



Bruce Power's Mid-Term Update

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CANADA'S BEST EMPLOYER FOR DIVERSITY 2022

Canada's Top 100 Employers



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PROGRESSIVE ABORIGINAL RELATIONS GOLD LEVEL

Canadian Council for Aboriginal Business Bruce Power acknowledges and honours the fact that its site lies within the traditional treaty territory of the Saugeen Ojibway Nation and the traditional harvesting territory of the Métis Nation of Ontario (Region 7) and the Historic Saugeen Métis.

We continue to build relationships with our hosts as we work towards true reconciliation.

A guide for members of the public who are interested in the 2023 Canadian Nuclear Safety Commission (CNSC) mid-term meeting.

Bruce Power's Mid-Term Update

This report provides an overview of Bruce Power's performance and activities over the past five years, a look-ahead at the next five years and facilitates public engagement in the upcoming meeting for Bruce Power's mid-term licence review.

In 2018, the CNSC held a two-part public hearing on the application by Bruce Power Inc. (Bruce Power) to renew, for a period of 10 years, its power reactor operating licence (PROL) for the Bruce Nuclear Generating Stations (NGS) A and B located near Tiverton, Ont.

The current licence authorizes Bruce Power to generate electricity from its eight reactors units, produce Cobalt-60 from the four units housed in Bruce B and lutetium-177 from Unit 7. Requests to intervene must be filed with the Registrar of the Commission by Aug. 3, either online – at <u>nuclearsafety.gc.ca/eng/</u> <u>the-commission/intervention</u> – or via email or regular mail.

Pursuant to the Canadian Nuclear Safety Commission Rules of Procedure, the request must include the following information:

- » A written submission of the comments to be presented to the Commission.
- » A statement setting out whether the requester wishes to intervene by way of written submission only or by way of written submission and oral presentation.
- » Name, address and telephone number of the requester.

Personal information, such as address and telephone number, is essential for linking the submission to its author.

Please submit your personal information on a separate page to ensure its confidentiality. It should be noted that all submissions are available to the public upon request to the Commission Registrar.

Interested parties are welcome to observe the mid-term meeting or to formally participate as intervenors. Key dates and guidance regarding the Commission meeting are stated below.



OTTAWA Aug. 3, 2023

Requests to intervene by mail or online are due

2028



KINCARDINE Sept. 20-21, 2023 Public meetings are held

The mid-term meeting will allow Bruce Power to communicate key performance milestones and achievements over the past five years and outline plans for the five years leading up to its licence renewal in 2028.

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Bruce Power remains committed to living its number one value of Safety First and protecting its employees, the public and the environment through a relentless focus on continuous improvement and safety.

Executive Summary

In the past five years, Bruce Power delivered on its mission to safely provide clean, reliable power and cancer-fighting medical isotopes while strengthening communities and protecting the environment to secure tomorrow.

This year, Bruce Power will present a comprehensive mid-term update on its license activities to the CNSC and, in this report, is pleased to highlight safe and reliable operation, performance milestones and achievements over the past five years to members of the public, its municipalities and Indigenous hosts.

Within this report you will find a summary of performance in key areas of the business, including community engagement; Indigenous relations, environmental, safety and operational performance; isotope production; pressure tube integrity; emergency preparedness; and Major Component Replacement (MCR) projects.

Bruce Power remains committed to living its number one value of Safety First and protecting its employees, the public and the environment through a relentless focus on continuous improvement and safety. The company is proud to maintain industry leading conventional and radiological safety programs and an emergency preparedness program that's always ready to respond.

Bruce Power's safety record is critical to supporting reliable operation of its Bruce A and Bruce B stations. Over the past five years, the Bruce site has operated to industry-recognized top performance, setting new operational records on its units during a pivotal time when Bruce Power also carried out MCR work while and at a time when external challenges were presented by the COVID-19 pandemic. Unit 6 MCR is approaching successful completion and will return to operation later this year and Unit 3 MCR is getting underway, having been taken offline in March of this year.

Bruce Power underwent a rigorous Type I CNSC inspection in Q1-2023 on its compliance to N290.7-14 (Cyber Security for Nuclear Power Plants). Overall, the inspection demonstrated Bruce Power has a mature security program with strong performance in satisfying licensing requirements. This provides a strong foundation for Bruce Power to continue implementation toward the new N290.7-21 standards.

Finally, Bruce Power recognizes the support of local and Indigenous communities and their engagement remains critical to its success. Bruce Power looks forward to further opportunities to foster partnerships and to promote economic growth locally, and beyond, in the coming years. Bruce Power looks forward to further opportunities to foster partnerships and to promote economic growth locally, and beyond, in the coming years.

HIGHLIGHTS OVER THE PAST FIVE YEARS INCLUDE:



Bruce Power received a 2021 Workplace Diversity & Inclusion Champion Award

in recognition of its Indigenous Employment Program. In 2022, Forbes named Bruce Power one of its Best Diversity Employers as a result of its focus on increasing Indigenous employment and creating economic opportunities within the communities.

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Bruce Power brought together a coalition of organizations, unions and businesses

to establish and support hockey hub mass vaccination centres across the province. The hockey hub mass vaccination model was developed by the Grey Bruce Health Unit, and financial, logistical, and volunteer support was provided by Bruce Power and its partners.



Canada's Top Employers

In 2022, Bruce Power was recognized as one of Canada's Top Employers for Young People for the 11th consecutive year.



Received its Environmental, Social and Governance (ESG) Risk Rating

In August 2022, Bruce Power received its Environmental, Social and Governance (ESG) Risk Rating by the third-party ESG rating agency Morningstar Sustainalytics, with strong and improving ESG performance year over year.



108 days of continuous four-unit operation

On Jan. 19, 2022, Bruce A marked 108 days of continuous four-unit operation; a new all-time record for the plant's operating units.

go

Producing lutetium-177 (Lu-177), a medical isotope used to non-invasively treat prostate and breast cancer

In July 2019, Bruce Power announced a partnership with Kinectrics and Framatome to develop an Isotope Production System (IPS) for use in Bruce Power reactors. Early in 2022, the first of its kind IPS was installed and is now producing lutetium-177 (Lu-177), a medical isotope used to non-invasively treat prostate cancer and neuroendocrine tumours. Additionally, Bruce Power has formed an historic partnership with Saugeen Ojibway Nation (SON) to jointly market new isotopes, starting with Lu-177.



Successfully tested the company's emergency response plans

In October 2022, Bruce Power held a three-day provincial exercise, Huron Endeavour, which successfully tested the company's emergency response plans by simulating an on-site emergency scenario, as well as the Provincial Nuclear Emergency Response Plan, with outside agencies and municipalities. Bruce Power uses the information obtained from these drills to continually enhance and improve its emergency response readiness and proficiency.

Bruce Power's role in Ontario

Bruce Power is Canada's only private sector nuclear generator, and is the world's largest operating nuclear facility. It is the source of 30 per cent of Ontario's electricity. The Tiverton, Ontario, nuclear site is home to eight operating CANDU reactors, each one capable of generating enough low-cost, reliable, safe and carbon-free electricity to meet the annual needs of a city the size of Ottawa.

Formed in 2001, Bruce Power is an all-Canadian partnership among TransCanada, OMERS Infrastructure Management Inc. (a division of the Ontario Municipal Employees Retirement System) as well as the Power Workers' Union and The Society of Energy Professionals, and an employee investment fund.

Bruce Power is powered by its people. More than 4,200 employees are the foundation of the company's accomplishments and are proud of the role they play in safely delivering clean, reliable, low-cost nuclear power to families and businesses across the province. Bruce Power has worked hard to build strong roots in Ontario and is committed to protecting the environment and supporting the communities in which it operates. per cent of Ontario's electricity.

operating CANDU reactors.

4,200

Bruce Power is powered by its people. More than 4,200 employees are the foundation of the company's accomplishments.



OVERSIGHT OF BRUCE POWER ACTIVITIES

The CNSC has a presence at each nuclear station in Canada. CNSC staff members have continuous access to inspect Bruce Power's stations and review its activities. CNSC staff report activities to the CNSC Commission, an appointed body of individuals which provides further oversight on nuclear activities.

Since the 2018 licence renewal, Bruce Power has made significant changes to strengthen the internal independent oversight model. This has been implemented by establishing two new organizations focused on Quality Assurance and Governance, Oversight, Assessment and Learning to create consistency in the oversight activities of key functions performed within the stations. Findings from independent oversight are debriefed with management, and roll up to the CEO, Board of Directors, and the Nuclear Safety Review Board on a regular basis.

In 2019, Bruce Power updated the Management System Manual embedding an Excellence and Accountability Model which guides our behaviours and work activities across every aspect of our business including routine station operations, on-line project work, inspection and maintenance outage activities and the major component replacement projects.

At Bruce Power, excellence means collectively living our common values, demonstrated through our behaviours, using our tools to achieve the results we want for the business: Safe, Reliable, Securing Tomorrow. Our accountability model is designed to provide clarity for individuals, leaders, and teams such that each understands what is expected of them in order to ensure we can deliver results. This model enables leaders to create an environment where individuals see themselves as part of a larger team that demonstrates collective ownership and accountability for the team's success. In addition to Bruce Power's own rigorous internal safety reporting and review process, the company is also required to formally notify the CNSC of activities that meet defined criteria. Event Reports are provided to CNSC staff when an activity meets the thresholds set out by the Commission. These reports represent a very small fraction of the activities undertaken in a nuclear station every year, but each is given scrutiny for causal factors, corrective action and resolution.

