

A large industrial turbine spindle is being lifted in a factory setting. The spindle is a massive, circular component with many blades, and it is being supported by a complex metal structure. A worker in a hard hat and safety vest is visible in the foreground, looking at the spindle. The background shows a large industrial facility with various equipment and structures.

Turbine spindle lift underway for Unit 2 refurbishment, Darlington Nuclear Generating Station.

A REPORT ON CANADA'S LARGEST CLEAN ENERGY PROJECT

# DARLINGTON REFURBISHMENT

**Q2 2018**

**ONTARIO**  
**POWER**  
GENERATION

# PLANNING FOR THE FUTURE

## POWERING ONTARIO TOGETHER

OPG and Bruce Power recently released *Powering Ontario Together*, a report on our collaboration aiming to leverage economies of scale throughout our efforts to extend the lifetime of the province's nuclear fleet.

Since 2016, when we released our first joint report, OPG and Bruce Power have experienced significant progress on the Darlington Refurbishment Project and the Bruce Life Extension Program, respectively. OPG has safely completed more than 60 per cent of the work on the Unit 2 schedule and has started the complex work of rebuilding the reactor. At the same time, Bruce Power is more than two years into its planning phase of the Life Extension Program, and has signed a number of key supplier agreements as it prepares for its first Major Component Replacement (MCR) project, starting in 2020.

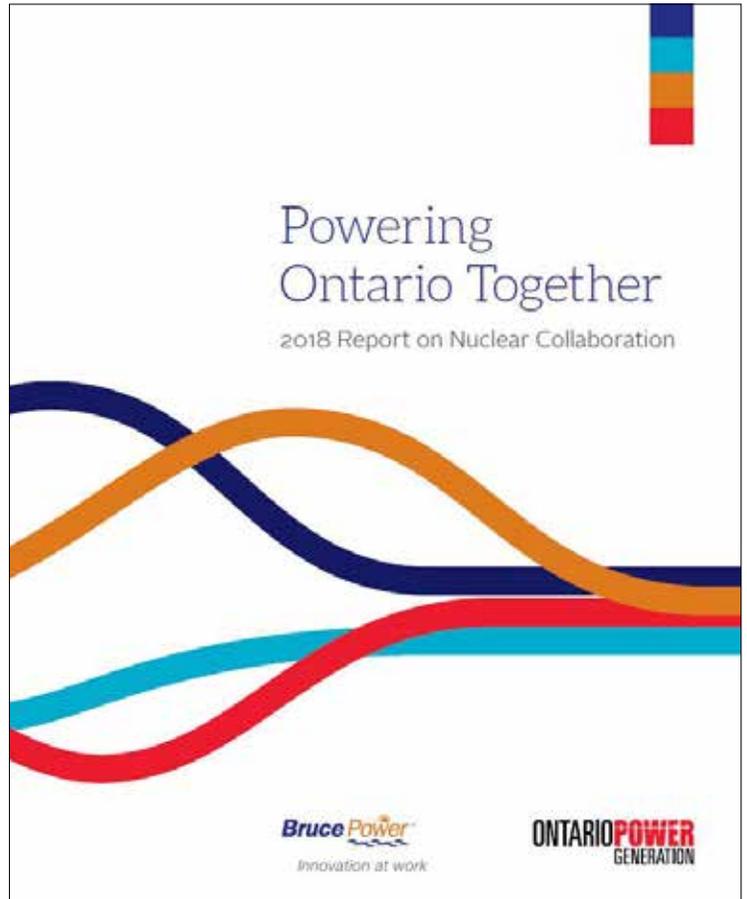
In *Powering Ontario Together*, we describe how our organizations continue working together in various areas, including labour arrangements, common tooling and waste management. With hundreds of local suppliers and the generation of thousands of jobs in the province, the Darlington Refurbishment Project and the Bruce Life Extension Program are 'Made in Ontario' ventures that are generating billions of dollars in economic and environmental benefits for Ontarians.



Visit [www.opg.com](http://www.opg.com) to read *Powering Ontario Together*, the 2018 report on OPG and Bruce Power's nuclear collaboration efforts.



