POWER NEWS

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Connecting the people who power Ontario

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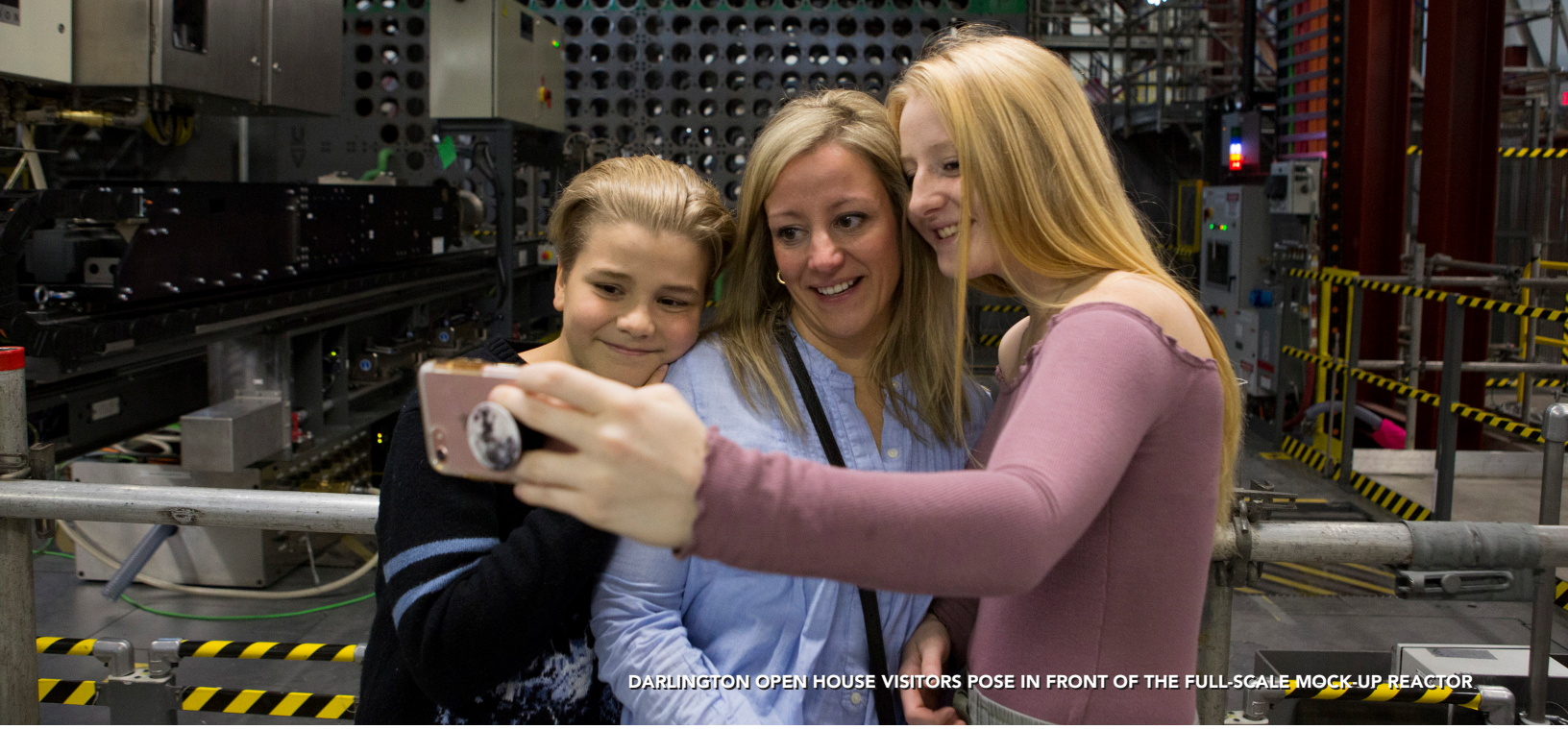


DARLINGTON OPEN HOUSE VISITORS POSE IN FRONT OF THE FULL-SCALE MOCK-UP REACTOR

DARLINGTON REFURBISHMENT ENTERS NEXT MAJOR PHASE

With the refurbishment of Darlington Nuclear Generating Station's Unit 2 reactor about 40 per cent complete, the Darlington Refurbishment project continues to track on time and on budget.