A small number of these Event Reports have enough significance to warrant further review by the CNSC Commission at one of its regular public meetings. The root cause, remedial actions and resolution of the event will be discussed in a public forum with this further level of oversight and accountability.



Bruce Power has worked hard to build strong roots in Ontario and is committed to protecting the environment and supporting the communities in which it operates.

Social Responsibility: Committing to being a good corporate citizen

ECONOMIC IMPACT

Bruce Power's operations support 22,000 direct and indirect jobs annually, contributing \$4 billion through the direct and indirect spending in operational equipment, supplies, materials and labour income in Ontario.

Approximately 480 companies directly do business with Bruce Power and these organizations in turn work with hundreds of sub-suppliers.

Over the next decade, as Bruce Power refurbishes its fleet through its Life-Extension program and Major Component Replacement (MCR) project, it will add an incremental 5,000 direct and indirect jobs, and billions in annual direct and indirect spending. More than 90 per cent of Bruce Power's capital and resource costs are spent in Ontario, and the company's supply chain supports hundreds of businesses throughout the province.

\$233.5M

municipal government share. Most of the municipal tax revenue collected from the clean energy sector stays in the Bruce, Grey and Huron region and supports municipal services, infrastructure improvements and recreation programs.

480 companies directly do business with Bruce Power and these organizations in turn work with hundreds of sub-suppliers.

22,000

direct and indirect jobs annually supported by Bruce Power's operations.

90%

More than 90% of Bruce Power's capital and resource costs are spent in Ontario, and the company's supply chain supports hundreds of businesses throughout the province.



COMMUNITY POLLING

9 IN 10

residents in Bruce, Grey and Huron counties believe Bruce Power operates a safe facility and contributes to the community in a positive way.

82%

of residents in our community support Bruce Power's Life-Extension Program.

94%

Nearly all respondents (94%) continue to have confidence that the nuclear facility **operates safely**, feel that Bruce Power is **involved with the community in a positive way** (92%), and agree Bruce Power is a **good community citizen** (92%).

HEALTHCARE SUPPORT

In 2019, Bruce Power made a \$1.45 million commitment over five years to hospital foundations across Grey, Bruce and Huron counties.

In 2021, Bruce Power expanded this commitment to \$1.8 million over five years to local hospital foundations with \$250,000 apiece being allocated to the Bruce Peninsula Health Services Foundation, the Saugeen Memorial Hospital Foundation, and the Owen Sound Regional Hospital Foundation; \$150,000 to the Kincardine and Community Health Care Foundation; and \$100,000 apiece to the Clinton Public Hospital Foundation, the



Wingham District Hospital Foundation, Alexandra Marine & General Hospital Foundation, Walkerton & District Hospital Foundation, Meaford Hospital Foundation, Chesley & District Health Services Foundation, Centre Grey Health Services Foundation, Durham Hospital Foundation and Hanover & District Hospital Foundation.

Also in 2019, Bruce Power announced it would provide \$300,000 over five years to the Pediatric Oncology Group of Ontario (POGO) as a key element in its multi-year Community Investment and Sponsorship Program.In 2022, Bruce Power increased its commitment to \$1.5 million to the Kincardine and Community Health Care Foundation in support of its Hospital Redevelopment Campaign, with an additional \$500,000 committed from Bruce Power suppliers.



This commitment continues to support the efforts of the foundations to provide the latest equipment and services while recognizing the important work and services provided by local hospitals to local residents and visitors.

Bruce Power has been a proud supporter of the Huron Shores Hospice, which provides quality end-of-life care, at no cost, to residents of Saugeen Shores, Kincardine, Huron-Kinloss and surrounding areas. It is a communityfunded organization, located within Tiverton Park Manor in Tiverton, Ontario. In 2021, Bruce Power announced \$25,000 donation to the Hospice, as well as a \$55,000 donation to the organization on behalf of the company's nuclear supply chain partners which was announced at the Huron Shores Hospice virtual hike event.



IN THE COMMUNITY

\$2

\$400,000

in annual environment & sustainability programs

\$2 Million invested locally through various communitybased programs

\$100,000

in annual elementary, secondary and post-secondary educational scholarships

CCAB Progressive Aboriginal Relations program

SUPPORTING COMMUNITIES DURING COVID-19

As one of the founding members and Co-Chair of the Ontario Chamber of Commerce Vaccination Support Council, Bruce Power joined Ontario's private sector in bringing forward resources and logistical expertise to support public health and all levels of government in the province's historic vaccination efforts.

Bruce Power brought together a coalition of organizations, unions and businesses to establish and support hockey hub mass vaccination centres across the province. The hockey hub mass vaccination model was developed by the Grey Bruce Health Unit, and financial, logistical, and volunteer support was provided by Bruce Power and its partners. Bruce Power has made a number of notable contributions to ensure the health and safety of the community during the COVID-19 pandemic.

 » More than three million pieces of Personal Protective Equipment donated to frontline workers, businesses, Indigenous communities and schools — the largest announced donation from a private-sector business in Canada.

- » More than 47,000 vaccines administered at a Bruce Power sponsored hockey hub vaccination centre in Brampton during only 19 clinic days (daily average >2,500).
- » \$60,000 in funding to support hockey hub clinics in Haldimand-Norfolk, Hamilton and Toronto.
- » Financial and logistical support for vaccination clinics in Grey, Bruce and Lambton counties and logistical support for clinics in Waterloo Region and Halton Region.

- » Set up a 36-bed recovery centre in partnership with Saugeen First Nation in response to a community outbreak.
- » 50 thermal monitors donated to recreation facilities and Indigenous communities to assist with pre-entry screening.
- » \$15,000 to Huron Chamber of Commerce for rapid test distribution Bruce Power's role in helping Ontario during the fight against the COVID-19 health crisis and in its vaccination efforts was recognized by Premier Doug Ford, Solicitor General Sylvia Jones, and public health and government officials across the province.

BRUCE POWER VISITORS' CENTRE

Bruce Power believes access to factual information is an important part of understanding and trusting nuclear power generation.

That's why the Bruce Power Visitors' Centre welcomes thousands of people through its doors annually, providing interactive and educational presentations and exhibits for all ages. Bruce Power introduced its Summer Bus Tour Program, which has been a major success, drawing about 30,000 participants since its inception from across Ontario, Canada and the world for a look at our site.

During the COVID-19 pandemic, the Visitors' Centre was closed to the public. This provided an opportunity to revamp the facility and the exhibits, bringing a fresh perspective to Bruce Power's public outreach initiatives. In June 2022, the Bruce Power Visitors' Centre re-opened to the public and more than 5,000 people have since visited to learn more about safe, reliable and carbon-free nuclear energy.

NUCLEAR INNOVATION INSTITUTE

A partnership between Bruce Power and the County of Bruce founded in 2018, the Nuclear Innovation Institute (NII), is an independent, notfor-profit, membership-based organization created as a platform for innovation in the industry.

NII leads projects and programs that drive the clean energy transformation, improve our health and environment, and promote new skills and knowledge in our communities. Bruce Power is meeting the challenges of climate change and global energy demand through progressive technology and by exploring all options of new nuclear and investing in our existing fleet.









Indigenous Relations: Driving engagement and collaboration, together

The Bruce Power site is located on the eastern shoes of Lake Huron near Tiverton, Ontario, with the traditional territory of the people of the Saugeen Ojibway Nation (SON), which includes the Chippewas of Nawash and Saugeen First Nation and the traditional harvesting territory of the Metis Nation of Ontario (Region 7) and the Historic Saugeen Metis. Bruce Power is dedicated to honouring Indigenous history and culture, and is committed to moving forward in the spirit of reconciliation and respect with the Saugeen Ojibway Nation (SON), Metis Nation of Ontario (MNO) Region 7 and the Historic Saugeen Métis (HSM), and to leading by example in this community and industry.

Bruce Power has worked closely with the SON, the HSM, and the MNO since 2018 on a variety of community engagement activities and meets regularly on items related to training, employment, business opportunities, sponsorships and special projects.



In 2019, Bruce Power proudly collaborated on a program called Indigenous Champions. The program was re-launched in 2022 as **Kaa-wii-jew-daamin (Walking Together)**, creating a stronger alignment with the Truth and Reconciliation Commission (TRC) and the final report Calls to Action. The program also supports the Canadian Council for Aboriginal Business (CCAB) Progressive Aboriginal Relations PAR program. Kaa-wii-jew-daa-min/Walking Together will be built on the principle of strengthening ones understanding of Indigenous peoples, issues, and the local territory Bruce Power operates in. The program will work to drive behavioural change in the organization, starting with leadership and working its way through the workforce.

UP ATE

BUSINESS DEVELOPMENT AND EMPLOYMENT

Bruce Power has been a Gold Certified company under Progressive Aboriginal Relations (PAR) for more than a decade. The PAR pillars (Employment, Leadership Actions, Community Actions and Business Development) drive the engagement and collaboration with Indigenous communities.

The Employment piece of the PAR program led Bruce Power to collaborate with SON, HSM, and MNO around the development of an Indigenous Employment Program to identify Indigenous candidates at all levels (coop opportunities, summer placements, scholarships, contract opportunities, etc.) and support pathways to opportunities with Bruce Power and our vendor partners. Through the program, Bruce Power works closely with local Indigenous communities to identify candidates, share job-training opportunities and collaborate on strategies to increase Indigenous employment. This has resulted in yearover-year sustained recruitment success, contract opportunities, transition to fulltime staff and promotion within Bruce Power. This success is also highlighted as Bruce Power recently hired a SON member for the role of Indigenous Relations Director. The individual had come through Bruce Power's recruitment program as a summer student while in law school, then as a contractor before being hired full-time.

