POWER NEWS

WINTER 2018

Connecting the people who power Ontario

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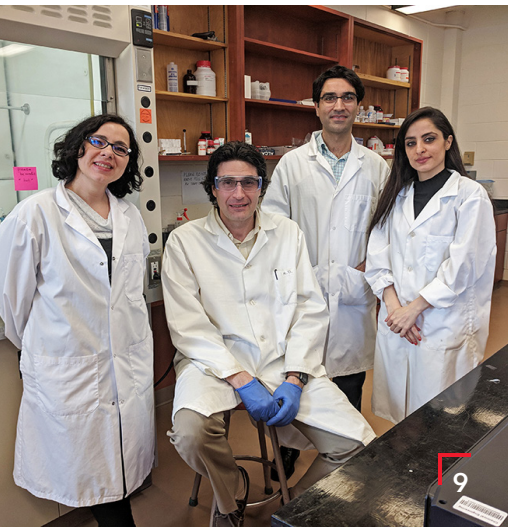

Mailing Address :
Ontario Power Generation
700 University Avenue, H19
Toronto, ON M5G 1X6

Email :
powernews@opg.com

Website :
www.opg.com

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WORKERS ASSEMBLE FUEL CHANNELS FOR DARLINGTON'S UNIT 2

DARLINGTON REFURBISHMENT REMAINS ON TRACK AT TWO-YEAR MARK

Just over two years have now passed since OPG and its project partners started the Darlington Refurbishment.

The 10-year mega-project began in October 2016 with the successful shutdown of Unit 2, the first of four nuclear reactors at the Darlington Nuclear Generating Station to undergo a mid-life refurbishment.

Today, with just over a year to go, the Darlington Refurbishment team is installing new components to Unit 2, preparing it for full power restoration by February 2020.

The project remains on time and on budget, with more than 11 million hours worked safely since the start of the project.

"This remarkable achievement is the result of the dedicated team of professionals who are delivering Canada's largest clean energy project, while generating billions in economic benefits for Ontarians through the creation of thousands of jobs," said Jeff Lyash, OPG President and CEO.

This past October, new calandria tubes were successfully installed in the Unit 2 reactor and work is now progressing as planned through the third major segment of the project – the installation and reassembly of reactor components. Installation of new fuel channels is now underway.

OPG has also started the planning and prerequisite activities for refurbishing Unit 3, incorporating lessons learned to date on Unit 2's execution. The Unit 3 refurbishment is expected to commence upon the return to service of Unit 2.

AUDITOR GENERAL LAUDS REFURB PROGRESS

In her value-for-money audit of the Darlington Refurbishment, released as part of the 2018 Annual Report, Ontario's Auditor General (AG) indicates OPG is diligently managing the project and has incorporated lessons learned from some of the early challenges on the prerequisite projects; used a fair and transparent procurement process; and implemented a clear accountability structure and management processes to successfully deliver the project.

The AG also identified risks that could impact future performance, such as a shortage of skilled trades. To mitigate this risk, OPG is working with vendors, trade unions and colleges to promote careers in trades.

NANTICOKE SOLAR IS SET TO BE IN SERVICE SPRING 2019

NEW NANTICOKE SOLAR FACILITY TAKING SHAPE

At OPG's Nanticoke site, work is well underway to transform the former home of Ontario's largest coal-fired station into the company's first ever solar power facility.

Crews have cleared the grounds near the decommissioned Nanticoke Generating Station and construction is progressing on the new Nanticoke Solar project. When the solar farm is up and running by the spring of 2019, it will be capable of generating 44 megawatts of clean, renewable power for the province.

A total of 192,431 solar panels will be installed on the former coal yard and adjacent agricultural lands, spanning a total area of 158 hectares. So far, more than 9,000 panels have been put in place.

"This is OPG's first solar installation, so it is a big learning experience for our organization. However, we're working with very experienced contractors," said Matt Sikstrom, Project Manager for Nanticoke Solar, which is being built with OPG's First Nation partners.

