

THE NEW OF AUS

Featuring an innovative approach to integrating solar power and low-cost energy storage, Kidston is set to be the world's first co-located solar pumped storage hydropower plant. Located in an abandoned gold mine in Queensland, Australia, once complete it will deliver 'Renewable Energy on Tap'. ANDRITZ is supplying the electro-mechanical equipment for the pumped storage hydro elements of this ground-breaking new project.

AUSTRALIA GOLD

Renewable Energy on Tap

Australia – Australia is going through an energy transition. With countless new wind and solar farms, a huge amount of variable output renewable energy has been connected to the national grid. Total annual electricity generation in Australia was around 265 TWh in 2019 with renewables contributing about 21%. However, just a year earlier in 2018 the share of renewable energy generation had been 19%.

In parallel, the low-carbon trend is also encouraging the decommissioning of the fossil-fueled generation capacity which provides vital grid stability functions. Indeed, Australia's government is expected to retire all its fossil-fueled power stations by 2050. Managing these two factors and maintaining stable grid characteristics requires bulk energy storage.



GROUND-BREAKING CEREMONY AT KIDSTON

The owner Genex Power invited to the ground-breaking ceremony for the 250 MW flagship project Kidston in Far North Queensland, Australia, on June 10, 2021. Selected guests were transported with chartered flights from Cairns to Kidston to visit the site at the old, abandoned gold mine, where the iconic pumped storage plant will be located. The ceremony included speeches, a site tour and interviews.



Source: Genex Power



Pumped storage technology is a key enabler of variable renewable energy generation as it allows a sustainable approach to developing a zero-carbon power portfolio. A mature technology able to provide dispatchable and synchronous energy when needed, pumped storage hydro technology provides important ancillary services to the grid. These services, such as synchronous inertia, voltage

power hub is a flagship project. After the Kidston goldmine—at one time Australia's biggest and richest mine—closed in 2001, only some large excavations and a nearby ghost town remained. With two massive voids in close proximity and a big difference in their elevation, the site makes a promising location for the world's first co-located solar power pumped hydro storage project.

infrastructure for accommodation, access to additional fresh water from the nearby Copperfield dam, as well as licenses, access roads and an airfield, a switchyard, and a 132 kV transmission line.

In 2018, a Joint Venture (JV), formed by EPC contractors McConnell Dowell and John Holland, in collaboration with Genex Power, conducted an international tender for the electro-mechanical equipment. ANDRITZ provided the best technical solution and was nominated as the preferred supplier. Over several months, the EPC JV partners and ANDRITZ were involved in a process of Early Contractor Involvement (ECI) to support optimization of the plant equipment, general layout of the underground cavern, construction methodology, and the delivery program.

Early involvement in the project allowed consideration and evaluation of different technical approaches and solutions,

and frequency control and black start capability, are vital to ensure grid stability and security of energy supply.

For these reasons the transformation of the old Kidston goldmine in Far North Queensland into a modern renewable

Renewable energy project developer Genex Power Ltd acquired the Kidston mine and the associated land for the project from the Queensland government. These assets include valuable infrastructure, such as the two open-cut water-filled pits, fully operable camp



Source: Genex Power



Wises and Eldridge Pits act as the upper and lower reservoirs with a water head of about 218 m (max) to 181 m (min) drop. The head variation of the upper reservoir is only about 3m, whereas the level of the lower water reservoir varies by about 40m.

positively impacting costs and delivery. The ECI process also presented an opportunity for developers and EPC contractors to tender preliminary and basic designs and involve expert partners like the plant equipment original equipment manufacturers and international technical consultants. This facilitated the rapid development of an advanced design, reducing time and minimizing project risk for the owner when compared with a traditional tender process. Ultimately, both the EPC JV contractors and the project owners benefited from this process. In April 2021, the Kidston project achieved the milestone Full Notice to Proceed and ANDRITZ was able to sign the contract with the EPC JV contractors.

Since 2017, a 50 MW solar farm has been operating near the site, which provides a continuous revenue stream for Genex Power. A 150 MW wind farm and further solar expansion is planned, which will contribute the energy needed to pump water from the lower to the upper reservoir when needed. Construction of the associated 250 MW pumped hydro plant has now begun.

A closed water system, the plant will feature two 125 MW reversible pump turbines and will be equipped with technically sophisticated features in order to provide reliable and continuous generation capacity. Due to the existing shape of the upper and lower water reservoirs (Wises and Eldridge), the head variation of the upper reservoir is about 3m only, whereas the level of the

lower water reservoir varies by about 40 m. However, the ANDRITZ pump turbines will be able to overcome this challenge and efficiently generate 2,000 MWh over an eight-hour continuous generation cycle. In 2020, ANDRITZ also secured a full Operations and Maintenance (O&M) contract of more than 10 years. The plant will be fully managed by ANDRITZ and remotely connected to the ANDRITZ control center in Schio, Italy.

"The local people welcome the project as it is also revitalising the remote area. It creates work. It creates opportunities. It creates perspectives."

The facility is to be connected to the grid through a new 275 kV transmission line, currently being built by a major Australian construction company. This line will stretch approximately 200 km to a new switchyard on the East Coast of Queensland.

After completion in 2024, the Kidston project will generate enough electrical energy to supply approximately 280,000 households with clean and sustainable energy, the equivalent of taking 33,000 cars off the road.

This iconic project is also revitalizing the ghost town of Kidston and the whole



TECHNICAL DETAILS

Kidston:

Total output: 250 MW

Scope:

2 × 125 MW Reversible Pump-Turbines

2 × 149 MVA Motor-Generator units

Head: 220 m

Speed: 375 rpm

Runner diameter: 3,440 mm



region as it creates jobs, initiates opportunities for locals and resuscitates infrastructure and existing facilities.

ANDRITZ is extremely proud to play a key role in this unique development and to be able to support Genex Power and the Australian people on their way to a stable and renewable energy future.

AUTHOR

Stefan Cambridge
hydronews@andritz.com

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