From now until next spring, workers will be dismantling the core of Unit 2, preparing it for the installation of new components that will extend its power-producing capability by 30 years.

While the first stage in this phase of the Darlington Refurbishment project involved the removal of items from the vault, such as feeders and severing of pressure tubes, the work in the second segment focuses on disassembling the reactor core.

"Essentially, we are completely dismantling the reactor before we move into the phase where we re-build it," said Andrew Negenman, Department Manager, Outages.

The major work in this segment involves removing reactor components, including pressure tubes, calandria tubes and end fittings. Other work involves electrical maintenance, water system replacement and continued maintenance of up to 1,000 valves.

The site is now busy with more than 3,000 skilled engineers, trades people and service professionals all working to advance the project.

By the end of this segment, 90 per cent of the entire project's bulk work is expected to be done, setting the stage for Unit 2's return-to-service.

Producing about 20 per cent of the province's electricity, Darlington Nuclear is one of the best performing and safest nuclear generating stations in the world. Ninety-six per cent of all money spent on refurbishing the power plant is going right back to Ontario-based manufacturers, contractors and other skilled workers, giving the province's economy a major boost.

OPEN HOUSE

More than 2,100 people took the opportunity to visit the world's first-ever nuclear reactor mock-up during the Darlington Refurbishment Open House held on Nov. 18.

Attendees got to visit the world-class training facility and take a virtual reality tour of a nuclear building airlock. Guided bus tours of the station were also available.

THE MANY UNSEEN WONDERS OF OPG'S NUCLEAR PRODUCTS

Whether it be sterilizing medical equipment and food or providing luminescent lighting on airplanes and wrist watches, Ontario's nuclear products help to keep us healthy and safe in a myriad of ways.

For decades, OPG has been supplying the world with valuable radioactive isotopes harvested from its nuclear reactors at Pickering Nuclear Generating Station (GS) and Darlington Nuclear GS. These isotopes, which include heavy water, Cobalt-60, and tritium, are key components in applications in medicine, sterilization, food preservation, lighting, and fusion research.

And the future for further innovation in this area is looking brighter than ever.

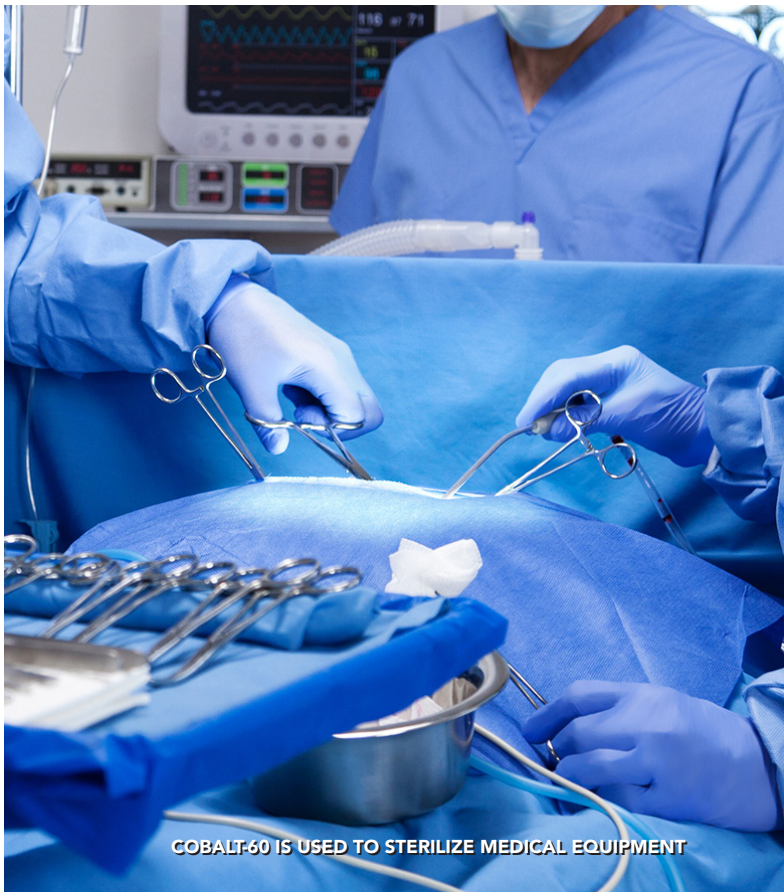
"We're affecting health care in a positive way and producing hundreds of jobs in the process. In the case of tritium, we're turning what could be waste into an asset," said David Zekveld, Senior Manager of Isotopes Sales with OPG. "Isotope sales are a strong financial contributor to OPG's bottom line."