Mike Rencheck and Jeff Lyash, respective presidents and CEOs of Bruce Power and OPG.



# BUILDING THE FUTURE OF ONTARIO

This fall, Ontario Power Generation and our project partners will reach the two-year anniversary since we began executing the Darlington Refurbishment Project. Heading toward this milestone, and after the successful disassembly of the Unit 2 reactor during our second quarter, the project remains on time and on budget.

We are now installing 480 calandria tubes into the unit — a complex series of work that will mark the historic start to rebuilding the reactor and generating another 30 years of safe, clean and reliable energy for Ontarians.

In addition to being an energy generator, the Darlington Refurbishment Project is an economic generator, creating opportunities for businesses and workers in Ontario.

By 2021, when the project team is half-way through refurbishment of all four units at Darlington, the provincial demand for skilled workers will be at its peak. Looking ahead, OPG has been taking proactive steps to help fill the gap, particularly through collaboration with other nuclear organizations.

Bruce Power will commence its Life Extension Program in 2020, and so, like OPG, has a vested interest in ensuring the nuclear industry has access to a steady supply of highly qualified workers. Both organizations have been working together on a number of focus areas, including labour arrangements, in accordance with our 2015 Memorandum of Understanding on sharing best practices during our refurbishment programs and in our station operations. Our efforts also directly support Ontario's 2017 Long-Term Energy Plan.

In this report, you will learn more about the status of the Darlington Refurbishment Project and how OPG is working to build the future of Ontario by extending the lifetime of the province's nuclear fleet.

*Dietmar Reiner,  
Senior Vice President, Nuclear Projects*

## PROJECT PILLAR PERFORMANCE

OPG's project pillars measure the organization's success in maintaining high standards in worker safety, quality of work, and ability to adhere to schedule and overall project cost. Here is an overview of our project pillar performance during the second quarter of the year (April 1 — June 30, 2018).

### COST

Unit 2 refurbishment costs are \$56 Million below plan. The life-to-date cost for Unit 2, and the forecasted completion of the overall project, remains on budget. 

### SCHEDULE

Unit 2 refurbishment remains on schedule. 

### SAFETY

No lost time injuries and four minor medically treated injuries occurred in the second quarter. Since January 2010, personnel has worked 3,102 days safely, and the project has experienced no Lost Time Injuries since Unit 2 Breaker Open in October 2016. 

### QUALITY

There have been no quality-related events in the quarter. 

### ENVIRONMENT

Environmental performance has been good with no reportable spills or infractions in Q2. Emissions are well below all regulatory limits. 



OPG workers inspect calandria tubes before installation into the Unit 2 reactor, Darlington Energy Complex.

LEARN MORE

Visit [OPG's YouTube channel](#) to watch our new video, **Building Together**, which gives you insight into what's happening right now, during the Darlington Refurbishment Project's reassembly phase.

## COMPONENT BY COMPONENT

### OPG starts rebuilding Unit 2 with new calandria tubes

Rebuilding Darlington's Unit 2 reactor is officially underway, with workers installing 480 new calandria tubes.

Calandria tubes provide passage through the reactor's tank, or calandria vessel, for the fuel channel assemblies. As well, they insulate the hot fuel channel from the relatively cool moderator. The replacement of the calandria tubes signals the start of physically rebuilding the reactor.

"After the removal of the reactor components, we then carefully inspected the calandria vessel, and cleaned and conditioned all other areas of the reactor to allow us to start calandria tube installation," said Dietmar Reiner, Senior Vice President, Nuclear Projects. "We're ready to rebuild."

The Canadian-designed calandria tubes are being manufactured in Cobourg, Ontario, by Cameco. After the tubes are delivered, they are prepared in a clean room environment to guard against foreign material, at the Darlington Energy Complex, then transported to the Unit 2 airlock before being taken into the reactor vault. There, the tubes will be installed by Aecon, with the support of boilermakers and millwrights and expertise from various OPG personnel.

"It's no easy task," said Mike Allen, Senior Vice President, Nuclear Refurbishment, "but the right team is in place to complete the work safely, with quality, on time and on budget."

