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NIXI

Innovation at work

BRIEFING TO 2018 MUNICIPAL COUNCILS

BRUCE POWER. WE POWER MORE FOR LESS.

ONTARIO'S LOW-COST ELECTRICIT SUPPLIER POWERING INNOVATION JOBS AND ECONOMIC GROWTH 🌽

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01 BRUCE POWER OVERVIEW

Bruce Power is Canada's only private sector nuclear generator. It is the world's largest operating nuclear facility, and is located in rural southwestern Ontario. The company is a Canadian-owned partnership of Ontario Municipal Employees Retirement System (OMERS), TransCanada Corporation, the Power Workers' Union and The Society of United Professionals. The site is capable of producing 6,400 Megawatts or about 30 per cent of Ontario's electricity.





OUR SITE: A STRATEGIC LOCATION

The siting of energy infrastructure has proven to be a challenging issue for many jurisdictions, including Ontario. The Bruce Power site is located in rural southwestern Ontario and has the unique benefit of a remote location, while at the same time enjoying well-established infrastructure to support the world's largest operating nuclear facility. There are a number of key considerations related to the siting of electricity generation infrastructure, including:

- Transmission availability
- Community support
- Environmental factors
- Established workforce

In 2012, Hydro One completed the largest transmission project in 20 years, bringing the Bruce-Milton line into service, creating the capability for all 6,400 Megawatts (MW) from the Bruce Power site, to be delivered to the growing Greater Toronto Area (GTA). This project was an estimated investment by Ontario ratepayers of \$700 million and will also accommodate additional renewable generation in the Bruce region. The Bruce-Milton line is a strategic asset for the people of Ontario and the Bruce Power site ensuring the delivery of 30 per cent of Ontario's electricity supply for the long term. Since the Bruce-Milton line came into service, it has proven to be reliable transmission infrastructure that is able to deliver the full eight units of output from the Bruce Power site to market. In May 2013, the Saugeen Ojibway Nation (SON) entered into an agreement with Hydro One to become a joint owner in the new Bruce-Milton transmission line and will benefit from the associated revenue. The total investment from SON was \$72 million and was borrowed with the support of the provincial Aboriginal Loan Guarantee Program. Bruce Power supports the agreement between the SON and Hydro One and believes it further enhances the strategic value of this infrastructure.

Community support and ongoing Indigenous engagement is also a critical component to our success at Bruce Power, and is an important siting consideration. For nuclear facilities, there is the added consideration of adequate site infrastructure and emergency preparedness capabilities that must be taken into account. The Bruce Power site has proven to be a very strong location as it relates to each of these factors and, as a result of this strong position, the eight units on the site are in many ways a strategic and critical infrastructure for the province. There are also a number of environmental factors to consider related to the location of electricity infrastructure, especially nuclear facilities.



The Bruce Power site was initially located on the shore of Lake Huron to provide a significant source of cooling water, while still being relatively close to the southern Ontario power market. The site is also located in one of the most seismically stable regions of Ontario and is 2,300 acres in size, leaving ample room for infrastructure to support the operation of a large nuclear facility. The strong environmental characteristics of the Bruce Power site have been proven a number of times over the last 15 years. The company successfully completed three Environmental Assessments (EA) under the Canadian Environmental Assessment Act (CEAA) including: the Restart of Units 3 and 4; the refurbishment and continued operation of Units 1-4 at Bruce A; and the continued operation of Units 5-8 at Bruce B. In all three assessments, the company demonstrated the strong characteristics of the site and, more importantly, that our operations do not have a significant adverse impact on the environment. This will continue to be re-affirmed through Environmental Risk Assessments [ERAs] we will conduct for future licence renewals. The Bruce Power site is well established with more than 56 km of roads and includes its own fire department, emergency response team, medical clinic, learning centre, training centre, reactor simulators and works department. All of this infrastructure is required to support the safe operation of our facility and is viewed by many as industry leading. The fact that the site has eight operating units means the cost of this infrastructure is supported by a large volume of output.

Over the past several years in particular, there has been a growing focus in the nuclear industry and with its regulator, the Canadian Nuclear Safety Commission (CNSC), on emergency preparedness and emergency response following the events at Fukushima. Bruce Power is considered a leader in its response to Fukushima and in 2012 carried out a joint exercise with Emergency Management Ontario called Huron Challenge-Trillium Resolve to test our collective capability to respond to emergency situations. In 2016, Bruce Power participated in Huron Resolve, a series of training events co-sponsored by the Office of the Fire Marshal and Emergency Management (OFMEM) and Bruce Power. It consisted of a symposium in June, a table top exercise and culminated with a full-scale functional exercise. 500 people from 30 organizations took part in the exercise.

BRUCE POWER OVERVIEW

In addition to returning the Bruce assets to their full operating potential over the last 15 years, another key focus has been on renewing the workforce for the long term. The company has largely established a new workforce recognizing the long-term view that has been established for the company through investments in both generation assets and the Bruce-Milton transmission line.