To build the expansive solar farm, more than 20,000 helical piles – long, steel anchors – are buried two metres into the ground. Metal racking is then installed onto this solid foundation. Finally, thousands of photovoltaic panels, with an average rating of 345 watts, are mounted onto the racks. Electrical equipment required to connect these panels to the provincial grid – things like transformers, breakers, AC-DC inverters, and protection and control equipment – will also be installed.

Once in place, the panels will convert sunlight into electricity, with the whole site controlled by a protection and control building located in the substation.

FAST FACTS

- The solar panels at Nanticoke Solar don't require much upkeep – just plug in and generate
- Access roads for the site were built using concrete from the Nanticoke smokestack demolition
- At Gull Bay First Nation, OPG is helping to install solar panels as part of a micro grid project

OPG FINALIZES PURCHASE OF EAGLE CREEK RENEWABLE ENERGY

OPG has finalized its agreement to purchase Eagle Creek Renewable Energy, an owner and operator of small hydroelectric facilities in the U.S.

The US $298-million acquisition, which received U.S. regulatory approval in November, will not impact Ontarians' electricity bills as it will be financed through OPG's corporate public debt program or other available credit facilities.

Eagle Creek currently owns and operates 63 hydroelectric facilities representing 216 megawatts (MW) of in-service capacity across the U.S., primarily in the Northeast and Midwest. It also has ownership interests equivalent to approximately 10 MW in 13 other hydroelectric facilities and two solar facilities in New England.

For comparison, OPG's 66 Ontario hydroelectric facilities provide an in-service capacity of 7,468 MW.

"By expanding our core business with this purchase, OPG is capitalizing on a new growth opportunity by making an investment in a strategic set of hydroelectric assets that will produce an attractive return for Ontario," said Jeff Lyash, OPG President and CEO.

Eagle Creek, which employs about 160 people, will continue to operate independently as a wholly-owned subsidiary of OPG, with its own Board of Directors and management team. Its financial results will be consolidated into OPG's financial results.

Although this investment has no impact on electricity bills in Ontario, it is expected to have a positive impact on OPG's financials and will generate income for the people of Ontario.

"As Ontario's largest electricity generator, we have been stewards of hydropower assets for more than a century and we are proud to continue that legacy with this acquisition," said Mike Martelli, President of Renewable Generation at OPG. "We look forward to a path of continued growth and success with Eagle Creek."

EAGLE CREEK'S WORUMBO HYDRO FACILITY IN LISBON FALLS, MAINE

WOODY KASSOUF

EMPLOYEE SPOTLIGHT
WOODY KASSOUF

POSITION:
Electrical and Control Technician FLMA

WORK LOCATION:
Darlington Nuclear GS

YEARS OF SERVICE: 12

FAVOURITE PLACE TO VISIT IN ONTARIO:
Beckwith Island

FAVOURITE BOOK:
Anything on falconry

FAVOURITE WEEKEND ACTIVITY:
Fishing, hunting, and conservation

OUR PEOPLE: WOODY KASSOUF

Recently, flocks of pesky seagulls threatened to make Darlington Nuclear Generating Station their permanent nesting ground. But OPG employee Woody Kassouf hatched a plan to keep the birds at bay.

Kassouf, who owns and raises birds of prey as a hobby, aimed to deploy his taloned companions along with his Brittany spaniel, Daisy, to scare the gulls off the property for good.

"Seagulls are seasonal migratory birds, and usually when they establish a breeding ground they likely will be back the next year," explained Kassouf, an Electrical and Control Technician Front Line Manager Assistant at Darlington Nuclear. "Rather than be reactive, we wanted to be proactive and establish our presence early on."

The large number of seagulls at Darlington not only increased the risk to staff of being hit by droppings, but also the risk of aggressive dive-bombings. The troublesome gulls were also making a mess of station property and outdoor equipment.

After his plan was cleared, Kassouf was allowed to bring his two Harris's hawks and a falcon onto the Darlington property over six days. In that time, Kassouf's birds spread their wings and struck an intimidating presence. By the fifth day, not a single seagull was spotted in the skies over Darlington.

