo Monte has been in development for decades, but it wasn't until 2011 that ANDRITZ Hydro received an order for electro-mechanical equipment from the project developer, the consortium Norte Energia. The ANDRITZ Hydro scope of supply included five vertical Francis turbines and generators as well as 18 excitation systems. With an output of more than 620 MW each and a diameter of 8,500 mm the Francis runners, designed, manufactured and installed by ANDRITZ Hydro, are among the largest and heaviest in the world.

The transportation of the runners from São Paulo state to Belo Monte was a complex logistical operation made by road, sea and barge including navigating through 600 km of the Amazonas and Xingu rivers. A special truck – 100 m in length and almost 9 m wide – was used for the road transport section.

This giant project also saw the construction of a dam on the Xingu River, located 40 km above the city of

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Altamira at the Pimental site, forming the Xingu Reservoir. A complementary powerhouse was built at the Pimental site, which has a net head of 11.4 m and a total turbine flow of 2,268 m³/sec. Pimental has a total installed capacity of 233 MW.

In 2011, ANDRITZ Hydro received a contract for electro-mechanical equipment at the Pimental hydropower plant, again from Norte Energia.

At Pimental the ANDRITZ Hydro scope of supply included six 38.8 MW Bulb turbine units, six 40.9 MVA generator units, as well as governors, excitation systems, supervision and control systems, electrical protection system, and complete mechanical and electrical auxiliaries for the plant.

Additional elements of the scope included the spillway and substation, emergency gates and stop log, two cranes and lifting equipment for the powerhouse and spillway, 18 segment gates, as well as a complete 230 kV / 69 kV substation.

The main spillway for the Belo Monte complex is one of the largest in the world and is also at the Pimental site dam. At 445.5 m across it features twenty 20 m x 22.3 m

gates with a total maximum flow of 62,000 m³/sec. The erection involved some 8,500 tonnes of equipment and was completed in 352 working days.

Designed, manufactured, supplied and installed by ANDRITZ Hydro, the Kaplan Bulb turbines have a runner diameter of 6,450 mm each. The final unit, #6, went into operation in the first week of January 2017, marking the start of full commercial operations. In March 2017, the turbine performance test was carried out, surpassing the contractual objectives.

SUSTAINABLE HYDROPOWER DEVELOPMENT

Alongside the impressive engineering, more than 117 socio-environmental projects were carried out during the Belo Monte and Pimental HPP development process. Around R\$6.3 billion (US\$1.2 billion) was invested in the community as a result. This includes 78 educational works and 31 basic health units in addition to three new hospitals. Furthermore, equipment and vehicles are made available to the public health agencies that work with the indigenous population of the region.

Development of the Belo Monte project followed more than 35 years of studies and community dialogue. →

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