As the area's largest employer, Bruce Power strives to create a pathway for careers for young people through training programs and incentives for members of the SON community. In 2022, Bruce Power launched its Supporting Pathways to Training program, a collaboration between Building Trade Unions, suppliers and vendors, Indigenous Skills and Employment Training delivery organizations, to increase Indigenous presence and help address the shortage of trades workers across the nuclear industry. Bruce Power received a 2021 Workplace Diversity & Inclusion Champion Award in recognition of its Indigenous Employment Program. In 2022, Forbes named Bruce Power one of its Best Diversity Employers as a result of its focus on increasing Indigenous employment and creating economic opportunities within the communities. This year, Bruce Power launched an Indigenous Leadership Development Program to provide growth opportunities to Indigenous employees and a pre-apprentice millwright program to provide educational support to Indigenous candidates with placements within the nuclear industry.

It is important Bruce Power works with Indigenous-owned businesses to share in the economic benefits of Bruce Power's Life-Extension Program. As such, Bruce Power follows an Indigenous Procurement Policy and co-ordinates with its suppliers through its Indigenous Relations Supplier Network (IRSN). The IRSN was created in 2017 to help local Indigenous communities participate fully in the business development, procurement and economic activities taking place on the Bruce Power site. IRSN companies discuss priorities based on the PAR pillars. In 2021, Bruce Power made it a requirement that IRSN members be PAR committed and start their PAR journey. This was done in large part to drive the behaviours that Bruce Power wanted to see from its suppliers in the Indigenous Relations space and have a focus with the companies on key outcomes and priorities that the IRSN could focus on moving forward.



COLLABORATION

Maintained Gold Certification under PAR.

Launched an Indigenous Employment Program.

Developed a skilled trades training program.

Formed an historic partnership with Saugeen Ojibway Nation (SON) to jointly market new isotopes.

Fostered Indigenous-owned businesses to support MCR.

PROTECTING THE ENVIRONMENT

Bruce Power is committed to environmental protection as demonstrated through a successful audit in 2022 of the Environmental Management System which forms the basis of our environmental protection programs.

An updated retrospective and predictive environmental risk assessment underwent regulatory review in 2022 and was accepted. The results of the 2022 environmental risk assessment were shared with Saugeen Ojibway Nation, Métis Nation of Ontario, and Historic Saugeen Métis prior to the submission of the environmental risk assessment to the Canadian Nuclear Safety Commission.

The environmental risk assessment demonstrates that the operation of the Bruce nuclear facility has not resulted in adverse effects on human health of nearby residents or visitors or on non human biota because of exposure to physical stressors or to radiological or chemical substances. The radiation doses to members of the public residing in the area surrounding the site are less than one per cent of the Canadian Nuclear Safety Commission effective dose limit for a member of the public. The assessment of the physical effects of the noise, cooling water intake and discharge, and habitat alteration has shown no unreasonable risk to human or ecological receptors.

Bruce Power takes its responsibility to protect the environment very seriously, and closely engages with local Indigenous communities.

Bruce Power collaborates with the Saugeen Ojibway Nation (SON) on the Coastal Waters Environmental Monitoring program by providing direct funding and in-kind expertise and data. The program covers coastal waters which form a basis of SON cultural, spiritual, and economic survival. SON members have a special connection to water, which they have relied on for sustenance and livelihood and have celebrated with ceremony and stewardship. The program commenced in 2019 and offsets approximately 10 per cent of annual impingement and entrainment losses. The goal of this program is the establishment of a baseline inventory for Lake Huron and Georgian Bay coastal waters, and annual monitoring to assess environmental change, which becomes increasingly important in the context of climate change.

Bruce Power also works with the Historic Saugeen Métis (HSM) on a project which aims to affect fisheries habitat restoration and enhancement through the removal of phragmites australis from nearby Fishing Islands. The combination of western science and Indigenous knowledge is producing an improved formula for dealing with compensating offsets. The Fishing Islands are an important traditional harvest area for the HSM Community. Fish, aquatic plants and bird eggs are all part of the traditional harvest and ways of life. Maintaining ecological integrity in this area is of high importance to the HSM Community and this project seeks to strengthen the role of the HSM community in fisheries related projects, by restoring coastal habitats, increasing shoreline complexity and restoring native plant diversity to improve near shore fish habitat. It is anticipated that more than 90 per cent elimination of high density phragmites australis can be achieved in 2023.

This is typical of interactions with Indigenous communities as surveys, workshops, and technical discussions assist Bruce Power in understanding their overlay of considerations. Reviews and feedback provided by regulators, independent experts, and peer reviewers prove to be an effective way to share information for integration into a comprehensive result.

Bruce Power has contributed to modelling the future impacts of climate change through two efforts. The first effort consisted of climate change modelling of the specific impacts to Lake Huron, including changes to air temperatures, water temperatures, and water levels. The changes to water temperatures were modelled



with and without the effect of Bruce Power operations. The second effort by the Climate Risk Institute took a broader approach to climate change and focused on the broader impacts of a changing climate and how these would affect Indigenous Communities and agricultural activity in Grey, Bruce, and Huron County. These efforts included consultations with SON, MNO and HSM to ascertain the potential impact of predicted climate change effects on habitats and species prioritized by each community.

Bruce Power and SON have met on several occasions and a number of project ideas have been developed for implementation in the near future. A field event to Sucker Creek, on the Bruce Peninsula, near Howdenvale, Ontario, has been scheduled with the SON, Bruce Power and other community partners. Local water courses have been highlighted by the SON community as potentially benefiting from restoration plans, particularly those that have outlets to Lake Huron. Project plans will be developed in 2023.

Through consultation with the MNO, a project plan has been drafted around improving fish habitat and restoring connectivity in Bothwell's Creek, near Leith, Ontario. Bothwell's Creek is a historically and culturally important waterway for the MNO, who are strongly connected to water and have been using Bothwell's creek for harvesting and subsistence, movement across the landscape, and recreational activities since they have been in the area at least as far back as 1826. In recent decades a reduction in fish and an increase in sediment deposition has been observed and which is adversely impacting MNO traditions. Together with Bruce Power, the MNO propose to remove debris that is impeding flow and restricting fish passage, reduce the impact of high erosion areas, and re-establish riparian vegetarian in more vulnerable areas along the streambank.

Bruce Power continues to engage and collaborate with local Indigenous communities on all environmental matters and is committed to seeking ways to lower the environmental impact of its operations.

COMMUNITY ENGAGEMENT AND SOCIAL RESPONSIBILITY

Bruce Power's Community Investment Fund supports many initiatives in local Indigenous communities and helps to support social programs to sustain necessities such as roads, water, education and recreation.

Bruce Power also sponsors band programs and projects, including the Pow Wow, Saugeen Charity Golf Tournament, the Food bank, the Saugeen Lunch Program, Hospice for Hope, and the Bears' Lair Entrepreneur Camp.

Through the pandemic, Bruce Power took an active role in ensuring communities were supported with what they needed, including providing care packages, personal protective equipment and hand sanitizer to both Saugeen and Nawash communities. Bruce Power also provided direct support to HSM and MNO with personal protective equipment, sanitizer, and ongoing support for food banks.



Bruce Power publishes a Sustainability Report annually which highlights the company's on-going commitment to having a positive impact in our local community and in supporting provincial and federal carbon-reduction goals.

Performance Summary

ENVIRONMENTAL SUSTAINABILITY

Bruce Power is committed to environmental sustainability in all areas of the business to minimize its environmental footprint and has adopted applicable best industry standards.

In 2020, Bruce Power formed the Environment and Sustainability Oversight Committee. This leadership level governance was the next natural step in taking its ongoing Environmental, Social, and Governance (ESG) efforts to the next level. The committee is dedicated to the integration of ESG monitoring and goals into Bruce Power's long-term business strategy, and that due consideration is being given to social and environmental trends that could impact the company's operations. Bruce Power continues to advance its sustainability goals, further strengthening its leadership position in minimizing the environmental and ethical impacts of its business.

In August 2022, the company received its Environmental, Social and Governance (ESG) Risk Rating by the third-party ESG rating agency Morningstar Sustainalytics, with strong and improving ESG performance year over year. The latest ESG Risk Rating ranked the company a spot in the top three within its subindustry on a global scale and sits in the top three per cent in the Utilities industry covered by Morningstar Sustainalytics. The ESG Risk Rating report saw strong performance in a number of areas, including Community Involvement, Emergency Response, Diversity Programs, Waste Management and Environmental Programs and Policies.

What is ESG? Environmental, Social, and Governance (ESG) criteria are a set of standards for a company's operations that socially conscious investors use to screen potential investments. Environmental criteria consider how a company performs as a steward of nature. Social criteria examine how it manages relationships with employees, suppliers, customers, and the communities where it operates. Governance deals with a company's leadership, audits, and internal controls.

An important part of securing tomorrow is being responsible stewards of the environment and corporate citizens while maintaining excellent governance by integrating strong ESG principles into Bruce Power's business strategies and operations. The aim is to continuously improve performance in each of these areas to exceed industry and stakeholder standards. Bruce Power attained a Conservation Certification by the Wildlife Habitat Council in 2022, reflecting the company's environmental leadership, conservation, monitoring, and community engagement efforts in Baie du Doré and Lake Huron. The Bruce Site was designated Certified Silver and associated projects included fish and habitat monitoring, invasive phragmites removal, and public education.