In 2001, the Bruce Power site faced a serious demographic challenge following many of the decisions taken in the late-1990s related to the shutdown of Bruce A. In 2001, only 10 per cent of staff was under the age of 35, with 44 per cent of staff between the ages of 46 and 55. Through recruitment, training and apprenticeships, Bruce Power has established a long-term workforce for the site. In 2016, 35 per cent of employees were under the age of 35, while the number of staff between 46 and 55 dropped to 32 per cent.

In 2017, Bruce Power was recognized as one of Canada's top employers for young people for the sixth year in a row.



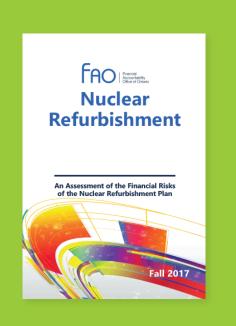
BRUCE POWER'S FUTURE AND THE LONG-TERM IESO CONTRACT

On Dec, 3, 2015, Bruce Power and the Independent Electricity System Operator (IESO) entered into an amended long-term agreement to secure 6,400 megawatts (MW) of electricity from the Bruce Power site, through a multi-year investment program.

The Bruce Power Refurbishment Implementation Agreement has been available to the public since it was first signed in 2005, and the company and the province continue to support this open and transparent approach.

The agreement, along with other background materials, has been made available on the company's website. In addition, the agreement also provides the IESO transparency to investment activities on the Bruce Power site throughout the life of the agreement and also ongoing reporting requirements.

The agreement also provides the IESO the ability to have access to Bruce Power's capital planning elements, including cost performance, and will provide for IESO oversight to be present at the Bruce Power site as this process progresses.



'There is currently no portfolio of alternative low emissions generation which could replace nuclear generation at a comparable cost." -FAO



FLEXIBLE BRUCE POWER NUCLEAR

Bruce Power has made investments in all eight units on site to offer additional flexibility to Ontario's electricity market. With the phase out of coal in particular, there has been a need to provide flexibility when demand in the province drops, while also ensuring availability to meet peaks given the unique nature of Ontario's energy market.

Of the 6,400 MW of capacity from the Bruce Power site, there is the capability, which has been significantly utilized by the province, for 2,400 MW of flexible or dynamic capability. The company has achieved this by enhancements to both our operations and physical upgrades on the non-nuclear side of the plant. For more prolonged system requirements, the site has also provided the Independent Electricity System Operator [IESO] the opportunity to remove units from service if needed. Both of these options provide the market with significant flexibility to manage supply and demand.

The Bruce Power units are the only nuclear facilities in Ontario that have this dynamic capability, which will be essential for the province moving forward. As Figure 1 outlines in a snapshot of one week in 2017, the Bruce Power site provided a significant degree of flexible response to meet the needs of the IESO.

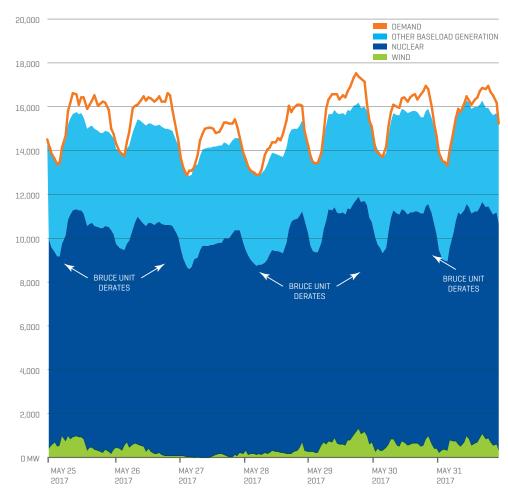


FIGURE 1: A SNAPSHOT OF MEETING MARKET NEEDS (MAY 25-MAY 31, 2017)

O2 LOW-COST, RELIABLE POWER

Bruce Power currently provides over 30 per cent of Ontario's electricity at 30 per cent less than the average cost to produce residential power. In fact, Bruce Power is the source of half of Ontario's nuclear generation and is the lowest cost source of nuclear energy in the province.

WE PRODUCE **30%** OF ONTARIO'S ELECTRICITY AT

30% LESS THAN THE AVERAGE COST TO GENERATE RESIDENTIAL POWER

3

The cost of electricity is often a misunderstood issue, as there is great confusion on what drives costs in Ontario.

As Figure 2 illustrates, the lower-cost sources of electricity — nuclear and hydro — help keep the average cost of electricity down as compared to other forms of more expensive generation.

In 2017, Bruce Power received a single price for all output from the site of \$66 per megawatt-hour (MWh).

The average residential price of electricity in the province was \$115 per MWh.

Figure 2 illustrates the important role electricity from the Bruce site plays in keeping prices low for families and businesses.

The price paid for Bruce Power nuclear is fully inclusive of all costs, including capital investments that have been made, funding for fuel, waste and decommissioning liabilities, and every element of the company's operation.

