

UPGRADING
POWERSITE REPORTS
WHAKAMARU

NEW ZEALAND – Whakamaru Hydroelectric Power Station is one of several on the Waikato River owned by Mercury NZ Ltd. New ANDRITZ Hydro turbines have substantially increased the flow capacity of the power station, reducing spill and optimizing operation of the river chain.

Originally commissioned in 1956, HPP Whakamaru comprises a concrete dam with short penstocks connected to four Francis turbines that were rated at 26 MW at 136 rpm and a net head of 36.5 m. The original turbines were delivered by the former Dominion Engineering (Canada), now part of ANDRITZ Hydro.

“The new turbine in the Whakamaru hydro station is performing better than expected, we got about 8% efficiency increase, which means the plant will provide about 40 GWh per year of extra energy.”

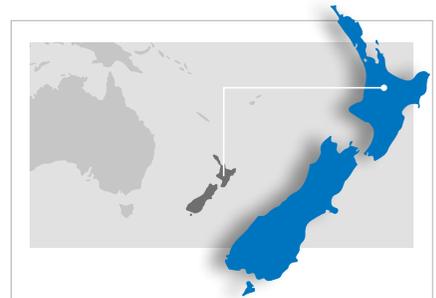
Phil Gibson
General Manager
Hydro & Wholesale, Mercury NZ Limited

When the tender was released in 2012 the customer’s main technical objective, other than modernizing the power station, was to maximize the flow and power at within environmental limits to reduce spill and optimize the operation of downstream power stations.

ANDRITZ Hydro was awarded the contract to upgrade the turbines at HPP Whakamaru in August 2013. The agreed scope of supply included four Francis turbine runners, head covers, bottom rings, guide vanes, and the complete replacement of the governing equipment with a new high pressure system.

The turbine runners were expected to be challenging to design, particularly given the relatively low head and the importance of stable draft tube flow. Included in the contract with ANDRITZ Hydro was a comprehensive model testing package in ANDRITZ Hydro own test rig in Linz, Austria.

A number of challenges were faced during the model test program and a significant number of iterations were necessary to obtain the best technical solution. The final result was an outstanding design with



Whakamaru | New Zealand

Technical data:

Total output:	127.2 MW
Scope:	4 × 31.8 MW
Head:	36.5 m
Speed:	136 rpm
Runner diameter:	3,425 mm



a turbine rated just under 32 MW – a rating increase of 22%. There were no significant modifications to the embedded parts. In addition, the turbine at model test stage significantly out-performed the guaranteed model efficiency.

Installation and commissioning of the first unit was completed in May 2017. Site efficiency testing was undertaken during commissioning and showed a significant gain in efficiency over the old turbine and more than had previously been expected.

The next three units are expected to be installed at a rate of one per summer through until 2020.

AUTHOR

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