Forty per cent of the world's single-use medical devices, such as syringes, gloves, implants and surgical instruments, are irradiated and sterilized with Cobalt-60. The isotope emits gamma radiation, which makes it ideal to enhance the safety of medical products and perishable foods such as fruits, meats and spices.

Currently, Cobalt-60 is extracted from reactors at Pickering Nuclear every 24 months as well as at Bruce Power's Bruce B plant. Plans are underway to expand Cobalt-60 production to Darlington Nuclear to ensure its steady supply as operations at Pickering wind down in 2024. Ontario's CANDU reactors produce 50 per cent of the world's supply of the isotope.

"We're creating a great number of jobs simply by harvesting Cobalt-60," Zekveld said.

OPG also produces and sells heavy water, or deuterium, an isotope used as a moderator in CANDU reactors to sustain a chain reaction. Virgin deuterium (which has not been used in a reactor) can be used to enhance magnetic resonance imaging and help pharmaceuticals last longer in the bloodstream.



COBALT-60 IS USED TO STERILIZE MEDICAL EQUIPMENT

Another radioactive isotope, tritium, is also commercially available from OPG. A by-product of the daily operations of a CANDU nuclear reactor, tritium is handled as a hazard at nuclear sites, but it is also used in the production of self-powered lights and medical research.

Minute amounts of tritium combined with phosphor create luminescence – a long-lasting, self-powered light source that does not require electricity. Tritium helps light up watch dials, keychains and military equipment, as well as land-mine markers and emergency exit signs in commercial buildings and airplanes.

Looking to the future, OPG is investigating the production of new isotopes, like Helium-3 and Plutonium-238. Helium-3 is used in lung imaging, detecting nuclear bombs, and could act as a fuel source in future nuclear fusion plants, while Plutonium-238 is used to power spacecraft involved in deep space exploration.

OPG'S MICHAEL ARCHIBALD IS ALL SMILES

IN THE NORTHEAST, NEW HYDROELECTRIC DEVELOPMENT YIELDS GREAT REWARDS

With hydroelectric development comes many economic benefits. From new jobs, to new revenue streams, to new business for local suppliers, OPG's recent developments in northeast Ontario have had many positive ripples in the community.

One man who has felt this is Michael Archibald.

Living in Cochrane, in northeastern Ontario, Archibald had a hand in building some important clean energy developments in the area as a contract labourer. Now as an OPG employee, he has a hand in keeping some of these hydroelectric stations running smoothly.

"You learn a lot more about the inspection process and about how to keep dams running," said Archibald, now a Service Trades Maintainer at the Abitibi Canyon work centre responsible for maintaining OPG's nearby hydroelectric stations.

A member of the Taykwa Tagamou Nation (TTN), Archibald most recently worked on the construction of the Peter Sutherland Sr. Generating Station (GS). The new hydroelectric facility located on the New Post Creek is a partnership between OPG and Coral Rapids Power, a wholly owned company of the TTN.

Working with contractor Kiewit, Archibald helped construct the station's walls and intake structures. It was during this project, which employed several TTN members, that Archibald jumped at the opportunity to join OPG full-time, applying for an opening as a general tradesperson at the Timmins work centre.