Also in 2022, Bruce Power joined the Electric Power Research Institute's Climate READi program and anticipates continued engagement across the company, which includes reviewing technical documents, continued training through webinars, attending in-person workshops, and disseminating final guidance throughout the company at all levels.

The latest ESG Risk Rating ranked the company a spot in the top three within its sub-industry on a global scale and sits in the top three per cent in the Utilities industry covered by Morningstar Sustainalytics.



\$2.06 million community donations by Bruce Power in 2022

INCLUDING:

Indigenous Community Investment Fund Environment & Sustainability Fund Local hospitals and health care initiatives Youth development programs Youth scholarships Mental health support

Carbon Offset Accelerator Fund announced to support carbon offset projects in Bruce, Grey and Huron counties and throughout Ontario.

12.9

Our 2022 Environmental, Social, and Governance (ESG) risk rating, which is the lowest we've achieved. This maintains Bruce Power's spot in the Top 3 within its sub-industry on a global scale.

\$400,000

distributed in support of local environmental initiatives in the areas of: conservation and restoration, education, awareness and research, climate change mitigation and resilience.

8

LAKE HURON

Bruce Power recognizes that the operation of Bruce A and Bruce B poses a risk to fish due to the potential for impingement and entrainment.

This is because we use the waters of Lake Huron for cooling, but we endeavor to minimize the impact to the extent possible. For example, the use of velocity cap structures at our deep water intakes has been proven to reduce fish impingement. Bruce B is also fitted with a chain rope curtain to dissuade schooling fish from being impinged.

Since the time its licence was renewed in 2018, Bruce Power has obtained a Fisheries Act Authorization from Fisheries and Oceans Canada that permits continued operation while meeting specific conditions related to impingement and entrainment, including offsetting to counterbalance fish losses. Under the authorization, fish losses from impingement and entrainment are balanced by fisheries offsets, resulting in a no net loss in fish populations over time.

As an example of such offsets, Bruce Power has been instrumental in the Truax Dam Removal project, located in the Saugeen River in Walkerton. The Truax Dam was removed in August 2019 after standing for more than 100 years, acting as a significant barrier to fish, despite the presence of a fishway. Extensive monitoring of fish biomass and habitat up and downstream of the dam began in 2018, and has continued annually since that time. Twenty-two biomass monitoring sites have been established in the Saugeen River and in upstream tributaries. A before and after impact study shows a clear increase in biomass in the Saugeen River upstream of the former Truax Dam location – in excess of 2,400 kilograms year. This is expected to increase with time as biomass and fish production increase in the upstream tributaries.

Bruce Power has obtained a Fisheries Act Authorization under which fish losses from impingement and entrainment are balanced by fisheries offsets, resulting in no net loss in fish populations over time.





Bruce Power contributes to modeling the future impacts of climate change on Lake Huron and broader impacts on Indigenous communities and agricultural activities within the region.

99.9

1

per cent of the water used on site is used for once-through cooling purposes and is returned directly to the lake.

X

208,440

seedlings planted since 2018 through our partnership with Saugeen Valley Conservation Authority.



types of fish species were measured over three years and it was found there was a negligible risk to fish populatuions resulting from our operations.

WASTE MANAGEMENT

Bruce Power manages many different forms of waste including hazardous waste (oils, chemicals, lighting lamps and ballasts – some of these are recycled), recyclable waste (glass, plastic, metal, cardboard, paper, wood, batteries, and electronics), organic waste (compost), and landfill waste.

Bruce Power also manages radioactive waste in partnership with Ontario Power Generation (OPG).

As part of its Waste Management program, Bruce Power complies with all waste regulations and requirements of the relevant federal, provincial, and municipal authorities. Further, Bruce Power continues to take an active role to reduce all forms of waste. From an environmental and financial standpoint waste reduction is good for the company and the community in which it operates. Bruce Power's philosophy employs a whole lifecycle approach in that it reduces waste at the consumer level, generate less waste at the company level, finds opportunities to reuse products (on site, off-site donations, or sell them at auction), and implement recycling programs that are available in the ever-changing recycling market.

To minimize the amount of waste sent to landfill each day, Bruce Power has implemented a number of initiatives that apply the principles of reduce, reuse, recycle, and recover. Wherever its fate, each waste stream generated at Bruce Power is processed and disposed of in a safe and environmentallyresponsible manner and at a minimum, in compliance with all applicable regulations.



NUCLEAR WASTE

Bruce Power manages and fully funds the storage and disposal of its radioactive waste under a commercial arrangement with Ontario Power Generation (OPG).

Since the 1970s, OPG has responsibly transported and managed all radioactive waste from the Bruce A and Bruce B generating stations. Waste is currently stored by OPG on an interim basis until long-term disposal facilities are established. Bruce Power embraces the three Rs – reduce, reuse, recycle – with the goal of diverting clean materials away from storage and reducing volumes that need to be managed or disposed of. Opportunities to better reduce radioactive waste volumes through optimized packaging and or processing prior to storage are continuously explored and assessed. The Nuclear Waste Management Organization (NWMO), established and funded by Canada's nuclear electricity producers, is responsible for implementing Canada's plan for the safe, long-term management of used nuclear fuel. The plan, which is supported by Bruce Power, calls for used nuclear fuel to be contained and isolated in a deep geological repository. It also calls for a comprehensive process to engage and select a site with informed and willing hosts for the project. The NWMO will select a single preferred site for Canada's deep geological repository in the fall of 2024. Bruce Power supports the NWMO in its activities to help build an understanding of the project, including the potential benefits and impacts to the host region.



LAND USE AND BIODIVERSITY

In 2020, Bruce Power set an internal target to protect 887 hectares of high quality habitat on site or maintain an equivalent amount off site. This target was established from an Ecological Land Classification study completed in 2017 that demonstrated 55 per cent of the Bruce Power site was composed of undisturbed forest, open, or wetland habitats, totaling 887 hectares.

As Bruce Power carries out its Major Component Replacement project, there are times when development is essential to support the continued generation of clean electricity through its Life-Extension program. Seven hectares of land was cleared at Bruce Power over the past four years to construct a training simulator and create additional parking capacity. At the same time Bruce Power worked with organizations like Nature Conservancy Canada, Ontario Nature and Bruce Trails Conservancy to acquire and permanently protect over 60 hectares of high-quality habitat from future development to compensate for this land clearing, significantly surpassing our target.



Ontario has a deeply decarbonized electricity grid, which is the envy of many jurisdictions around the world thanks to a clean baseload supply of nuclear and hydroelectricity.

ELECTRICITY OUTPUT BY FUEL TYPE 2022



D

NET ZERO BY 2027

Bruce Power is continuing to contribute to a Net Zero Canada by 2050 by announcing its commitment to achieve Net Zero greenhouse gas (GHG) emissions from its site operations by 2027. This makes Bruce Power the first nuclear operator in North America to announce such an ambitious commitment. While the company reliably produces large volumes of emissionsfree electricity that is critical to Ontario staying off coal, as well as continued system reliability, Bruce Power is taking the next step to ensure it minimizes and offsets emissions from routine undertakings such as vehicles, machinery, buildings, and equipment to achieve Net Zero status by 2027.

Bruce Power's commitment to achieving Net Zero GHG emissions by 2027 will account for all direct and indirect GHG emissions that occur from sources that are owned or controlled by the company. For example, emissions from combustion in owned or controlled generators, boilers, furnaces, and vehicles; or emissions from chemical production in owned or controlled process equipment. In addition, Bruce Power will account for indirect GHG emissions from the generation of purchased electricity or energy (e.g. heating steam) consumed by the company. Where further reductions are not feasible, Bruce Power will pursue emission offsets.

Other emissions, which are a consequence of the activities of the company, but occur from sources not owned or controlled by the company, will be further assessed to understand where improvements can be influenced. This will be counterbalanced by investments being made to increase clean electricity output from the Bruce Power site, displacing GHG emissions from the electricity sector in Ontario.

2027

Bruce Power aims to be the first nuclear operator in North America to achieve Net Zero emissions from site operations.





CARBON OFFSET COALITION AND CARBON OFFSET ACCELERATOR FUND

Bruce Power unveiled the Carbon Offset Coalition under partnership with the Nuclear Innovation Institute; a Net Zero carbon reduction community partnership program.

The Carbon Offset Coalition is aimed at supporting grassroots Net Zero initiatives, and nature based solutions that will both remove and offset carbon emissions. The goal of the coalition is to bring together Indigenous and non-Indigenous communities, and business and agricultural organizations across southwestern Ontario to support initiatives focused on removing and offsetting carbon from the atmosphere. The Coalition is part of the company's commitment to produce Net Zero emissions by 2027, while also playing a lead role in supporting a Net Zero Canada by 2050.