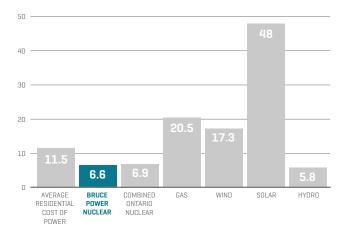
Through Bruce Power's site lease with Ontario Power Generation (OPG), the company will continue to fund decommissioning and waste management costs. The cost to manage these liabilities will be determined through the Ontario Nuclear Fund Agreement (ONFA) process and are reflected in Bruce Power's price of power. There is often a misperception that, because of the upfront capital costs associated with nuclear energy, the cost of power will be high as a result. Due to the large volumes of electricity generated from nuclear facilities, and their high levels of reliability, this is not the case as outlined in the price comparison, which is fully inclusive of all costs.

RELIABILITY

Through the strong performance of the Bruce site, the 50 terrawatt-hours (TWh) produced in 2017 eclipsed the Bruce Power record of 47.6 TWh, which was the highest the site had achieved since 1991, when Ontario Hydro operated the facility.

The reliability of our equipment continues to improve, which means our units operate more consistently, providing carbon-free Bruce Power electricity to the people of Ontario, keeping our air clean.

FIGURE 2: ONTARIO ELECTRICITY BOARD TOTAL UNIT SUPPLY COST (cents/kWh)



03 ONTARIO'S SUPPLY MIX

Ontario's energy market has undergone a significant transformation over the last decade. Ontario was the first jurisdiction in North America to end its use of coal-fired electricity, which it accomplished in 2014. Much of this success was made possible by Ontario's nuclear industry. Moving forward it is important for Ontario to have a balanced supply mix that allows for the continued advancement of renewable technology, along with nuclear, to maintain these emission-reduction efforts. The unique dual-peaking nature of our energy market often goes unrecognized and this requires Ontario, more than many jurisdictions, to be self-sufficient. From a seasonal perspective, we have peaks in both the summer and winter, with periods of lower demand in the fall and spring. The same is the case on a day-to-day basis, where demand fluctuates significantly. To manage this, we need a system that is built to manage the peaks, while ensuring we have the flexibility to accommodate the periods of lower demand.

There have been some major issues that have dominated the energy policy agenda over the last decade in Ontario including cost, renewable implementation, enhancing supply to secure system reliability, the phase out of coalfired electricity, a long-term nuclear plan through a price contract with the IESO, and significant investment in infrastructure.

Nuclear power plays a critical role in meeting the energy needs of the province every day. In 2017, nuclear accounted for more than 60 per cent of Ontario's supply, with Bruce Power providing just over 30 per cent of the province's electricity.

Consistent with the recommendations put forward and Bruce Power's amended contract with the IESO, this would place available nuclear capacity in the range of 10,000 MW over the next two decades and beyond. The percentage of nuclear in the range of 45–50 per cent of supply in the province is required to maintain the province's coal-free status, while providing a reliable supply of emissions-free electricity.

FIGURE 4: ONTARIO'S ENERGY SUPPLY MIX

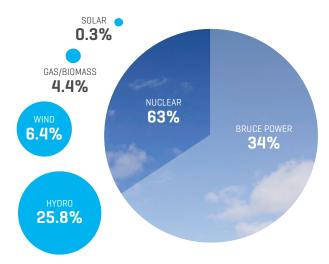


FIGURE 3: PAST AND CURRENT NUCLEAR CAPACITY

	2003		2017	
SUPPLY MIX	INSTALLED CAPACITY	PERCENTAGE OF ONTARIO INSTALLED CAPACITY	INSTALLED CAPACITY	PERCENTAGE OF ONTARIO INSTALLED CAPACITY
NUCLEAR	11,600 MW	37%	13,009 MW	35%
HYDRO	7,700 MW	25%	8,472 MW	23%
WIND			4,313 MW	12%
BIOENERGY	70 MW	<1%	495 MW	1%
SolarPV			380 MW	1%
NATURAL GAS	4,400 MW	14%	10,277 MW	28%
COAL	7,500 MW	24%		
EFFICIENCY/DR				
TOTAL	31,300 MW	100%	36,946 MW	100%

04 INVESTMENT, JOBS AND ECONOMIC GROWTH

In May 2018, the Canadian Manufacturers & Exporters, the Provincial Building and Construction Trades Council of Ontario, and Bruce Power released a report entitled 'Powering Innovation, Jobs & Economic Growth.' The report details the farreaching impacts that Bruce Power's Life-Extension Program will have on jobs and Ontario's economy and takes an in-depth look at how extending the life of the Bruce Power site to 2064 will positively impact the people of Ontario through low-cost, reliable, carbon-free electricity, as well as the continued investment in jobs and the economy. The study outlines the importance of refurbishing Bruce Power's remaining six units, which will ensure the long-term stability of power prices, create thousands of jobs, increase Ontario's tax revenue and invest billions into Ontario's economy for decades.