"What I was able to do was just exercise the birds. They enjoy the chase, just like a dog likes chasing a squirrel. They weren't in hunting mode." Which is a good thing for the gulls, as Kassouf's birds have been trained to hunt in the wild with great speed and accuracy, tackling game like rabbits and ducks.

Kassouf, whose day job involves non-destructive testing of nuclear fuel channels, says he's always had a great interest in birds of prey. He took up the sport of falconry several years ago by buying his first hawk and has since developed a deep passion and bond with his birds, who dutifully return to their master at the blow of a whistle.

Early next year, Kassouf hopes to return to Darlington with his birds to ensure the seagulls stay away. The hope is to expand his unique technique to other OPG locations.

NUCLEAR POWER'S NEXT EVOLUTION

The future of clean power could lie in safe, small, scalable nuclear power plants – and OPG is working to bring this exciting new technology to Canada.

Like traditional nuclear reactors, small modular reactors, or SMRs, are designed to provide reliable, carbon-free electricity. But unlike conventional reactors, SMRs are much smaller, less expensive, and faster to build due to their modular design.

SMRs ranging in size from 1.5 megawatts (MW) to 300 MW could augment Ontario and Canada's supply of clean energy while providing heat and reliable power to industrial operations as well as remote, rural communities that rely on dirty diesel generation. The innovative new technology also presents a significant growth opportunity for OPG.

"We recognize the potential value and benefits of SMRs to augment Canada's energy supply mix which will be a significant contributor in the climate change solution," said Jeff Lyash, President and CEO of OPG.

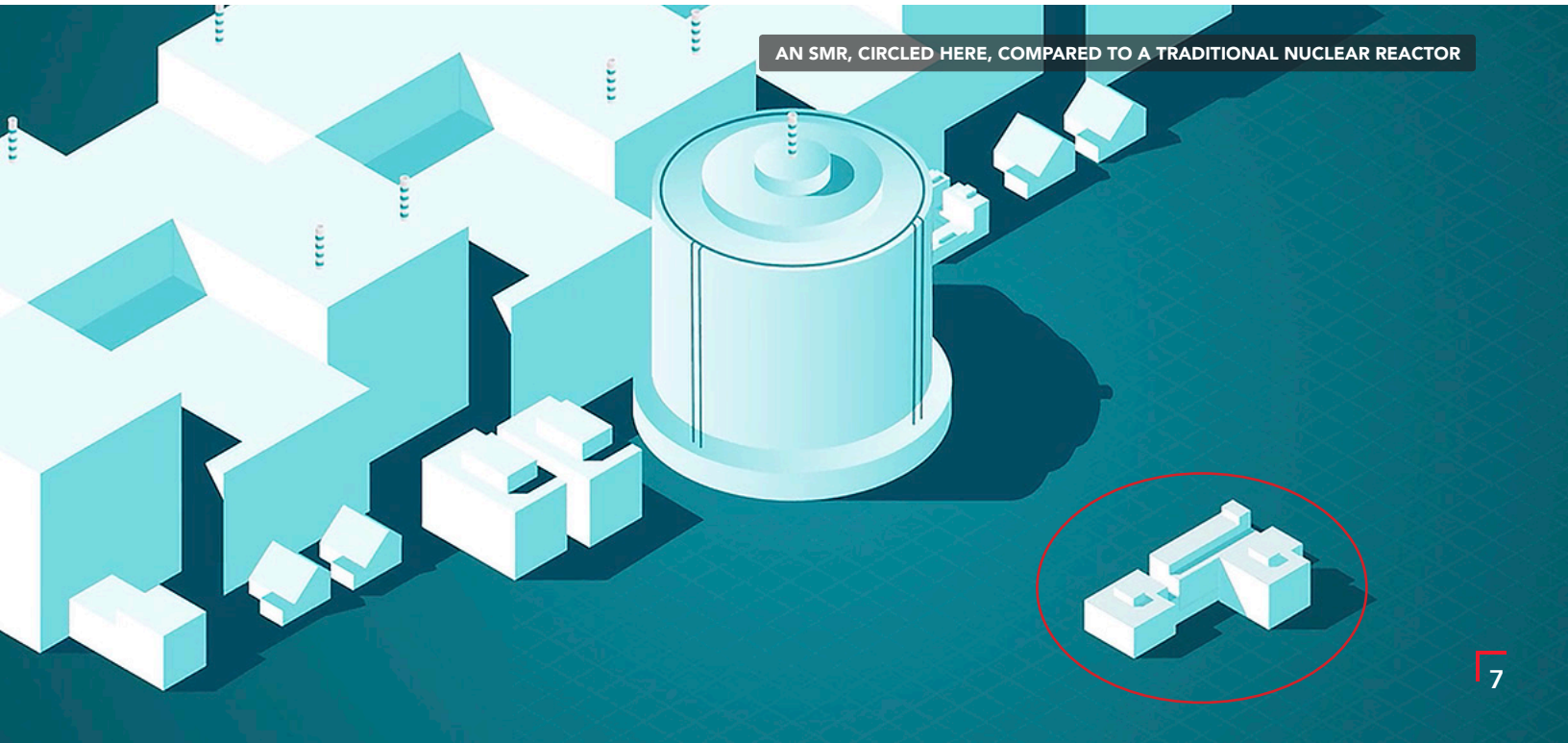
OPG, along with other Canadian power companies, urged the federal government to provide funding for the development of prototype reactors in a recently released Canadian roadmap study for SMRs. The report found Canada is uniquely positioned to lead the world in SMR development given its long history in nuclear power.

