

Tunnel will increase Canada's power generation capacity

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Four hundred and sixty feet beneath Niagara Falls, Ont., the place bustles like the tourist town above. Lights and dust conceal the time of day for 400 workers who have spent five years boring and cementing the 6-mile Niagara Tunnel from the Sir Adam Beck Reservoir to above Niagara Falls. The 47-foot diameter tunnel, about as tall as a four-story building, has a single-lane road carrying workers, cement and rocks back and forth 24 hours a day.

The digging work -- way over budget and well beyond the original schedule -- broke through last month when "Big Becky", at one time the world's largest tunneling machine, emerged almost 2 miles upstream from the Falls. The tunnel is the culmination of Canada's long-term goal to increase its water draw from the Niagara River by 14 percent to the maximum allowed by treaty.

Water from the new tunnel should generate 1.6 terawatt hours of energy, enough to power about 160,000 homes. The Canadian plant produces 10 terawatt hours of "green energy" a year now, said Ted Gruetzner, Ontario Power Generation media relations manager.

Two 45-foot diameter tunnels already supply water to the generating station, said Bill McKinlay, Ontario Power Generation director of public affairs for hydroelectricity. The Niagara Tunnel will be 41.7 feet wide once it is complete.

"It will be able to fill an Olympic size swimming pool in a matter of seconds," McKinlay said of the new tunnel.

The project was expected to cost about (Canadian) \$1 billion, but it had a \$612 million cost overrun when Big Becky ran into unstable rock and had to be rerouted, Gruetzner said.

The unstable rock also delayed the project about three years. The project was originally expected to be completed in 2010 but is now expected to be completed in 2013, just before Ontario stops burning coal in 2014.

"The Ontario government, when they got elected, they got elected on a 'closing coal' program," Gruetzner said. "Coal was playing a fairly large role, so you cannot just turn that off."

Last year two of the eight coal burning units in Nanticoke Generating Station, in Nanticoke, Ont., were shut down, and this year another two will be, Gruetzner said. The plant may later be converted to burn natural gas or biomass.

The Niagara Tunnel is one of many solar, wind, hydroelectric and natural gas projects that will fill the void left by fewer coal plants, he said. Paying for the tunnel "will add about 50 cents a month to people's bills," he said.

Membrane is key. The tunnel is being coated with a two-foot layer of cement on top of a membrane, which prevents the water from leaving the tunnel, McKinlay said.

"The membrane is really critical to the whole operation," he said. "It's absolutely critical that it's a nice, seamless membrane so no water can get behind it."

The inside of the tunnel is designed to not need maintenance for 100 years, he said.

Workers have been following behind Big Becky laying concrete on the bottom third of the tunnel since the start of the project, Gruetzner said.

Many of the workers are local residents who were trained by supervisors from Strabag, the Austrian contractor responsible for the project, McKinlay said. The workers will stay with the tunnel for the next step, but Big Becky will not.

Becky's drilling front will be kept at an undetermined location in the Falls as a monument to the tunnel, and her parts will be sold for scrap metal, Gruetzner said.

"They're kind of purpose built," he said of the giant tunnel-boring machines.

The tunnel will allow Ontario to use the maximum amount of water allowed by the 1950 Niagara Treaty.

"In the summer, more water goes over the falls for scenic purposes," Gruetzner said. "Starting when the time changes in the spring, we cut back on water flow production."

Up to 1.6 million gallons per second would flow over the falls if they were untouched, said John Kangas, chairman of the Great Lakes and Ohio River Division of the U.S. Army Corps of Engineers. In the non-tourist season, only about 375,000 gallons per second, or less than a quarter of the total flow, goes over the falls.

The new tunnel will not change that amount, because the U.S. has been drawing off whatever amount of water Canada could not handle, up to the treaty limit. The U.S. used the water to generate power, and then sent half of it back to Canada, Kangas said. The rest of that power was taken by the U.S. as a rental fee. "The U.S. has had more capability to produce energy, but now with the new tunnel they (Ontario Power Generation) have the capacity to process that water," Kangas said.

That arrangement has affected only about five percent of the water drawn, Gruetzner said. The U.S. and Ontario each get about 400,000 gallons per second to generate power during daylight tourist hours, and about 600,000 gallons per second to generate power the rest of the year, Kangas said.

The U.S. reached the maximum amount of water it could pull off the falls about 40 years ago with the Niagara Power Project. The two tunnels on the American side are 46 feet wide and 66 feet high, said Louis Paonessa, New York Power Authority community relations. The Lewiston and Moses Niagara hydroelectric plants, in the Falls, receive the water pulled off the falls on the American side. The two plants generated a combined total of 12.5 terawatt hours in 2010, about seven percent of the power used by all of New York State that year, according to data from the New York Independent System Operator.

Although the power from the Falls is clean and vital for economies on both sides of the border, it comes with an aesthetic cost in the diminished splendor of the falls, said the Falls Historian Paul Gromosiak.

"Seventy-five percent of the water is diverted most of the time, it's only in the daylight hours over the summer that people are allowed to see 50 percent of the water," he said. "The natural world seems to be taking a back seat to the commercial world."

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