Based on this report and the economics of the amended agreement with the IESO, the economic benefits are:

- Creating and sustaining 22,000 jobs, directly and indirectly during the Life-Extension Program, which will see the site operate until 2064. There will also be \$4 billion in annual economic benefit in Ontario's economy through direct and indirect spending on operational equipment, supplies, materials and labour income.
- Creating and sustaining an additional 3,000-5,000 direct and indirect jobs annually during the Major Component Replacement Project, from 2020-33, and, contributing between \$900 million and \$1.2 billion in direct and indirect labour income annually, for every year of the investment program. In addition, between \$700 million and \$1 billion in direct and indirect annual economic benefit will be realized through the purchasing of equipment, supplies and materials.

Over 90 per cent of Bruce Power's spend takes place in Ontario and the company's supply chain supports hundreds of businesses throughout the province. This investment program will also create significant, long-term employment for Ontario's Building and Construction Trades.

The Bruce site is home to a number of building and construction trades including Boilermakers, Carpenters, Electricians, Insulators, Ironworkers and Rodmen, Labourers, Millwrights, Operating Engineers, Painters, Pipefitters/Plumbers, Sheet Metal and Roofers, and Teamsters. Over the last 17 years, Bruce Power has developed a strong working relationship with these trades, including the Provincial Building and Construction Trades Council of Ontario, with millions of hours of tradesperson work being carried out on site.



In September 2015, Bruce Power and the Building Trades signed a collaboration agreement signaling a shared commitment to the ongoing role of Bruce Power nuclear in the province and recognizing the strategic importance of the company to thousands of tradespeople.

The Collaboration Agreement focuses on the following areas:

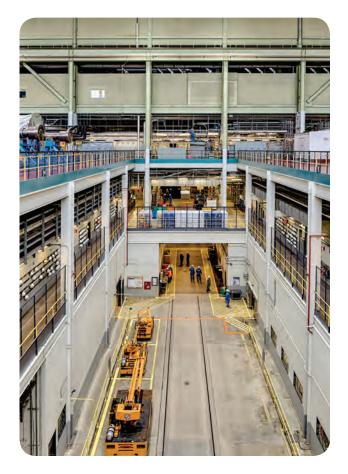
- Continuing to deliver strong safety performance through the shared value of 'Safety First.'
- Ensuring the necessary availability of skilled trades in the short, medium and long term by promoting recruitment, training and apprenticeships.
- Working together to ensure the successful execution of projects on the site.
- Increasing the diversity within the trades with a particular focus on Indigenous people, women and visible minorities.
- Creating opportunities for former military service members to find careers within the skilled trades.
- Ensuring nuclear power continues to play an important role as part of a reliable, clean, affordable and balanced supply mix in the province.



There is a transparent process to determine the cost of life extension following a defined project management process. It's estimated the refurbishments of Units 3-8 will cost \$8 billion (\$2014), while an additional \$5 billion (\$2014) has been allocated for the Asset Management (AM) activities from 2016-53. In the short term, between 2016 and '20, the company will invest \$2.3 billion (\$2014) in both Asset Management (AM) and refurbishment activities as part of this plan. This is incremental to the company's ongoing financial investments to sustain eight units of operation.

The total private investment in publicly owned assets outlined in the agreement is about \$13 billion (\$2014).

As a private sector operator, Bruce Power is responsible for meeting all site investment requirements and the implementation of this program. Through the amended agreement, Bruce Power will make life-extension investments in Units 3-8 to enable a coordinated refurbishment schedule that has been developed with the IESO and reinforced through the Ministry of Energy's 2017 Long-Term Energy Plan.



The agreement optimizes asset life and manage investment requirements to achieve the lowest price possible for consumers, while also ensuring Bruce Power can make long-term investment decisions and adequately plan and prepare for projects.

OUR LIFE-EXTENSION PROGRAM

The optimized refurbishment schedule allows for a coordinated program with Ontario Power Generation that will ensure Ontario's electricity needs are met during the refurbishment period, while also maximizing the work program on the Bruce Power site. It also ensures adequate time for Bruce Power to prepare to successfully execute the Major Component Replacement [MCR], which starts with Unit 6 in 2020.

The MCR will be limited in scope to focus on the replacement of key equipment, including steam generators and reactor components. This approach was developed from lessons learned from the return-to-service of Units 1 and 2 in 2012 and the company's site life-extension activities since 2001. Items outside of these major components will be carried out through a program referred to in the agreement as Asset Management [AM], which began in early-2016 and will run through 2053.

BUILDING ON LESSONS LEARNED

For example, the improvement of performance between Units 2 and 1 was impressive, with the removal of pressure tubes being completed eight per cent more quickly; the installation of pressure tubes, 42 per cent; the removal of calandria tubes, 77 per cent; and cleaning and reactor preparation activities, 53 per cent.



All of the activities that are part of these investment programs have been successfully completed on Bruce Power's units since 2001, and the plan will build on this extensive experience into the future. Bruce Power learned many lessons and improved on its performance during the height of the first-of-a-kind Restart project.

These lessons learned continue to be reviewed, and further efficiencies have been realized during other maintenance programs completed on site since 2012. These marked improvements give us confidence as we continue to extend the life of our site to 2064.