In an effort to bring SMRs to Canada, OPG has partnered with NuScale Power, which has designed a ground-breaking SMR pressurized-water reactor capable of generating 60 MW of electricity. The Portland, Oregon-based company's SMR is factory-made and offers scalable power based on need.

In November, OPG and NuScale signed a Memorandum of Understanding that will support the expansion of NuScale's SMR design to the Canadian market. As part of the agreement, OPG will lend its 50-plus years of safe nuclear experience as NuScale's design goes through a review process by the Canadian Nuclear Safety Commission to ensure it meets all regulatory requirements.

FAST FACTS

- SMRs are much smaller than a traditional reactor
- They generate heat and power through nuclear fission
- Factory constructed and delivered to site
- Currently more than 150 proposed SMR designs world wide



AN SMR, CIRCLED HERE, COMPARED TO A TRADITIONAL NUCLEAR REACTOR

OPG, MOHAWK COUNCIL OF AKWESASNE MARK 10 YEARS OF PARTNERSHIP

OPG, MOHAWK COUNCIL CELEBRATE 10 YEARS OF PARTNERSHIP

On Oct. 2, more than 70 people from the Mohawk Council of Akwesasne (MCA), OPG and the Cornwall community gathered inside the St. Lawrence Power Development Visitor Centre to mark the 10th anniversary of the final settlement agreement between OPG and MCA.

The settlement came after more than 15 years of negotiations and acknowledged past wrongs made by OPG's predecessor company, the Hydro-Electric Power Commission of Ontario, in the development of power operations on the St. Lawrence River decades ago.

"The signing of the agreement and delivery of our apology in 2008 signalled an important step forward for both parties," said Mike Martelli, President of Renewable Generation at OPG.

The construction of OPG's R.H. Saunders Generating Station as well as the St. Lawrence Seaway in the 1950s required more than 6,500 people to be relocated to higher ground. For the Mohawk people of Akwesasne, this resulted in flooding of their traditional territory and loss of resources and quality of life.

As part of the 2008 settlement agreement, OPG issued a public apology and both groups agreed to a new partnership that has resulted in several environmental initiatives as well as employment and capacity building programs.

Another great outcome was a traditional Mohawk mural painted in 2017 by local artist John B. Thomas, which is displayed prominently in the visitor centre. Titled "Kaniatares," or Long River, the 21-foot mural depicts a typical day in a Mohawk village on the St. Lawrence River in the 1700s.