He started work there in 2016 before applying for his current position at Abitibi Canyon. He now works with a team of six other Service Trades Maintainers who conduct monthly inspections and maintenance of OPG's hydroelectric stations in the Abitibi Canyon area, which include Otter Rapids GS and now Peter Sutherland Sr. GS.

Prior to this, Archibald contributed as a labourer to two earlier OPG developments, the Upper Mattagami and Lower Mattagami River projects. "With the Upper Mattagami project, it was a totally new experience for me. I learned quite a lot through the construction phase," he said.

Whether as a contractor or employee, Archibald has embraced the opportunities and training OPG's developments have provided. Now with 10 years of experience under his belt, the tradesman says he looks forward to servicing stations like Peter Sutherland Sr. GS and keeping them in top shape for the long haul.

"I just want to keep getting training for my trade and keep improving," Archibald said.

DARRYL DAWSON

OUR PEOPLE: DARRYL DAWSON

At Pickering Nuclear Generating Station, members of the Security and Emergency Services (SES) stand on guard 24 hours a day, seven days a week to keep the power plant safe and secure.

It is an important task taken up by highly trained individuals, many of whom are former military veterans with experience serving in missions overseas.

Darryl Dawson, an armed Nuclear Security Officer, is one of those individuals. His job at Pickering Nuclear is to act as an armed deterrent against threats to the plant and its employees.

Dawson's previous life in the Canadian Army was fraught with danger as he was part of a team tasked with defusing Improvised Explosive Devices (IEDs) in Kandahar, Afghanistan. In March 2009, his armoured vehicle was destroyed by an IED triggered by Taliban insurgents. The young corporal and another soldier were the only ones to survive the blast, albeit with severe wounds.

Dawson received a commendation from Queen Elizabeth II for his actions that day, which involved pulling the other survivor out of the destroyed vehicle. "I didn't do anything special. He would've done the same for me," Dawson recalled.

The healing process was a long road, but Dawson eventually recovered to continue active duty. It was his family, however, specifically his young daughter, that made him rethink his future. Dawson, who grew up in nearby Whitby, wanted to see more of his loved ones. With this in mind, he made the jump to Pickering Nuclear in 2012 and never looked back.

If there's a similarity between his current job and his previous one, it's the training and comradery. Armed Nuclear Security Officers train regularly to keep their skills sharp on the range and in mock facilities.

Recently, the former soldier completed an 18-month rotation as a Security Programs Senior Consultant for SES. He's now looking at possibly learning a skilled trade in the future.

"I've learned a lot in the last 12 years and I'd like to continue my education," Dawson said.

EMPLOYEE SPOTLIGHT DARRYL DAWSON

POSITION: Nuclear Security Officer

WORK LOCATION: Pickering Nuclear GS

YEARS OF SERVICE: 5

RECENTLY VISITED: The Yukon

FAVOURITE MOVIE? *Old School*

FAVOURITE WEEKEND ACTIVITY?
Camping anywhere in the province

NEW FISH COUNTER KEEPS AN EYE OUT FOR ATLANTIC SALMON

Fish in the Ganaraska River in Port Hope have become the latest reality TV stars thanks to a state-of-the-art camera that monitors their movements underwater.

Recently installed as part of a fish ladder in Corbett's Creek Dam, the new Iceland-built Riverwatcher fish counter is the first of its kind in the Great Lakes and only the second in Canada. It was purchased by the Ministry of Natural Resources and Forestry (MNRF) to support the Lake Ontario Atlantic Salmon Restoration Program.

As a long-time sponsor of the biodiversity program, OPG works with the Ontario Federation of Anglers and Hunters (OFAH) and MNRF to restore a self-sustaining Atlantic salmon population more than a century after the species disappeared from Lake Ontario.

Over the last two years, OFAH has stocked more than 120,000 Atlantic salmon in the Ganaraska River, a historically important tributary for fish. Now, the new camera will help detect any Atlantic salmon returning upstream next year from Lake Ontario, and provide valuable information on their health, numbers and migration patterns, as well as information on other fish, such as rainbow trout, chinook and coho salmon.