In November 2021, Bruce Power announced a \$1 million Carbon Offset Accelerator Fund to support carbon sequestration and offset projects in the Clean Energy Frontier region of Bruce, Grey and Huron counties and throughout Ontario. In April 2022, Bruce Power announced funding for two large scale environmental projects in our region through its Carbon Offset Accelerator Fund:

- » Bruce Power has committed to a significant investment of more than \$900,000 towards a three-year partnership with ALUS through its New Acre Project for the development of land across Bruce and Grey counties, including a minimum of 600 acres of nature-based projects that will lead to measurable environmental impacts, including greenhouse gas reductions and sequestering opportunities on marginal lands as well as biodiversity and water quality improvements.
- » Sustainable Forestry Ontario Bruce County owns and manages a 12,800-acre community forest in Ontario that originated from the County's purchase of private lands that were devastated by over-harvesting or land clearing for development.



acres of nature-based projects that will lead to measurable environmental impacts





^b

Bruce Power's Green Financing Framework received a medium green 'shading' with an excellent governance score in a second party opinion from CICERO, a highly regarded independent third party green finance opinion provider.

GREEN BONDS

Bruce Power has issued \$1.1 billion in Green Bonds to date with the inaugural issuance of \$500 million in November 2021 being a global first for nuclear power, and a significant milestone in the recognition of the critical role nuclear technology plays in fighting climate change and enabling a Net Zero future.

This was made possible by Bruce Power's track record of delivering emission reduction projects and its leadership in environmental stewardship, which includes coal phase-out, its commitment to be Net Zero by 2027 in support of a Net Zero Canada by 2050.

The proceeds from this historic Green Bond offering will be used or allocated in accordance with Bruce Power's Green Financing Framework to finance or re-finance eligible investments associated with life extension and increasing output of existing units both of which contribute to Canada's prosperous, clean energy future, and advance its climate change objectives.

Bruce Power's Green Financing Framework received a medium green 'shading' with an excellent governance score in a second party opinion from Center for International Climate and Energy Research-Oslo (CICERO), a highly regarded independent third party green finance opinion provider.

The green bond offering was supported by a syndicate of seven Canadian banks and well received by the Canadian investor base with orders approximately six times the offering size and with more than 60 investors participating in the initial offering. The strength of the transaction and high-quality review from CICERO demonstrated support for nuclear within the sustainable finance markets.

There is a growing recognition of the positive role that nuclear plays in combating climate change and a sustainable future. The first green bond with nuclear as a use of proceeds is symbolic of that recognition.

1.1B

Issuance of \$1.1 billion in Green Bonds to date. The inaugural issuance in 2021 was a global first for nuclear power.

Bruce Power and its employees are committed to protecting the safety of its people, the plant and the environment. Every decision reflects its number one value of Safety First.

SAFETY FIRST IS BRUCE POWER'S NUMBER ONE VALUE

Bruce Power and its employees are committed to protecting the safety of its people, the plant and the environment. Every decision reflects our Safety First value.

As an organization, we have one of the strongest industrial safety records supported by a rigorous Occupational Health and Safety Management System, and we will continue to build on this performance while undertaking new levels of activity, including the on-going and forthcoming Major Component Replacement projects.

Bruce Power's goal of zero occupational injuries and illnesses reflects its steadfast commitment to the safety of its employees and contractors. The Occupational Health and Safety (OH&S) system provides a framework which regularly realigns safety objectives and programs to ensure continuous improvement. In striving for excellence, legal requirements are considered the minimum standard. Bruce Power adopts proven and effective best-in-class practices to provide enhanced safeguards vital to sustainable, top-quartile performance. The company complies with these, as well as other safety requirements to which it subscribes. All employees' participation in identifying and effectively resolving safety issues is crucial to successfully upholding health and safety in the workplace.

Over the past five years, Bruce Power has sustained strong performance in all regulatory performance measures set forth by the Canadian Nuclear Safety Commission (CNSC) including the Industrial Safety Accident Rate (ISAR), Accident Severity Rate (ASR) and Accident Frequency Rate (AFR).

In 2018, the World Association of Nuclear Operators (WANO) and the Institute of Nuclear Power Operations (INPO) collaborated on a new safety indicator to standardize injury reporting worldwide and across nuclear generation types to replace the traditional Lost Time Injury Rate. This new metric narrows the organization to focus and capture lessons on this sub-set of more serious events and injuries. Today, Bruce Power continues to adopt a safety model known internally as Safety Classification and Learning Model (SCLM) to consistently classify safety events based on the actual hazardous energies involved.

Bruce Power has implemented several internal initiatives, applying best industry practices, to further improve its ability to identify potential safety risks and hazards and continues to benchmark and improve its safety program.

INNOVATION TO IMPROVE RADIATION SAFETY

Radiation protection is a critical component of Bruce Power's safety program. Radiation protection is all about protecting our employees – each and every day. The CNSC has recognized Bruce Power's comprehensive radiation program which seeks to maintain dose impacts from our operations, outages and Major Component Replacement projects as low as reasonably achievable.

50 MILLISIEVERTS:

The annual allowable dose rate for workers as set by the Canadian Nuclear Safety Commission. Bruce Power sets lower internal rates to ensure the federal dose rates are not exceeded.

< 0.01%

For the 31st year, Bruce Power's dose to the public is less than one per cent of legal limits and indistinguishable from natural sources such as soil, rocks, water, air and vegetation. In Canada, the CNSC sets the dose limits for workers and the public. This is done by following the recommendations of the International Commission on Radiological Protection, which comprises some of the world's leading scientists and other professionals in the field of radiation protection, and by using many of the standards and guides of the International Atomic Energy Agency. Bruce Power also has its own standards, which comply with the *Nuclear Safety and Control Act* as well as other applicable federal and provincial regulations. Bruce Power's dose limits are, in most cases, more restrictive than the federal dose limits. These limits are in place to ensure the federal dose limits are not exceeded and to keep risk low to the workers.

Strict standards and regulations exist to ensure safety systems are in place to protect people inside facilities which use nuclear substances and devices. People who work with nuclear substances are also required to use protective equipment and to wear protective clothing, as well as dosimeters, to ensure they do not exceed limits. They may also be required to submit urine samples so that intakes of radionuclides can be tracked. Consistent with Bruce Power's number one value of Safety First, the company adopts an approach to radiological exposure of As Low As Reasonably Achieveable (ALARA).

Efforts to reduce worker dose have also led to the implementation of an Outage Dose Reduction Committee. As the majority of Bruce Power's radiation dose consequences are realized through maintenance outages, this new committee is focused on ensuring outages are continually driving down dose expenditures through identification and implementation of processes and initiatives designed to meet industry best targets in Collective Radiation Exposure (CRE).

In 2021, the CNSC introduced updated *Radiation Protection Regulations* (RPRs) including new dose limits to the lens of the eye. Bruce Power has incorporated the updated RPRs into governance and implemented them in the field.



STRONG OPERATIONAL PERFORMANCE

Excellence is a word that is synonymous with the nuclear industry. Bruce Power achieves operational excellence through a collective commitment to a higher standard and always demonstrating the expected behaviors that result in earning the company a reputation as an exemplary operator in the industry.

Broadly speaking, excellence means protecting the four pillars of nuclear safety: Reactor safety, industrial safety, radiation safety and environmental safety. This allows Bruce Power to live up to its mission of safely providing clean, reliable power and cancer-fighting medical isotopes while strengthening its communities and protecting the environment to secure tomorrow.

EXCELLENCE MEANS PROTECTING THE FOUR PILLARS OF NUCLEAR SAFETY:

Reactor safety Industrial safety Radiation safety Environmental safety

BRUCE POWER'S UNITS ACHIEVE RECORD RUNS

In 2022, Bruce Power celebrated a decade of eightunit operations, producing safe, clean and reliable electricity for Ontario.

Also of note, on Jan. 19, 2022, Bruce A marked 108 days of continuous four-unit operation; a new all-time record for the plant's operating units. In addition, several individual units have experienced record runs over the last five years:

- » On March 5, 2019, Bruce Power's Unit 5 set a long-run record of 521 consecutive days of safe, reliable operation, besting its previous record of 520 consecutive days.
- » On April 1, 2020, Unit 1 marked 624 consecutive days of steady operation (on the way to a record 694 day production run), a Bruce Power record run of providing clean, reliable, cost-effective energy to the people of Ontario. Unit 1 surpassed Unit 8's run of 623 consecutive days between May of 2016 and February of 2018.
- » Bruce Power's Unit 2 achieved a record run of 626 consecutive days of providing clean, reliable electricity to the province before it was removed from service May 5, 2022, for a planned maintenance outage.

These record runs are a testament to our ability to maintain fleet reliability and to provide a dependable source of power to Ontario.

A 7,000-square-foot addition to the Bruce Learning Centre was built in 2019 to house a new Bruce B simulator. The new simulator, put into service in January 2020, is being used to train and test operating staff on the current Bruce B configuration. The software used in the simulator allows Operators to train by enacting potential station events. The new simulator is integral to maintaining the qualifications of certified Operations staff who require extensive training to maintain their certification.





SUCCESSFUL VACUUM BUILDING OUTAGE

In May 2022, the Bruce A Vacuum Building outage saw all four Bruce A operating units removed from service for planned inspections as per the requirements of the Canadian Nuclear Safety Commission.

Vacuum buildings are unique to multi-unit CANDU generating stations and are part of their robust safety systems, providing an additional protective barrier to the release of radioactivity to the environment in the highly unlikely event of a nuclear emergency. All four operating units must be shut down once every 12 years to allow for inspections and maintenance to the vacuum building.

During the Vacuum Building Outage (VBO), Bruce Power invested in an innovative new filtration system which will provide an extra layer of safety and protection for the public and the surrounding environment. Bruce Power works closely with the Independent Electricity System Operator (IESO) to ensure the timing of these outages can be accommodated to meet the needs of the province's electricity grid. VBOs are scheduled during periods of the year when demand is expected to be low – usually the spring or fall. This allows Bruce Power to make sure its units will be operational for the summer peak period, providing about 30 per cent of Ontario's electricity with zero carbon emissions at a time when reliable energy is most needed.