During the celebration on Oct. 2, the visitor centre's auditorium was renamed "Sowatise John B. Thomas Memorial Auditorium" in honour of Thomas, who passed away in March 2018.

"Our community and Council takes great pride in the relationship we have with OPG and we look forward to many more years of positive outcomes," said MCA Grand Chief Abram Benedict.

ONTARIO UNIVERSITIES HELPING TO DRIVE NUCLEAR INNOVATION

At the University of Waterloo, an intrepid team of grad students has been researching and developing autonomous driving robots to inspect the innards of a nuclear reactor.

Working with Clearpath Robotics, the students are building mobile robots equipped with non-contact sensors, radiation detectors, and high-definition cameras. The small rovers could provide detailed information on the condition of a nuclear reactor and reduce monitoring costs.

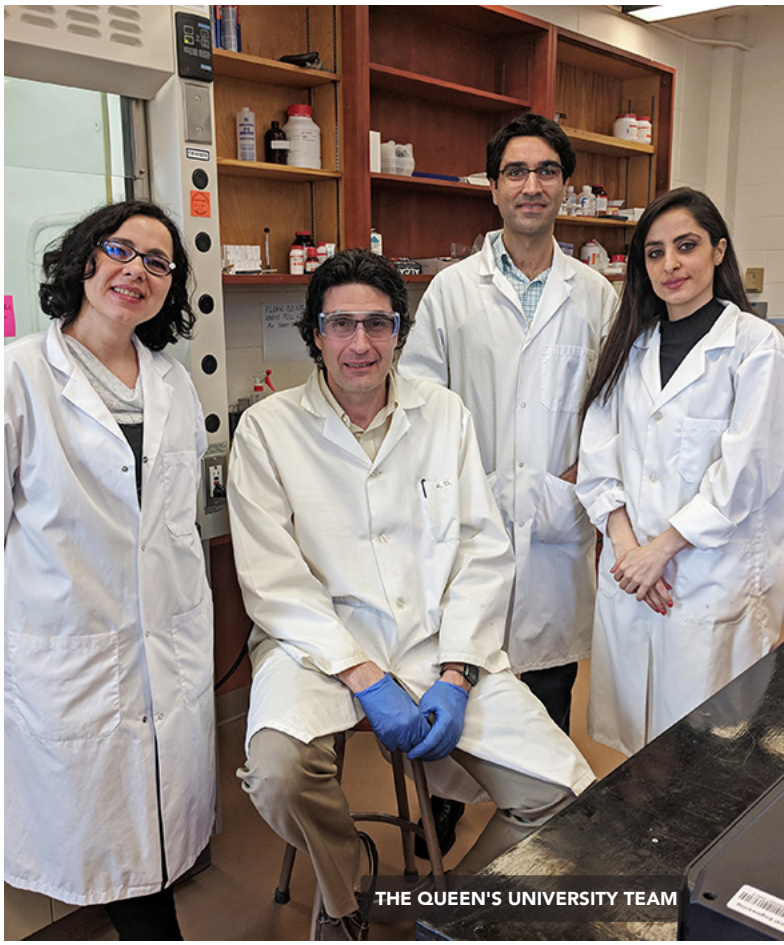
It's just one of five projects OPG has initiated with Ontario universities to help drive nuclear innovation in the province. The company is tapping into bright, young minds to develop innovative solutions and technologies that could help with future nuclear waste management and decommissioning activities.

"We looked at this as an R&D investment and a perfect opportunity to gestate ideas," said Don Jarron, Director of Decommissioning with OPG.

Working with the University Network of Excellence in Nuclear Engineering (UNENE), a non-profit alliance of Canadian universities, nuclear utilities, and research agencies, OPG is directly sponsoring nuclear research initiatives at five different universities over three years. Beginning in 2017, OPG has provided program funding to the University of Toronto, University of Western Ontario, Queen's University, University of Ontario Institute of Technology, and the University of Waterloo.