"The new fish counter will help address one of our chief challenges – seeing returning adult Atlantic salmon amidst all the other species of migratory salmon and trout," said Chris Robinson, Atlantic Salmon Restoration Program Coordinator with OFAH. "It will also help manage all of those other species."

Video of fish going up and down the river can be viewed on the Riverwatcher Daily website. The counter uses infrared scanning technology and a high-resolution camera to identify individual species and even measure a fish's estimated length. It also charts the daily movements of fish going up and down past the box-shaped counter.

Previously, the Ganaraska River was monitored by an older fish counter, but it was rudimentary compared to the newer technology and was in disrepair.

"Multiple fish can come through at one time and the old counter couldn't always keep up with a heavy fish run," Robinson said. "The new camera lets us sort that out easily. We've had up to eight fish at one time in front of the camera."

Now fully operational, Robinson has modest expectations for what the camera will pick up when the Atlantic salmon begin returning to the river in 2018 and 2019. He hopes to see at least a few hundred Atlantic salmon.

"We have modest expectations to start," Robinson said. "This camera will help identify when they'll be coming into the river, if they're coming early, or if they're coming in later. It will help with the actual count and also help us to understand their biology better."

THE NEW GANARASKA RIVER FISH COUNTER, PICTURED AT RIGHT, WILL KEEP TABS ON AREA FISH

PROTECTING THE RARE GREY FOX ON PELEE ISLAND

Located in west Lake Erie near the U.S. border line, Pelee Island is not only the southernmost populated point in Canada, it's also the last confirmed refuge in Ontario for the threatened grey fox species.

Sized no larger than the average housecat and sharing a similar appearance to their cousin, the red fox, the secretive grey fox is the only canine in the western hemisphere that can climb trees thanks to their semi-retractable claws.

The cinnamon-and-grey coloured mammal used to be a common sight across southern Ontario and parts of Manitoba. But a loss of forest habitat, along with harsh winters, increased road fatalities, and predators like coyotes, has led to a steep decline in their numbers. Now, the 42 square-kilometre Pelee Island is home to the only confirmed breeding population of grey foxes in the country.

"It's the last stronghold for the species in Canada," said Tovah Barocas, Vice President of External Relations for Earth Rangers, one of OPG's long-term biodiversity partners.

Sadly, habitat degradation on the island continues to threaten the last vestige of the grey fox population. To help curb this trend, Earth Rangers has launched a campaign to protect the rare mammal with the help of their kid members across the province.

Children and their families are encouraged to start a "Bring Back the Wild" campaign to raise funds that will help the Nature Conservancy of Canada (NCC) improve habitat on 1,000 acres of land on Pelee Island. The habitat restoration work will help the omnivorous grey foxes hunt, make dens, and remove invasive plant species that threaten their food supply.

GREY FOX IN THE SNOW

"Some of these invasive species, like garlic mustard and common reed, spread really quickly and take over habitat and native species that act as food for grey foxes," said Barocas. "It's all about supporting and sustaining their population."

Since 2012, OPG has been a proud supporter of Earth Rangers, whose presenters visit schools across the province to educate kids on issues of biodiversity and the environment. The partnership has played a critical role in inspiring more than 47,000 children to protect at-risk species across Ontario by raising nearly half a million dollars.

"It's important to raise a generation of Ontarians that will continue this legacy of habitat protection," said Barocas.

FUN FACTS

- Grey foxes can climb trees using their sharp, hooked claws
- The animal is identified by its grizzled grey fur and light cinnamon coloured patches
- Grey fox dens are usually found in dense shrubs close to a water source

OPG'S MICHAEL TAKLA, FAR RIGHT, HELPED DESIGN THE SKAN

OPG EMPLOYEE HAS BIG DREAMS FOR SKIN CANCER DETECTOR CONCEPT

It has been a whirlwind year for Michael Takla, an Engineering and Applied Science Trainee with OPG.