The VBO was completed with record performance and ahead of schedule, allowing Bruce A's units to come back online for the province's summer peak demand.

Isotopes: Leading the way in medical innovation

Bruce Power does more than deliver 30 per cent of the electricity used by Ontario's families and businesses. Medical isotopes supplied by Bruce Power are vital resources to the medical community, and the company continues to seek ways to expand the types of isotopes it produces. The sterilization of single-use medical devices using cobalt-60 is one of the key factors that make the modern health system possible. These items touch on all aspects of health care.

In 2019, the first harvest of medical-grade cobalt-60 took place at Bruce Power. This medical isotope is used worldwide in cancer treatment and radiation therapy for complex brain conditions.

In July 2019, Bruce Power announced a partnership with Isogen (a joint venture between Kinectrics and Framatome) to develop an Isotope Production System

(IPS) for use in Bruce Power reactors. Early in 2022, the first of its kind IPS was installed and is now producing lutetium-177 (Lu-177), a medical isotope used to non-invasively treat prostate cancer and neuroendocrine tumours. Lu-177 is harvested weekly and shipped to ITM Isotope Technologies Munich SE (ITM) in Germany for processing to yield high-quality, pharmaceutical grade no-carrier-added lutetium-177 (n.c.a. lutetium-177). ITM is a supplier of n.c.a. lutetium-177 to health-care facilities around the world, and the isotope has been successfully used in various clinical and commercial radiopharmaceutical cancer treatments.

GAMZOOK'AAMIN AAKOZIWIN (WE ARE TEAMING UP ON THE SICKNESS)

Bruce Power has formed an historic partnership with Saugeen Ojibway Nation (SON) to jointly market new isotopes, starting with lutetium-177, in support of the global fight against cancer while also working together to create new economic opportunities within the SON territory.

Nuclear





Bruce Power worked with a unique group of domestic and international partners to bring the Isotope Production System to commercial service.

40+M

nuclear medicine procedures are performed worldwide each year using isotopes, with approximately 36 million for diagnostic nuclear medicine and four million for therapy.

The IPS will leverage Bruce Power's continuous operation to provide a consistent and scalable supply of cancer-fighting isotopes.

157

Bruce Power's Unit 7 is the first commercial power reactor in the world with the capability to produce short-lived medical isotopes.

6

61

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BrucePower

51790-Y6

Isolation Chamber Empty

QUANTITY OPERATOR

BRUCE POWER'S 2023 MID-TERM UPDATE

Pressure Tube integrity: A proactive approach to safe operations

Bruce Power is committed to the safety of its people, plants and communities and remains open and transparent with both the public and Canadian Nuclear Safety Commission (CNSC) regarding a technical issue that it had proactively disclosed to the CNSC in 2021.

As part of Bruce Power's ongoing planned inspection, testing, analysis and maintenance activities, some higher than anticipated hydrogen equivalent concentration readings were observed in two units, both of which were not operating at the time. Unit 3 was in a routine inspection and maintenance outage, while Unit 6 was undergoing its Major Component Replacement, where all pressure tubes are being replaced.

While these hydrogen equivalent concentration readings are included in Bruce Power's Licence, Bruce Power proactively and promptly reported the findings to the CNSC and is adhering to its operating licence.

Since the discovery of elevated hydrogen equivalent concentrations in the rolled joint regions of surveillance pressure tube and during the Unit 3 outage in July 2021, Bruce Power expanded outage inspection activities in the 2021 Units 3 and 7 outages and 2022 Units 4 and 5 outages by modifying the Circumferential Wet Scrape Tool (CWEST) to acquire inlet and outlet rolled joint measurements at various clock positions and axial positions. An industry workshop on elevated hydrogen equivalent ([H]eq) concentration was held on March 25, 2022, to present the status on the work completed to-date to improve the mechanistic understanding of this behaviour and predictive modelling capabilities and to solicit CNSC feedback on future work. Since the time they were noted in July 2021, Bruce Power has provided regular updates to the CNSC on the elevated [H]eq concentration observations through various correspondences and meetings.

Bruce Power has demonstrated that the pressure tubes installed in Bruce Units 3 to 8 remain fit-for-service and safe for operation with elevated [H]eq in the inlet region of interest through the completion of activities and similarly for the outlet region of interest, consistent with the conclusion in the Commissions Reasons for Decision. Units 1 and 2 have been refurbished with newer pressure tube materials and therefore were not affected by elevated [H]eq. Bruce Power will continue working with the industry to update fitness for service assessments to incorporate the results of the activities as they become available and as per established processes.

Bruce Power's Safety First value drives every decision the company makes and every activity it carries out. Working through its rigorous processes, Bruce Power has concluded there is no impact from the findings on the safety of its units.

All six units that are currently operating have recently undergone similar inspections and demonstrated fitness for service.

Bruce Power's ongoing and robust testing program will also continue to evolve and build on its track record of safety.

Further information about pressure tube integrity and how inspections are carried out, along with descriptive videos, can be found on the Bruce Power website at <u>www.brucepower.com/safety-first/</u> <u>pressure-tube-integrity.</u>





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Safety First"

Bruce Power will continue working with the industry to update fitness for service assessments to incorporate the results of the activities as they become available and as per established processes.



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Emergency preparedness and response

As part of its operating licence, Bruce Power maintains a robust and multi-faceted emergency response program. This includes its Emergency and Protective Services department, which features an award-winning security service, a fully equipped fire department, an ambulance and an around-the-clock emergency response organization.

The effectiveness of Bruce Power's emergency response program is continuously assessed through a series of drills and exercises. Every year, the company's emergency response organization undertakes more than 50 drills and at least one major exercise, which is evaluated by the Canadian Nuclear Safety Commission (CNSC). The CNSC has consistently rated Bruce Power's emergency response capabilities as satisfactory. While the scenarios presented within these exercises are extremely unlikely, they are purposely designed to challenge our readiness with worst-case conditions to rigorously test our people, processes and systems.

Bruce Power has completed a Hazard Identification and Risk Assessment (HIRA) following the Province of Ontario guidance. The HIRA identifies all the potential hazards which may impact on Bruce Power - from fire and floods to diseases and demonstrations. These are all assessed by calculating the probability of the event occurring and the consequence from the occurrence of the event. The HIRA report itself summarizes the top 10 risks so they can be prioritized within the emergency management program and consequently drilled/exercised more frequently to test our response capability in these higher risk scenarios.

Every three years, Bruce Power also participates in a provincial nuclear emergency exercise, which includes internal and external stakeholder participation to test Bruce Power's response to the Provincial Nuclear Emergency Response Plan. The most recent provincial exercise was Exercise Huron Endeavour in October 2022, with the participation of the Canadian Nuclear Safety Commission, Health Canada, Ontario's Provincial Emergency Operations Centre and neighbouring Municipalities of Kincardine and Saugeen Shores. This successfully tested Bruce Power's emergency response plans by simulating an on-site emergency scenario, as well as the Provincial Nuclear Emergency Response Plan, with outside agencies and municipalities. Bruce Power uses the information obtained from these drills to continually enhance and improve its emergency response readiness and proficiency.

PROVINCIAL LARGE-SCALE EMERGENCY RESPONSE EXERCISES



2022 HURON ENDEAVOUR



2019 HURON RESILIENCE



2016 HURON RESOLVE



2012 HURON CHALLANGE



HURON ENDEAVOUR

As nuclear professionals, we look out for each other in the work we do each day on site, but we're also looking out for our friends and families in our communities and across Ontario.

Bruce Power opened its \$25 million fire training facility in 2015, and in 2018 expanded its training agreement with local fire departments to allow them to The state-of-the-art facility includes a mock-up of a turbine generator, which allows firefighters to practice in realistic scenarios. Propane-fuelled props, cameras, located throughout the building, capture video footage and stream it back to a central control room. The main building, which can be used year round, also features a 50-foot tower for high-angle rescue training. There are also a number of outdoor fire simulators including a car, forklift and transformer.



Participants included Bruce Power; CNSC; federal, provincial and municipal governments/agencies; and local health organizations.



Scenario involved a cargo aircraft crash, leading to a main steam line break and resulting in mass casualties and equipment deficiencies within the powerhouse. A reactor unit was assumed to suffer a Primary Heat Transport pump motor failure, in combination with a stranded fueling machine with spent fuel on board and a moderator leak.



The exercise involved activation of the full on-call Emergency Response Organization, mass casualty response including triage and transport to local hospitals, coordination of public health and safety, Province of Ontario bulletins and protective action planning, opening of the Reception Evacuation Centre and processing evacuees, activation of local Emergency Operation Centres, deployment of emergency mitigating equipment, contaminated casualty treatment and transfer to local hospitals for further treatment, plume modelling and dose projection, relocation of the Emergency Management Centre to an alternate facility, Off Site Survey Team deployment and recovery and business continuity planning.

Bruce Power is committed to continuous improvement, which includes taking lessons learned within the industry and applying them to its site and operations.

The tsunami event that damaged the Fukushima nuclear power plant in Japan in 2011 fundamentally changed how Bruce Power looks at extreme weather, emergency planning and response. While tsunami is not a realistic accident scenario on Bruce Power's site, severe weather, such as a large tornado, is a possibility. In the wake of Fukushima, Bruce Power has invested more than \$50 million enhancements on the Bruce site.