The AM approach allows the company to manage the scope of work during refurbishment, balance the work program and extend the life of the units before their scheduled refurbishment begins, through targeted inspections and investments that will add an additional 30 reactor years of life. This optimizes the life of the assets and enables a coordinated refurbishment program.



Bruce Power has worked with the IESO and the Ministry of Energy to establish a coordinated MCR refurbishment schedule sequence for the Bruce Power site. The schedule reflects a shared desire and need to carry out MCR activities in a sequential manner. The schedule starts with the Unit 6 MCR beginning in 2020, for a duration of 48 months.

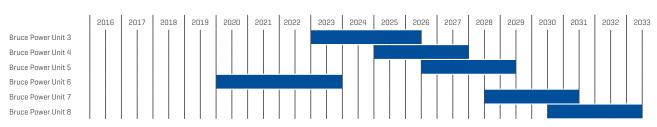


FIGURE 5: BRUCE POWER REFURBISHMENT SCHEDULE

Also, AM activities will also be carried out in a targeted way to support the life extension of the units both in support of the schedule and the ongoing safe, reliable operations of the units for their full operational life. Asset management activities are core business for Bruce Power. Through many outages since 2001, the company has successfully carried out hundreds of thousands of tasks and investment programs, which have resulted in industry-leading success both in improving the performance of the Bruce Power units and extending their operational lives. Bruce Power is confident in its ability to deliver the investment program required on site that will build on 17 years of experience in securing the long-term future of the site at a competitive cost of electricity for Ontario ratepayers.

MCR SCHEDULE & PROJECT DETAILS

The integrated schedule for the first unit, Unit 6, is based on a 48-month duration. Once Unit 6 MCR is successfully completed, the plan will be for successive units to have improvements over this schedule window and the duration for each will shorten. The schedule broadly consists of the following key critical path items:

- Reactor Shutdown and De-fuel:
 approximately 4 months
- **Reactor Preparation:** approximately 5 months
- Reactor Re-tubing & Feeder Replacement:
 approximately 32 months
- **Commissioning:** approximately 7 months

The steam generator program will be completed within the critical path window of the de-tube, re-tube and feeder replacement programs.

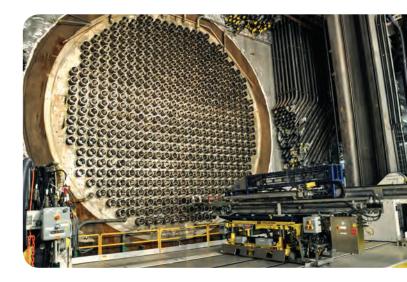
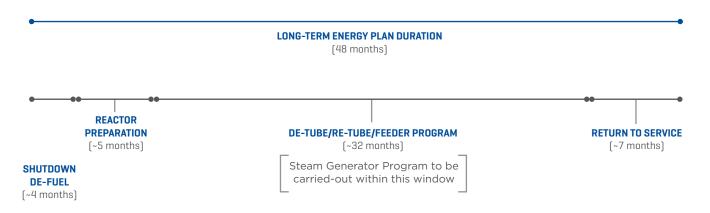


FIGURE 6: UNIT 6 PROJECT SCHEDULE



Feeder, Steam Generator and Key Asset Management activities will be done within the de-tube/re-tube critical path window.



The first nine months of the project will be focused on the de-fuel and preparation of the Unit 6 vault for the key MCR activities. The overall de-fuel and vault preparation activities are planned to take approximately nine months, while various opportunities will be explored to improve on this schedule. During this period, the unit will be fully de-fuelled, protective bulkheads will be installed, heavy water removed from key systems and activities carried out to prepare the vault for the critical de-tube/re-tube activities.

The de-tube, re-tube and feeder program is planned to take approximately 32 months and is the heart of the project, when the key reactor internals will be removed and replaced with new components, allowing the reactor to operate for an additional 30-35 years.

These activities have been carried out in a wide-range of nuclear projects both domestically and internationally. The project team has built this looking at lessons learned from across the industry to put in place a prudent and credible cost and schedule for this essential component to the project.

Bruce Power's experience during the refurbishments of Units 1 and 2 has been essential to developing the MCR plan, as a number of first-of-a-kind tasks were tackled, and significant improvement was seen on all of the key de-tube/re-tube activities between Unit 2 and Unit 1. Based on previous lessons learned, the de-tube, re-tube and feeders programs have established the following core operating principles that will enable success on MCR:

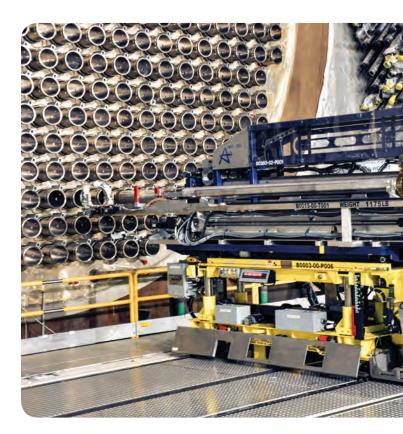
- No first-of-a-kind tools.
- No first-of-a-kind components.
- Around the clock, 24-7 coverage and activity on the reactor face.
- All tooling built, tested and production rates verified.
- All training on tools/process complete prior to execution.
- Bruce Power support and oversight dedicated to the project.
- Quality checks occur real-time as the work happens.