In May, the recent McMaster University graduate started his new job with OPG's Plant Engineering Services in Niagara region. A few short months later, he and three fellow McMaster undergraduates were on a plane to U.K. to accept the 2017 James Dyson Award and a $50,000 prize for their low-cost, non-invasive melanoma detection device – dubbed The sKan.

"We were really surprised to win because there were so many cool projects," said Takla, a 23-year-old electrical and biomedical engineering grad. The Canadian team's idea was selected from over 1,000 entries from 23 countries in the international contest, which celebrates the next generation of design engineers.

The innovative handheld concept, which started as a final-year class project, promises to detect melanoma by monitoring the heat emissions of cells in the skin. As cancer cells recover more quickly from a cold shock than the healthy skin around it, the device's heat map can provide confirmation of melanoma, the deadliest form of skin cancer.

The sKan aims to offer doctors a quantitative source of melanoma detection for under $1,000, Takla said. "We hope that it can be a tool used in any family doctor's office, and eventually even in the home," he said.

"It's a very clever device with the potential to save lives around the world," said James Dyson, the inventor of the bagless vacuum cleaner who was one of three judges to choose The sKan as the best idea out of 20 finalists.

Takla, who focused on developing the software for the device, says the prize money will be used to further develop the prototype and get it ready for use in preclinical trials.

In the meantime, the young engineer has been busy getting acclimated to his new role at OPG.

Working with the Protection and Controls Engineering team in Niagara, Takla has been working to integrate control systems for sluice gates so hydroelectric operators can open and close them remotely from the Saunders control centre in Cornwall.

As an Applied Science Trainee, he'll be learning a lot over the next two years as he does three-month rotations in Thunder Bay, Renfrew, and Timmins, before returning to Niagara. But he'll also be making time with his team to refine The sKan and patent the device.

"It's now something I work on in the evenings," Takla said. "It's nice to have great projects to focus on at work and then have time to work on this."

OPG'S X-LAB IS TESTING VIRTUAL REALITY HEADSETS TO ASSIST WITH TRAINING

OPG'S X-LAB LOOKS TO THE FUTURE WITH INNOVATION

From virtual reality headsets to specialized glasses that deliver real-time information, there's a whole lot of innovation going on behind the doors of the X-Lab at OPG's Pickering Nuclear Generating Station.

The special division is tapping into the latest technology to improve training and make work processes more efficient at the Pickering plant and across operations at OPG.

"We're working on various innovative projects and building on ideas we've received from employees and supervisors who manage the plant," said Clive Bands, a Front Line Manager of Radiation Control at Pickering who is one of four full-time members involved with the X-Lab. "We're working to improve efficiencies in various areas."

One of those areas is training. Currently, new employees at Pickering Nuclear are trained and tested by an individual giving instruction in a one-on-one setting. It's a resource and time intensive process that Bands and his crew believe could be simplified using virtual reality (VR).

Currently in the testing phase are VR kiosks where new employees can don a Vive headset and get immersed in a fully 3D simulation of the plant's vault environment. The tech could free up a lot of time for training technicians to improve and update the curriculum as well as oversee the VR training.

The X-Lab team is also experimenting with augmented reality via Google Glass and Microsoft HoloLens smartglasses. Bands says these glasses could eventually replace physical manuals, diagrams and written procedures by overlaying information and instructions directly onto the futuristic glass's heads-up display.

"Currently, we're working with written procedures, which can be burdensome," Bands explained. "The glasses would give you step-by-step instructions on how to complete certain procedures."

Headed by OPG's Jason Wight, the special lab started several months ago as OPG sought to update current business practices and improve innovation. In addition to four full-time members, the lab has attracted other engineers at Pickering Nuclear who suggest ideas and tinker on their own innovative concepts in their spare time.

"The beauty in it is if you've got a great idea, other people will work on it with you and it will grow. It's very organic," Bands said.

OPG MAINTAINS STRONG OPERATIONAL PERFORMANCE IN THIRD QUARTER

OPG's net income attributable to the Shareholder was $131 million for the third quarter of 2017, down from $194 million for the same period in 2016. The earnings fluctuation was driven by lower nuclear electricity generation primarily due to the Darlington Refurbishment and the continuation of existing base regulated nuclear rates.

