

Two new, efficient units set to boost clean power output at Sir Adam Beck 1 Hydroelectric Station

BY KIM MCLENNAN, DIRECTOR, RG STAKEHOLDER RELATIONS, ONTARIO POWER GENERATION

AT A GLANCE:

- First full generator replacement on two historic units
- Upgrade will improve overall unit efficiency
- 115 MW additional capacity added upon project completion

Located in southwestern Ontario, Ontario Power Generation's flagship hydroelectric station Sir Adam Beck I Generating Station (GS) is currently undergoing the first full generator replacement on two of its historic generating units. Once completed, this massive project will provide additional clean power for the province of Ontario.

First put into service in 1922, the 10-unit Sir Adam Beck I station was the largest hydro plant in North America and helped set the standard for 25 Hz power. In the 1950s, generators and household appliances were converted to run on a new standard – 60 Hz – but Sir Adam Beck I's G1 and G2 units remained on 25 Hz right up until 2009 as it generated power for steel plants and other industries whose equipment still ran on the old frequency.

After an eight-week suspension due to the COVID-19 pandemic, project work resumed in June 2020 to install two new G1 and G2 units that will add about 115 megawatts (MW) of incremental generating capacity to the 99-year-old hydro station. Currently, the hydro station's eight remaining units (G3 to G10) have a maximum capacity of 447 MW of power, with an estimated annual energy production of 2,149 gigawatt hours.

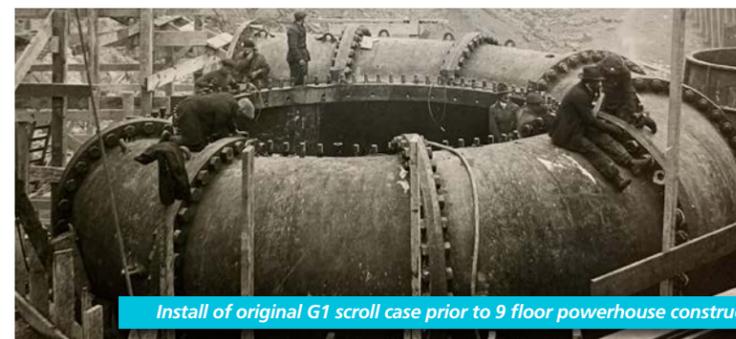
This is the first full generator replacement to take place in the facility's long history.

"We are installing modern units that are larger – 57 MW vs. 40 MW – and will make more efficient use of the available water," said Dave Bonell, Project Manager at OPG.

In 2019, OPG removed the outdated 25 hertz (Hz) G1 and G2 turbine-generators, which were mothballed back in 2009. These original units operated on the now discontinued 25 Hz distribution system, providing power to steel mills in Hamilton and upstate New York.

Installation of the new units will begin in the spring of 2021 (after new scroll cases are installed) and both units are expected to be in service in 2022.

Even though the old units were more than 99 years old, they were very well-built, Bonell said. So well-built in fact that the project team plans to reuse some of the concrete-embedded components, which will result in more project efficiencies and cost savings. These include the penstocks, the long pipes that bring water down the side of the Niagara escarpment, and draft tubes, which are fitted at the end of a turbine runner to maximize pressure.



Install of original G1 scroll case prior to 9 floor powerhouse construction.

Removing secondary concrete holding original scroll case in place. Both scroll cases are being replaced.



G2 Scroll case concrete and steel removal.

Meanwhile, the units' century-old cast steel scroll cases, which are spiral-shaped intakes that guide water flow into the turbine, are set to be replaced due to cracks and voids found in the castings. The replacement scroll cases are being manufactured locally in Mississauga, Ont.

"This is an interesting removal, as the steel scroll case was actually installed before the powerhouse was completed," Bonell said. "After they were put in place, they were embedded with a secondary concrete pour, and the nine-story powerhouse was built on top. We now need to remove all that concrete and the steel from the 39-foot-wide scroll case in

pieces through an 18-foot-wide turbine pit. The same process will be done to install the replacement, with five sections that will fit together like a jigsaw puzzle."

OPG owns and operates 66 of the 224 waterpower facilities located in Ontario, just over 40 of which are over a century old. Refurbishments of aging waterpower structures provides a significant opportunity to improve efficiency at existing facilities, while preserving Ontario's historical sites. Waterpower remains the backbone of a reliable, renewable energy system and today still represents approximately 90 per cent of the renewable energy supply in the province.



MAVEL
www.mavel.cz

HYDRO TURBINES
Kaplan • Francis • Pelton
30 kW to 30+ MW

Benešov, CZ
+420 317 728 483
info@mavel.cz

Boston, MA USA
+1 617 242 2204
americas@mavel.cz