The feeder program is a key element of the MCR project that will include replacement of feeders in Unit 6. Feeders are either inlets to or outlets from the fuel channels. An inlet feeder is a long pipe that delivers cooled heavy water from the steam generators to a reactor fuel channel, while an outlet feeder is a long pipe that receives the heated heavy water from the opposite end of the fuel channel and delivers it to the steam generators to make steam. Each reactor has 480 fuel channels; therefore there are 480 inlet feeders and 480 outlet feeders.

The feeder replacement program will allow the reactor to operate for an additional 30 years, while Bruce Power's comprehensive feeder inspection and testing program will ensure that the condition of the individual feeders is known, understood and well managed. The removal and replacement of steam generators is a stage that will be completed within the critical path window. The replacement itself will involve the removal, replacement and re-connection of eight steam generators.

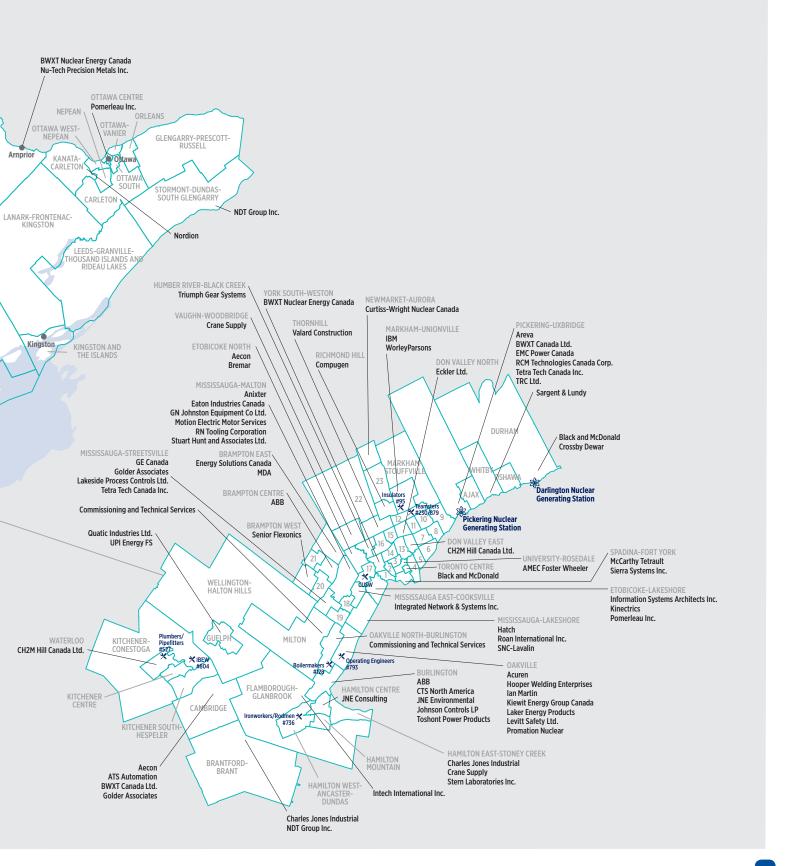
The steam generators must be removed in ordered sequence to maintain structural weight loads inside the reactor building. Only two steam generators at a time can be removed from each bank of four. The 1,800-tonne capacity crane is used to remove the old steam generators.

Return-to-service involves a number of activities necessary to bring the units back safely. In many ways, this is a process Bruce Power undertakes following every outage. This program is expected to take six months as documentation associated with maintenance modifications must be completed and reviewed by the CNSC.



04 | INVESTMENT, JOBS AND ECONOMIC GROWTH





05 PUBLIC SUPPORT & COMMUNITY ENGAGEMENT

Being a good community partner is one of Bruce Power's core values, and we take this responsibility seriously. Every year, our Community Investment and Sponsorship Program donates about \$2 million to organizations, projects and events that enhance the quality of life in Bruce, Grey and Huron counties, and across the province and country. We also launched an Environment and Sustainability Fund. Bruce Power and its employees are extremely active in our communities. Our 4,200 employees and hundreds of local contractors give countless hours to projects, sports and fundraising initiatives that improve the quality of life in their communities.

The company also holds a community celebration each summer, rotating the event between our host communities of Kincardine and Port Elgin. It's our way of saying thanks to our communities for their support.

Our employees have also continued to grow our annual Multicultural Day celebrations, where community members are introduced to different customs, arts, crafts and foods unique to dozens of different cultures from around the world, but whose descendants now live in the Kincardine area. The weeknight event is enjoyed by over 1,000 people annually.