Operating results across the company were strong, with electricity generated during the quarter remaining fairly consistent with the same quarter last year. Total generation was 19.4 terawatt hours (TWh), compared to 19.5 TWh for 2016. Offsetting the reduction from Darlington Nuclear, largely due to the planned refurbishment, was an increase in generation from Pickering Nuclear and OPG's regulated hydroelectric fleet.

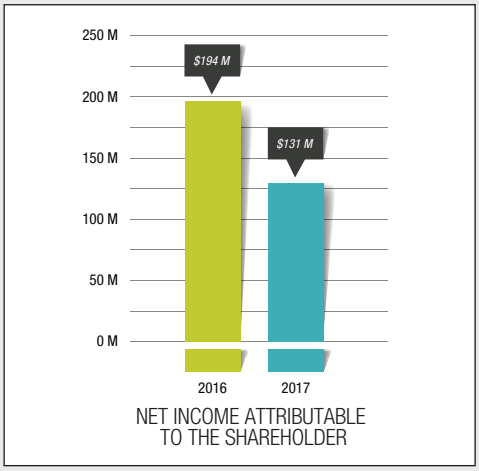
"The company's focus continues to be on ensuring the success of the Darlington Refurbishment project," said Jeff Lyash, OPG President and CEO. "After the one-year mark of work on Darlington's Unit 2, Canada's largest clean energy project remains on time and on budget."

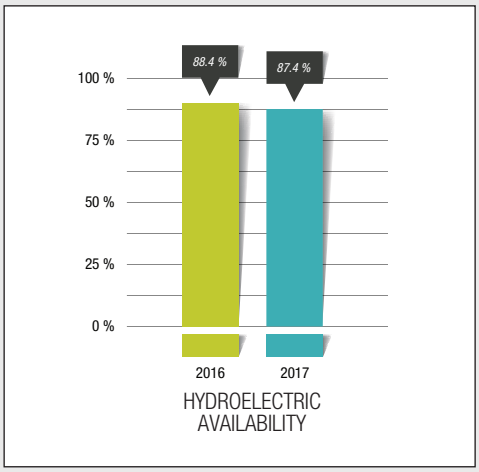
In October, the Ontario government released its 2017 Long-Term Energy Plan (LTEP), which included some very positive news for OPG. The LTEP recognizes hydroelectric power as Ontario's largest source of renewable energy and highlights the opportunity to continue to invest in optimizing existing facilities. The LTEP also notes a large potential for new projects in the north as well as the important role pumped hydro storage could play in system reliability.

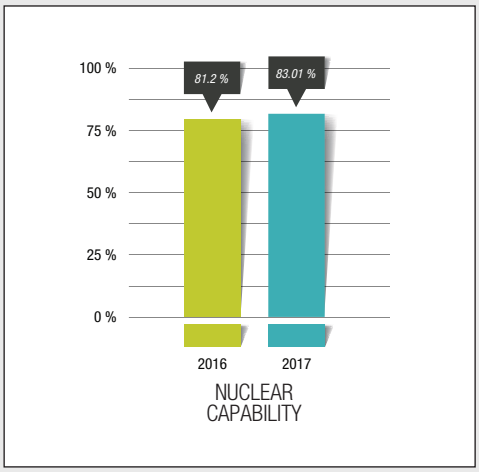
The LTEP also reaffirms the province's strong support for the nuclear industry and for maximizing existing energy assets, both major positives for OPG and its key projects. It goes on to highlight successful progress on the Darlington Refurbishment project and recognizes the value of continuing to operate Pickering Nuclear until 2024.

So far this year, Pickering Nuclear's continued strong performance has more than justified the LTEP's support. The station has generated 2.1 terawatt hours more electricity when compared to the same period last year. In the third quarter, Pickering Nuclear generated more electricity primarily due to fewer outage days.

YEAR-TO-DATE SEPT. 30 RESULTS





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