Additionally, this year Bruce Power received a Top Innovative Practice Award for its Containment Filtered Venting System (CFVS); a first-of-its-kind patented, passive, dry system installed at Bruce Power as part of the company's post-Fukushima response. This landmark project represents the final development to provide additional plant enhancements and acts as a final barrier to mitigate environmental releases in the unlikely event primary safety systems fail to operate.

The CFVS design does not require electrical power and would therefore function during a station loss of power event to provide safety for plant personnel. This provides increasing versatility to Bruce site emergency response. The system works independently of all other safety systems and is designed as a last resort to protect the environment during severe accident scenarios.



for its Containment Filtered Venting System (CFVC); a first-of-its-kind patented, passive, dry system.



EMERGENCY MANAGEMENT PROGRAM ENHANCEMENTS INCLUDE:

- Complete overhaul of the Emergency Management Centre (EMC), including backup power, backup communications and mobile command.
- Procurement of more emergency mitigating equipment (EME), emergency radios and satellite communications, as well as the establishment of an offsite storage facility for additional fire trucks, hoses, generators, cables, and other heavy equipment.
- Modifications and additional tie-in points were installed in the stations to provide emergency cooling water using fire trucks and lake water for emergency cooling to steam generators, irradiated fuel bays, primary heat transport, moderator, and shield tank systems.
- Modifications and additional electrical tie-in connections were installed in the stations to connect large portable generators to supply power to critical reactor systems.
- Major upgrades to offsite radiological monitoring stations with remote capability.
- **Overhaul of the Severe Accident** Management Guidelines (SAMG) with review and input from external organizations such as the World Association of Nuclear Operators (WANO), Western European Nuclear Regulators' Association (WENRA), **Canadian Nuclear Safety Commission** (CNSC), Nuclear Regulatory Commission (NRC) and Tokvo Electric Power Company Holdings (TEPCO). Our guidance now includes detailed information for multi-unit events. spent fuel events, shutdown and low operating states, and damaged infrastructure.
- Several major multi-day, multi-unit event simulations and drills have been conducted with partner organizations to continuously improve the response timing and coordination.



CONTAINMENT FILTERED VENTING SYSTEM

The tsunami that hit Japan and disrupted power and cooling to the Fukushima generating station triggered a massive change in the industry to be able to better respond to beyond-design basis events.

Hundreds of millions of dollars have been invested in the Bruce site to make our emergency response and our assets more resilient to provide additional cooling and power in extreme circumstances and to continue to provide clean and reliable energy to the Province of Ontario.

One of these improvements was the installation of the Containment Filtered Venting System (CFVS), which required years of design, modelling and testing and coordination amongst international vendors. The CFVS acts as a final barrier to mitigate environmental releases if primary safety systems and backup systems fail to operate, or to mitigate a multi-unit severe accident scenario that would overwhelm the capacity of the Vacuum Building (VB). Moisture removers are installed on the containment side and connected to specialized filters inside the transfer chamber that vent through a stack that exhausts at the top of the VB. The system, comprised of filters made of sintered metal screens that will stop tiny particles down to 2.5 micrometres and designed to capture Cesium and Iodine (95% of the radioactive particular in a disaster scenario), works independently of all other safety systems and designed as a last resort to protect the environment. The CFVS is a game changer that effectively minimizes the need for traditional protective measures for the public in the event of worst case scenarios

50M

Bruce Power has invested more than \$50 million to enhance its emergency response.

500

Bruce Power has completed more than 500 drills and exercises since 2018.

PROTECTING OUR EMPLOYEES AND COMMUNITY THROUGH COVID

In March 2020, Bruce Power activated its Emergency Response Organization and the Emergency Management Centre (EMC), to lead its response to the COVID-19 pandemic.

The EMC remained active until June 10, 2020, when a Recovery Director and oversight team took over. The EMC ensured that processes and practices were established to ensure that adequate personnel were available to maintain the safe operation of the stations. During that time, Bruce Power not only ensured a reliable electricity supply to the province but also provided substantial support to local communities while protecting our staff on site.

Throughout this activation period there were measures put in place that have been recognized and adopted as best practice elsewhere, including establishing crews in alternate locations to minimize the spread of COVID-19, the effective use of virtual turnovers and the establishment of planning teams to work on issues under the oversight of the Planning Chief. The scanning of site ID badges by personnel upon their arrival to our site allowed the company to track the numbers and names of individuals at each station and within the site perimeter. This initiative has remained in practice and is now a tool available during other events, including emergency events or severe weather.

During the pandemic the Bruce Power personnel worked from home until the province lifted COVID-19 restrictions; however, during this time drills were required to be performed for ERO personnel to maintain their proficiency and qualifications. As a result, Bruce Power adopted a method to control and evaluate drills virtually through cameras in the Emergency Operations Centre. As the COVID-19 restrictions were gradually lifted by the province, a minimum number of people attended drills in person while other evaluators/observers watched the drill virtually.

COVID-19 RESPONSE



50

thermal monitors donated to rec facilities, Indigenous communites, and congregate living settings.



\$500,000

donated to local food banks (with help from employees, nuclear suppliers and public.)



\$27,500 in local restaurant gift cards for health care workers.



\$2.5 MILLION

pieces of PPE donated to Long-Term Care homes, Indigenous communities, municipalities, schools, and community organization.



masks mailed to Bruce Power employees, contractors, and pensioners.



2,000

grocery/essentials packages donated to residents in Kincardine and Saugeen Shores.



Major Component Replacement

As part of its Life-Extension Program, Bruce Power is undertaking Major Component Replacement (MCR) projects on six of its eight reactor units. The primary scope of the MCR project is the removal and replacement of large nuclear components such as steam generators, all reactor internal parts and the vault pipework. During this multi-year campaign, upgrades are also made to electrical, the cooling water system, steam turbines, and safety systems, among others.

This privately funded investment into Units 3-8 will extend the life of the Bruce Power site through 2064, and will allow the company to continue to produce a stable and reliable source for Ontario's clean energy mix and supply the world market with cancer-fighting medical isotopes.

A SUCCESSFUL START TO MCR

In 2018, the Independent Electricity System Operator verified the company's final cost estimate for the Unit 6 project, granting the MCR its final governmental approval, paving the way for it to proceed in 2020. To prepare, Bruce Power and its supplier partners spent 2019 building and renovating facilities to house the influx of workers who will be ascending on the site to complete the MCR. This includes a state-of-the-art office complex and training facility in Kincardine. The 129,000-square-foot building houses offices and the unique training tools that will be needed to make the Unit 6 MCR – and its subsequent projects – a success.

2020 marked the fifth year of Bruce Power's 40-year Life-Extension Program, which will allow the site to provide low-cost electricity through 2064. The Life-Extension Program includes the Major Component Replacement (MCR) Project, which will see Units 3-8 refurbished between 2020 and 2033.



Bruce Power and its partners have completed the bulk of the construction phase of the Unit 6 MCR outage and will transition to return-to-service activities this year to bring the unit back online in the fourth quarter of 2023, providing the people, businesses and hospitals of Ontario with clean and reliable electricity for decades to come.

An important milestone was reached Dec. 6, 2022, with the completion of the refill of the moderator system. The moderator system in a CANDU reactor circulates heavy water (D2O) through the calandria to remove moderator heat during reactor operation.

In November 2022, the reactor area bridges were reinstalled in the Unit 6 vault. The reactor area bridges carry fuelling machines to all units for fuel bundles to be installed and removed while the reactor is online, a feature unique to CANDU reactors.

On May 10, 2023, the CNSC released the fuel load hold point for Unit 6. On May 11, 2023, Bruce Power Operations staff installed the first fuel bundles back into Unit 6 and refueled the unit's 480 fuel channels with 5,760 fuel bundles by the end of May. This will be followed by heat transport system fill and pressurization and other lead-out activities and regulatory inspections to be completed to return it to Ontario's electricity grid.

The lifetime Asset Management Program and Unit 6 MCR remain on plan. MCR6 achieved a number of milestones in in 2021 and 2022, including completion of the installation of eight steam generators and all reactor components that will allow it to return to service in 2023.





APPLYING INNOVATION AND LESSONS LEARNED TO SECOND MCR

Unit 3 MCR began March 1, 2023, after the Independent Electricity System Operator (IESO) verified the company's plan for the project in March 2022.

The Unit 3 MCR represents the next step in Bruce Power's Life-Extension Program, which is one of Canada's largest privatesector clean energy projects and will help Ontario and Canada reach their Net Zero targets.

Bruce Power and its partners will carry forward experience and innovation gathered in Unit 6 to find efficiencies in each subsequent MCR outage. An example of this was the development of an award-winning ground-breaking technology by ATS Industrial Automation in collaboration with Bruce Power to fully automate the Inspection and Calandria Tubes Installation series to deliver significant critical path savings while also reducing worker radiation exposure.

Additionally, in the early stages, the defuel of Unit 3 has progressed better than planned due, in part, to the design, development and implementation of flow restricting caps that mimic the flow resistance of a fueled channel. The use of the caps has allowed the core to be defueled more efficiently by facilitating the use of the fueling machines throughout the defuel. This efficiency reduces the time that the unit is operating the primary heat transport pumps while leveraging the same machines and processes that our operators deploy every day during the online fueling of reactor units.

In May 2023, the first ever Primary Heat Transport (PHT) chemical decontamination of a CANDU unit in refurbishment was completed in Unit 3. This \$80 million investment will significantly reduce overall dose to staff.