Our community is integral to our success. We enjoy great support along the Lake Huron shoreline, but it's something we will never take for granted, and that's why we strive to be the best corporate citizen we can be.

INDIGENOUS ENGAGEMENT

Bruce Power also works closely with local Indigenous communities, on whose Traditional lands our site is located.

The company has Protocol Agreements and values a strong working relationship with the Saugeen Ojibway Nation, Historic Saugeen Métis and the Métis Nation of Ontario.

In 2018, we renewed our Indigenous Community Investment Fund, which invests in key community, educational, environmental, training and youth development initiatives in local Indigenous communities. Bruce Power also introduced a four-year Indigenous Scholarship Program in 2015 to assist post-secondary students as they further their studies, and extended it by another four years in 2018. A separate Indigenous Scholarship for Post-secondary Education Beyond First Year Program supports students from our local Indigenous communities of Saugeen, Nawash, Historic Saugeen Métis and Métis Nation of Ontario Region 7 after their first year of post-secondary school, when scholarships are more difficult to obtain. Ten students receive \$2,000 through this program.

Bruce Power and its supplier partners have also created an Indigenous Relations Supplier Network (IRSN) as they look to further strengthen their relationships with local Indigenous communities.

The IRSN, which has been under development since June 2017, is focused on a coordinated and collaborative approach to community investment, training, education and employment.

This will be a key vehicle to ensure that Indigenous communities have the opportunity to actively participate in the company's ongoing investment program in the area of employment, business partnerships and procurement. Through the IRSN, Bruce Power and other members of the Organization of Canadian Nuclear Industries, can collaborate on projects enabled through work on site to help grow Indigenous business communities, create longterm jobs, and identify areas to focus on for collective social investment.

Aboriginal RELATIONS

Bruce Power is Gold certified by the Canadian Council for Aboriginal Business

Canadian Council for Aboriginal Business

Bruce Power is also an active member of the Canadian Council for Aboriginal Business and was awarded a Gold level certification in its Progressive Aboriginal Relations program, which is the highest level offered by the CCAB. Bruce Power is only one of 17 companies in Canada to receive this designation. We also work closely with our suppliers and contractors, encouraging them to become active members of the CCAB.

We also hold many events each year on our site, including Indigenous Day celebrations, which welcomes members of our First Nation communities to our site to teach employees about their culture.



LOCAL AND PROVINCIAL POLLING

Bruce Power, while in the electricity generation business, relies heavily on the support and commitment of our surrounding communities. In a phone survey of 600 randomly selected Ontario residents in May 2018, support for refurbishment Bruce Power's nuclear plants reached 8 in 10 Ontarians.

The poll concludes that 76 per cent of decided Ontarians support refurbishment with over 34 per cent strongly in support, compared to only 11 per cent who strongly oppose. In terms of geographic support, 74 per cent of individuals in the Greater Toronto Area (GTA) and 82 per cent outside of the GTA are supportive, meaning support is consistent across the province. Polling of residents in Grey, Bruce and Huron counties shows the opinions about the refurbishment of the Bruce facility, and Bruce Power as an organization, have not changed significantly since spring 2014.



When it comes to communication, the majority of residents are aware of Bruce Power's outreach efforts and do not express any concerns about operations at the Bruce facility.

8 IN 10 [79%]

of residents continue to support the life extension of the Bruce nuclear facility, statistically unchanged from spring.



9 in 10 [93%]

residents are most likely to agree they have confidence the Bruce Power facility operates safely and that Bruce Power is a good community citizen. **8 IN 10** [84%]

Of those that are familiar with Bruce Power, impressions remain positive as the vast majority (84%) continue to hold positive views of the organization.



Residents are most likely to support refurbishment of the Bruce facility because it will

CREATE JOBS[21%]

Other common reasons include that it is necessary (8%), because they like nuclear power (7%) and because it's good for the economy (6%). **OVER HALF** [60%]

of the area's residents have read, seen or heard something about Bruce Power recently. Residents are most likely to highlight the Internet as their preferred source for information about Bruce Power and are statistically more likely to cite this platform than in 2017 (22%; +5 points). Other preferred sources of information include newsletters or flyers (19%), newspapers (18%), or the radio (12%).

06 CONTRIBUTING TO MODERN HEALTH CARE

Bruce Power positively impacts millions of people. Aside from providing carbon-free electricity, it also benefits the world's health care system. Bruce Power has a long-term agreement to supply Cobalt-60 to Ottawabased Nordion so it can use the radioactive isotopes to sterilize 40 per cent of the world's single-use medical devices and equipment. These supplies include sutures, syringes, gloves, surgical gowns and masks. Cobalt-60 is also used to sterilize pharmaceutical wares and cosmetics, and irradiate spices and other consumer products. The World Health Organization (WHO) estimates more than 640,000 major surgeries are performed each day around the world and sterile disposable medical devices are used in virtually all of these procedures. Cobalt-60 is supplied to over 200 gamma irradiators in 55 countries.