## FILLING THE GAP IN SKILLED TRADES

With the demand for skilled trades on the rise, OPG is taking a proactive approach to help fill the gap.

Our Indigenous Opportunities in Nuclear program (ION) recruits and places skilled members from Indigenous communities in jobs within the fast-growing nuclear industry. One of those recruits is Ben Shaughnessy, a millwright apprentice from Curve Lake, Ont. who was recently contracted by OPG to work on the Darlington Refurbishment Project.

"Deciding to work in nuclear was a big step for me," said Shaughnessy. "There's a lot to learn, and it was a little intimidating at first. But now, after learning about nuclear and how seriously safety is taken on site, I'm really comfortable. The plant's a great place to work."

By 2021, when OPG is half-way through the Darlington Refurbishment project and Bruce Power is undertaking a similar effort, the demand for tradespeople like

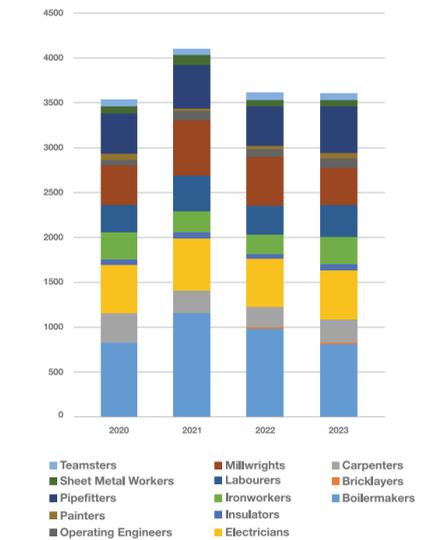
Shaughnessy will reach its peak. OPG established ION, among other capacity-building initiatives, to help ensure the project and the wider nuclear industry is steadily supported by highly qualified workers.

"The ION application process is in-depth. It includes security clearance and additional training in nuclear professionalism," said Kenn Ross, OPG Indigenous Relations Advisor. "We're working closely with each candidate along the process, so they are placed in job opportunities that best leverage their skills and help them build their careers."

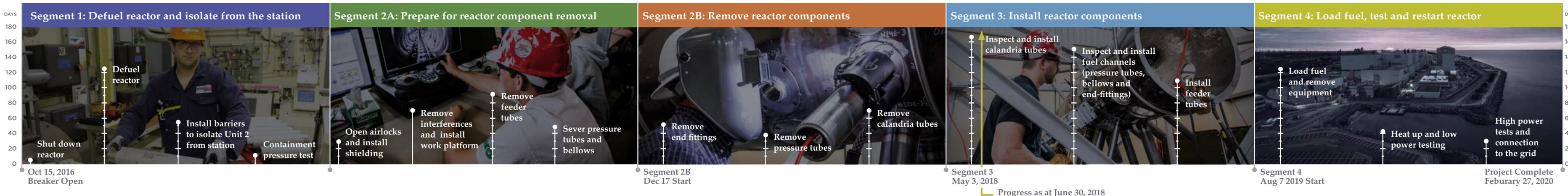
The ION team has been working with Kagita Mikam, an Aboriginal Employment and Training agency, to select the most qualified candidates and place them in positions across nuclear, including OPG, union halls and vendor partner organizations.



Ben Shaughnessy, a millwright apprentice from Curve Lake, Ont. and a recruit in OPG's Indigenous Opportunities in Nuclear program.



## THE UNIT 2 DARLINGTON REFRUBISHMENT SCHEDULE





OPG worker, on-site, at Darlington Nuclear Generating Station.

**Ontario Power Generation** (OPG) produces almost half the electricity that Ontario homes, schools, hospitals and business rely on each day. After decades of reliable power generation, OPG's Darlington Nuclear Generating Station is receiving a mid-life refurbishment that will benefit Ontarians for another 30 years.

To learn more about Darlington Refurbishment, the largest clean energy project in Canada, visit our website at [www.opg.com](http://www.opg.com) and subscribe to the **Darlington Refurbishment Project Newsletter**.

Have questions? Contact us at [darlingtonrefurb@opg.com](mailto:darlingtonrefurb@opg.com).

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