"We have existing tooling we can use now, but we identified key areas in decommissioning and nuclear waste ripe for further innovation," Jarron said. "If any one of these ideas takes off, it could improve safety, save money, and advance Canadian innovation in this field."

Five to six graduate students at each school, under the guidance of some of Ontario's best professors, are now tackling a specific project that could prove valuable during future safe storage and decommissioning of the Pickering Nuclear Generating Station, which was granted a 10-year operating licence from the Canadian Nuclear Safety Commission in August. The station will operate safely and reliably until the end of 2024, followed by safe storage activities, such as removal of fuel and water.



THE QUEEN'S UNIVERSITY TEAM

At the University of Toronto's Institute for Aerospace Studies, students are working to develop new ways for networks of Unmanned Aerial Vehicles, or drones, to inspect and service nuclear structures so that they continue to remain safe over long periods of time.

Meanwhile, at Queen's University, students are looking at a technique to filter tritium from heavy water using graphene oxide, which could prove useful for dealing with large volumes of tritiated heavy water during decommissioning.

And at Western University, grad students in the faculty of chemistry are working on a laser ablation technique that could remove layers of contamination from metal surfaces to decrease waste.

DRONES FLY HIGH TO FIGHT INVASIVE PLANT SPECIES

To keep invasive Phragmites in check at the Western Waste Management site in Kincardine, OPG recently deployed drones to collect data that will help control the unwanted plant's growth.

Invasive Phragmites, also known as European common reed, is an extremely aggressive plant that is listed as restricted under Ontario's Invasive Species Act. For decades, it has caused damage to Ontario's biodiversity, wetlands and beaches by outcompeting native vegetation for water and nutrients as well as releasing toxins from its roots that threaten surrounding plants.

"Areas that are heavily infested with Phragmites generally provide poor habitat and food supply for other species, including many species at risk," said Karissa Finlayson, Assistant Environmental Advisor with OPG.

As part of OPG's Onsite Biodiversity Program, the company successfully mapped the affected wetland area, called Baie du Doré, and gathered data on how Phragmites are impacting this area in Bruce County. Working with OPG's Unmanned Aerial Vehicles team, part of the Innovation and Reactor Inspection (IRI) division, environment staff were able to get a clear, bird's eye view of the site thanks to the drones.

"One of the many benefits to drone technology is that we are able to see areas that are not easily accessible by foot," said Gerry McKenna, Section Manager of Environment (Corporate Programs) with OPG. "This is a great adaptation of technology for ecological assessments and it ultimately saves OPG time and money."

The data collected will help shape an effective plan to deal with the invasive plant. Actions taken will include cutting and removing Phragmites in the affected wetland, which will be a combined effort with Bruce Power, operator of the nearby Bruce Nuclear Generating Station.

This project supports Environment Canada's "Great Lakes Protection Initiative," a five-year study of Great Lakes Coastal Wetlands that sets out to determine the impact of climate change and water levels on coastal wetlands. The Baie du Dore is one of 24 study sites.

DRONES ARE HELPING TO KEEP INVASIVE PHRAGMITES IN CHECK

OPG REPORTS BOOST IN NET INCOME IN Q3

OPG reported net income attributable to the Shareholder of $279 million for the third quarter of 2018, compared to $131 million for the same quarter in 2017.

The company's net income for Q3 was favourably impacted by the new regulated prices for OPG's nuclear and most of its hydroelectric generation, resulting from the Ontario Energy Board's decision on OPG's application for new regulated prices for the 2017-2021 period issued in December 2017.

Partially offsetting this increase in earnings was lower nuclear electricity generation of 0.7 terawatt hours (TWh) in Q3 compared to the same quarter in 2017. This was primarily due to a combination of increased unplanned outage days at the Pickering Nuclear Generating Station (GS) and planned outage days at the Darlington Nuclear GS. Darlington's unit capability factor for the operating units in Q3 was 91.7 per cent, compared to 96.2 per cent for the same quarter in 2017, while Pickering's unit capability factor decreased to 87.9 per cent in Q3 compared to 88.7 per cent for the same quarter last year.