Cobalt is mined like any other mineral. It's removed from the ground and processed into pure Cobalt-59 powder, which is then compressed into slugs and coated with nickel. These slugs are then encapsulated and assembled into adjuster rods, which are used to control the reaction in Bruce Power's reactors, where the cobalt is activated by absorbing neutrons to become Cobalt-60. The Cobalt-60 rods are then stored in Bruce Power's secondary fuel bay, suspended on the bay wall about 14 feet below the surface. Specialized fuel handlers extract the Cobalt-60 rods one at a time, and place them in a shielded flask to be shipped to Nordion's facility. Once the bundles are received by Nordion, the Cobalt-60 is removed from its encapsulation and welded into a new double-encapsulated source called a C-188. It is then shipped to the sites of Nordion's customers for use in irradiators.

Cobalt-60 harvested from the four Bruce B reactors can also be used to help stop the spread of the Zika virus. Cobalt-60 is the key component of the Sterile Insect Technique (SIT), a process aimed at eliminating or, at a minimum, suppressing the population of insects that spread disease or damage agricultural crops.

WHAT IS GAMMA KNIFE?

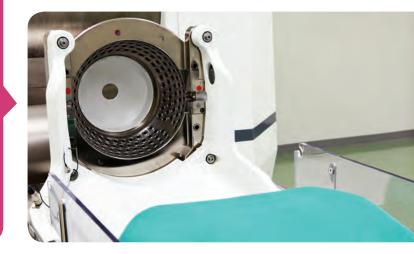
Gamma Knife radiosurgery is a type of radiation therapy used to treat tumours and other abnormalities in the brain. In Gamma Knife radiosurgery, specialized equipment focuses close to 200 tiny beams of radiation on a tumour or other target. Although each beam has very little effect on the healthy brain tissue it passes through, a strong dose of radiation is delivered to the site where all the beams meet.

The precision of Gamma Knife radiosurgery results in minimal damage to healthy tissues surrounding the target. In some cases, Gamma Knife radiosurgery may have a lower risk of side effects compared with other types of radiation therapy. Also, Gamma Knife radiosurgery is often a safer option than is traditional brain surgery. Gamma Knife radiosurgery is usually a one-time therapy completed in a single day. In early-2016, the International Atomic Energy Association deployed the SIT using gamma radiation from Cobalt-60 to combat the spread of Zika and West Nile viruses, as well as dengue. SIT poses no risk to the environment or to public health and, in fact, is considered one of the most environmentally friendly insect pest control methods ever developed because the insects are not killed, they simply do not self-replicate or become established in the environment.



Bruce Power and Nordion have also expanded their partnership and entered into an agreement to supply High Specific Activity (HSA) Cobalt-60, also referred to as medical-grade Cobalt. HSA applications include non-invasive radiosurgery for the precise treatment of

brain tumors as well as other external beam therapies that are used to treat more general cancer tumors in the body. This type of Cobalt-60 is produced in a limited number of nuclear reactors globally and used in radiation-based treatment of cancer and other diseases in Canada and around the world. For over six decades, Nordion's supply of medical-grade Cobalt has come primarily from the National Research Universal (NRU) reactor at Chalk River, Ontario, which reached its end of life in March 2018.



CANADA'S LARGES PUBLIC-PRIVATE PARTNERSHIP

In 2001, the Bruce Power Public-Private Partnership received the Gold Award for Infrastructure by the Canadian Council for Public-Private Partnerships (CCPPP) in its National Awards for Innovation and Excellence in Public-Private Partnerships. A public-private partnership (P3) involves a joint venture between government and the private sector to deliver important services to the public. The vast majority of these tend to be focused on the delivery of large infrastructure projects. Canada currently has 245 P3s, with the largest, and one of the more unique, being Bruce Power.



Over the last 17 years, Bruce Power has invested over \$10 billion in private dollars into the publicly owned site, while doubling the number of operational units from four to eight. Having returned the site to its full potential, the company is now gearing up for its multi-year, multi-billion dollar life-extension plan for Units 3-8, so they can provide stable, safe, low-cost and reliable power to the province until 2064. The long-term, annual economic impact of operating the facility will create and sustain 22,000 direct and indirect jobs annually, and \$4 billion in annual economic benefit every year.

The unique Bruce Power P3 structure allows the company to align itself with the energy policy goals of the province. Since 2001, the provincial policy goals have been to phase out coal in order to lower greenhouse gas emissions and ensure the province has reliable but flexible supply of electricity even though energy efficiency and conservation has reduced demands. It also aligns with keeping electricity prices low for families and businesses, and investing private dollars into public assets without impacting the province's balance sheet in the process. This allows the province to focus on meeting its own fiscal targets and supporting programs like health care and education. This is a model that has served Ontario well over the last decade and will be essential moving forward.



The site is leased from the Province of Ontario under a long-term arrangement where all of the assets remain publicly owned, while the company is responsible for operating and investing in the units, including refurbishment and maintenance costs. Bruce Power is also responsible for waste management costs, while contributing to fund the decommissioning of the facilities at their end of life.



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