The Unit 3 MCR represents the next step in Bruce Power's Life-Extension Program, which is one of Canada's largest private-sector clean energy projects and will help Ontario and Canada reach their Net Zero targets.





NEW INFRASTRUCTURE AND TECHNOLOGY FOR MCRS

Building on infrastructure projects developed for the Unit 6 MCR project, there are plans to establish a number of new facilities at Bruce A, which will support Unit 3 MCR and also the Unit 4 MCR starting in 2025. Projects include:

- the establishment of a Central Storage Facility used to safely store equipment and tooling between successive Major Component Replacement outages;
- » the addition of a Secondary Security Guardhouse to facilitate efficient access to the Bruce A station for project personnel;
- » the erection of a Material Handling Building;
- » the expansion of supplemental Bruce A parking lots;
- » a reconfiguration of the Bruce A Amenities Building;
- » the establishment of a vestibule north of Unit 3 to facilitate the shipment of materials into and out of the unit; and
- » new temporary power supplies for equipment.

Beyond the improvements in infrastructure, Bruce Power is also pursuing innovations over and above the tools and techniques used successfully at Bruce B. In fact, Bruce Power has completed initial innovation assessments including Proof of Concepts for:

- » the automation of some inspections using established robotics techniques;
- » the establishment of three dimensional digital twin for plant modelling and training; and
- » advanced Feeder Grayloc gap measurement tooling.

As of the time of writing, Bruce Power is deploying a new system which is to be used to decontaminate the Primary Heat Transport System through the injection of a slightly acidic solution of heavy water into key systems and components with the objective of lowering the source term from the components. Lowering the dose consequence of the project is in line with Bruce Power's goal of keeping doses as low as reasonably achievable.

On Feb. 1, 2023, Unit 3 marked 45 years since declaring commercial operation, with the Bruce A unit beginning its lengthy run of providing clean, reliable power for the people of Ontario. Unit 3 established its operational record of 404 continuous days online in 2020.



Extending the operational life of the Bruce Power units will ensure the people of Ontario have a safe and reliable supply of electricity at a stable price for decades to come.

45

On Feb. 1, 2023, Unit 3 marked 45 years since declaring commercial operation, with the Bruce A unit beginning its lengthy run of providing clean, reliable power for the people of Ontario.

404

Unit 3 established its operational record of 404 continuous days online in 2020.

2030

Bruce Power initiative that will support Ontario's climate change goals and future clean energy needs

Bruce Power's Major Component Replacement (MCR) Training Facility (B72) opened in Kincardine in April 2019. The 129,000 sq. ft. facility offers unique training tools to allow skilled tradespeople the opportunity to practice executing the highly technical MCR programs. The building features a two-storey office area including office space; classrooms and amenities for the occupants; a one-storey, high-bay shop area to host training; room for 330 office workers and space for an additional 150 in the shop space; and parking, amenities and facilities for about 500 employees.

Powering Ontario Forward: A look to the next 5 years

In December 2022, the IESO released the Pathways to Decarbonization report to the Minister of Energy to evaluate a moratorium on new natural gas generation in Ontario and to develop a pathway to zero emissions in the electricity sector, while considering reliability, cost and impacts on broader electrification efforts.

The report sends a clear signal that nuclear power is essential to building an achievable path to Net Zero, a fact which has led to growing support for nuclear on a global scale.

Ontario is a leader in nuclear innovation, and with many promising new energy technologies on the horizon, it's important to recognize that large-scale nuclear continues to do the heavy lifting for the province's clean energy needs. Bruce Power is proud of its role as an industry leader and will continue to provide the province with a long-term stable supply of carbon-free electricity with the successful completion of its MCR projects and Project 2030. Ontario needs nuclear now more than ever as it faces an unprecedented increase in demand for clean electricity in the coming years.



MCR

2023 will be an exciting year for Bruce Power with Unit 6's anticipated sync to the Ontario electricity grid in the fourth quarter of the year and return to commercial operation.

The Major Component Replacement (MCR) project on Unit 3 reactor is underway in 2023 with a number of project milestones taking place, including defueling, bulkhead installation, vault turnover to fuel channel feeder replacement and lower and upper feeder removal.

The MCR on Unit 4 is planned to begin in early 2025, with an expected return to service date in mid-2028. Unit 5 will come offline is mid-2026 to begin its MCR.

PROJECT 2030

Bruce Power is taking action now to help Ontario meet the growing demand for reliable clean energy and further decarbonize its energy supply mix.

Project 2030 is a Bruce Power initiative that will support Ontario's climate change goals and future clean energy needs by targeting a site net peak output of upwards of 7,000 megawatts (MW) for the 2030s. The Project began in 2018 with a site net peak capability of 6,430 MW, and the new peak generating capacity will be nearly equal to adding another large reactor to our site without the need to build additional infrastructure.

Project 2030 will focus on continued asset optimization, innovations, and leveraging new efficient technology, which could include integration with storage and other forms of energy to increase site capacity to help support a low-carbon electricity grid for decades to come.

MEDICAL ISOTOPES

In 2022, Bruce Power signed an MOU with Boston Scientific to explore the production of yttrium-90 (Y-90), an innovative internal radiation therapy treatment used for liver cancer.

TheraSphere™ Y-90 Glass Microspheres, manufactured by Boston Scientific, are a targeted liver cancer therapy consisting of millions of microscopic, irradiated Y-90 glass microspheres used to treat hepatic malignancies. Through this collaboration, Bruce Power will play a critical role in ensuring Boston Scientific customers and their patients have dependable access to a reliable, made-in-Canada supply of TheraSphere devices, which are currently distributed to 30 countries.

Bruce Power's continual operations 24 hours a day, seven days a week means a consistent supply of cancer-fighting isotopes. The possibilities for the IPS to serve the world's medical community with cancer-fighting isotopes is vast, positioning Ontario as a global leader in the production of medical isotopes and ensuring Canada is at the forefront of isotope research, development and innovation.





Conclusion

Ontario needs nuclear now more than ever as it faces an unprecedented increase in demand for clean electricity in the coming years. Bruce Power is Ontario's lowest cost source of nuclear power, producing more than 30 per cent of the province's electricity.

Additionally, Bruce Power remains committed to continuing to innovate and seek new ways to expand the types of isotopes we produce. An exciting project is underway, brought together through partnership with Bruce Power, Isogen and the Saugeen Ojibway Nation. This project builds on Bruce Power's existing isotope production, expanding the scale and availability of medical isotopes increasingly being used in innovative nuclear medicine applications worldwide.

Public support for nuclear power is increasing. A 2022 independent telephone poll conducted across the region by Ipsos found residents continue to have confidence that Bruce Power operates safely, is involved with the community in a positive way, and agree that Bruce Power is a strong community citizen. Nearly all respondents (94 per cent) continue to have confidence that the nuclear facility operates safely, feel that Bruce Power is involved with the community in a positive way (92 per cent), and agree Bruce Power is a good community citizen (92 per cent). Eight in 10 residents feel familiar with Bruce Power and 86 per cent of those residents have a favourable impression, saying they feel 'excellent,' very good' or 'good' about the company.

Bruce Power is committed to Safety First and this value drives every decision and activity, and understands how important that commitment is to the community. Bruce Power is also committed to transparency and has proactively shared information with community leaders, including Indigenous communities, along with members of the general public, CNSC, and within our industry. Bruce Power is required under its contract with the Independent Electricity System Operator (IESO) to sell all of its electricity output at a fixed price. In December 2015, Bruce Power amended its long-term contract with the IESO, an organization established under the Electricity Act to manage Ontario's electricity system. In this capacity the IESO enters into contracts for electricity output with various supply sources across the province. In Ontario, virtually all electricity generated in the province is purchased at rates set under contract with the IESO or through prices set by the Ontario Energy Board (OEB).

Under separate agreements, Bruce Power leases the facility from Ontario Power Generation (OPG) and through this lease is required to assume all costs associated with its operation, life extension, services and through the lease payments fund the long-term liabilities including the rental of the facility. This lease arrangement is designed to ensure all costs related to Bruce Power's operation are assigned to the company and included within its price of power.



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Bruce Power is committed to making up-to-date information about its operations available and answering questions from interested parties.

Inquiries can be directed to <u>info@brucepower.com</u>. Additional information about Bruce Power's Life-Extension Capital Program, the cost of electricity from Bruce Power and Bruce Power's contract with the IESO can be found at <u>www.brucepower.com/who-we-are/delivering-transparency-and-trust</u>. Visit our social channels or community portal where you can ask questions, provide feedback and engage with our community relations team.

brucepower.com/in-the-community



OUR COMMITMENT TO A DIVERSE WORKFORCE

37%

of temporary and permanent hires are women compared to 31% in 2019.

32%

of hiring into non-traditional roles was women, compared to 29% in 2019.

30%

of all promotions were women in 2022.



Bruce Pow

15% of Operations is women in 2023, compared to five years ago when women represented 12% of Operations.

20% of leadership positions (FLM+) are women in 2023, compared to 18% in 2019.

20% of temporary and permanent hires are visible minorities compared to 16% in 2019.



ENERGY INDUSTRY INNOVATION OF THE YEAR

Bronze Stevie winner for the Isotope Production System International Business Award

TOP INNOVATIVE PRACTICE AWARDS

Nuclear Energy Institute



TOP 100 INFRASTRUCTURE PROJECTS IN CANADA

Top 100 Projects







brucepower.com

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