Meanwhile, OPG's regulated hydroelectric stations saw a decline in generation of 0.3 TWh in the third quarter, primarily due to lower water flows across most rivers systems in the province.

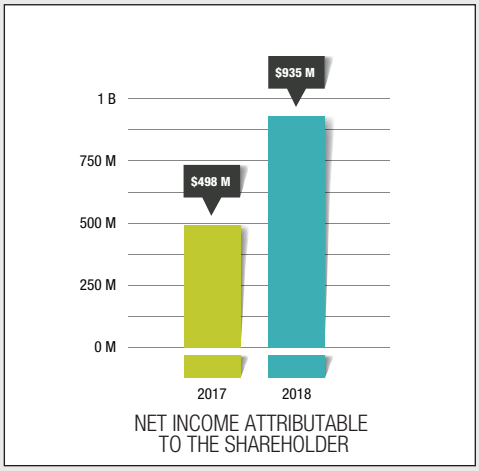
Total electricity generated during the three months ended Sept. 30, 2018, was 18.3 TWh, compared to 19.4 TWh for the same quarter in 2017.

On the Darlington Refurbishment, OPG remains on time and on budget as the project marked its second anniversary. Planning and prerequisite activities continue for the Unit 3 refurbishment.

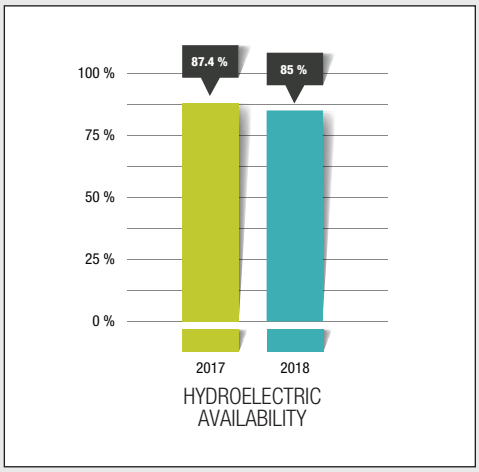
For the ninth consecutive year, Darlington Nuclear achieved the highest possible safety rating from the Canadian Nuclear Safety Commission, while Pickering Nuclear achieved the highest possible safety rating for the third year in a row. The International Atomic Energy Agency also confirmed that Pickering Nuclear GS demonstrated strong operational safety performance.

On the projects front, construction work continues on a 10 megawatt (MW) single-unit powerhouse on the existing Ranney Falls GS site. And in Niagara Falls, a project to rehabilitate two of the older units at OPG's Sir Adam Beck 1 GS is in the early stages of planning. The conversion of these units to newer technology is expected to add approximately 100 MW of incremental generating capacity.

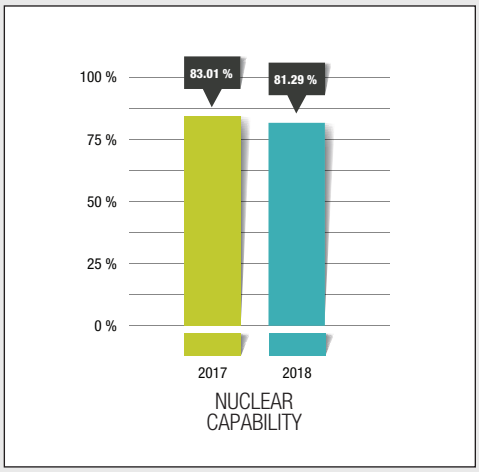
YEAR-TO-DATE SEPT 30 RESULTS



NET INCOME ATTRIBUTABLE TO THE SHAREHOLDER



HYDROELECTRIC AVAILABILITY



NUCLEAR CAPABILITY

Holiday Spirit. Made in Ontario.

At Ontario Power Generation, we hope you take the time over the holidays to enjoy some of our province's amazing winter festivals with your family and friends.

Wishing you a joyous and safe holiday season.

ONTARIO POWER GENERATION

Lumina Borealis at Fort Henry