°CICERO Shades of Green

Bruce Power L.P.
Green Finance Second Opinion

July 16, 2021

Bruce Power L.P. (Bruce Power), established in 2001, is Canada's only private sector nuclear generator. With 4,200 employees, Bruce Power annually produces 30% of Ontario's power. It operates eight nuclear reactors on Lake Huron where it leases the Bruce Nuclear Generation site from Ontario Power Generation (OPG). The facility has a capacity of 6,400 megawatts, making it the largest operating nuclear power plant in the world.

The Green Finance Framework of Bruce Power focuses on life extension and investments related to increasing incremental output of the existing nuclear units to increase efficiency and extend the plant's lifetime to beyond 2060. Bruce Power informs us that to the best of their knowledge there are no fossil fuel related investments included. Life extension of nuclear reactors is a climate friendly power source with a low land use footprint that will make it easier to achieve the target in the Paris agreement of limiting global warming to well below 2°C. On the other hand, refurbishing nuclear reactors leads to a life extension for many decades that may be considered controversial by some.

Some concerns related to nuclear power generation as an industry are final waste disposal, the potential for weapon proliferation and maximum credible accidental radiation with devastating regional consequences. Being subject to Canadian regulations mitigates the possibility for weapon proliferation and accidents. No accidental radiation events or other harmful impacts on the environment have been recorded since Bruce Power started operation in 2001. Still, while the risk of a nuclear incident is remote, a maximum credible accident at any nuclear power plant could have devastating consequences. A Deep Geological Repository (DGR) is the scientifically accepted method for long-term storage of such waste approved in Canada, however a host site has yet to be selected. Bruce Power is not directly responsible for waste storage. The on-site storage is managed by OPG, a provincial crown corporation. Bruce Power procures all its nuclear fuel from Cameco Corporation, a Canadian based and regulated company. Uranium is sourced internationally by Cameco. Going forward, Bruce Power limits countries of origin to Canada, USA, Australia and Kazakhstan. While Bruce Power historically has used uranium from more environmental and social risk prone countries, they now have reasonable procedures and safeguards in place to mitigate against these risks.

According to the regulation of the nuclear power industry in Canada, Bruce Power carries out risk analysis covering a broad set of issues, including potential impacts from climate change and local environmental impacts. The intended reporting is comprehensive, and Bruce Power informs us that the intention is for an independent party to verify both the allocation and the impact sections of its future impact reporting. However, we encourage Bruce Power to consider reporting on indirect greenhouse gas emissions from sources not owned or controlled by Bruce Power (Scope 3), in particular associated with uranium mining.

Based on the overall assessment of the project types that will be financed as well as governance, and transparency and supply chain considerations, Bruce Power's Green Finance framework receives a **CICERO Medium Green** shading and a governance score of **Excellent.**

SHADES OF GREEN

Based on our review, we rate Bruce Power's green finance framework **CICERO Medium Green.**

Included in the overall shading is an assessment of the governance structure of the green finance framework. CICERO Shades of Green finds the governance procedures in Bruce Power's framework to be **Excellent.**

GREEN BOND and GREEN LOAN PRINCIPLES

Based on this review, this Framework is found in alignment with the principles.

°CICERO Medium Green

°CICERO
Shades of
Green

Contents

1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated June 2021**.** This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. CICERO Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

Expressing concerns with 'Shades of Green'

CICERO Green second opinions are graded dark green, medium green or light green, reflecting a broad, qualitative review of the climate and environmental risks and ambitions. The shading methodology aims to provide transparency to investors that seek to understand and act upon potential exposure to climate risks and impacts. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The shades are intended to communicate the following:

CICERO Shades of Green	Examples
Dark green is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated.	Wind energy projects with a strong governance structure that integrates environmental concerns
Medium green is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered.	Bridging technologies such as plug-in hybrid buses
Light green is allocated to projects and solutions that are climate friendly but do not represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them.	Efficiency investments for fossil fuel technologies where clean alternatives are not available

Sound governance and transparency processes facilitate delivery of the client's climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green finance are carefully considered and reflected in the overall shading. CICERO Green considers four factors in its review of the client's governance processes: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

2 Brief description of Bruce Power's green finance framework and related policies

Bruce Power L.P. (Bruce Power), established in 2001, is Canada's only private-sector nuclear generator, indirectly owned by TC Energy, Ontario Municipal Employees Retirement System (OMERS), the Power Workers' Union, The Society of United Professionals and the Bruce Power Employee Investment Trust. With 4,200 employees Bruce Power annually produces 30% of Ontario's power and operates eight nuclear reactors on Lake Huron where it leases the Bruce site from Ontario Power Generation (OPG). With those eight units in operation, the facility has a capacity of 6,400 megawatts making it the largest operating nuclear power plant in the world[1]. Bruce Power has signed a long-term agreement with the Province of Ontario to refurbish six of its eight units. The Life-Extension Program consists of the Major Component Replacement ("MCR") Program and the Asset Management Plan. The MCR Program focuses on the replacement of key reactor components in Units 3-8; the life extension of each unit will add approximately 30-35 years of operational life. The Asset Management Plan involves inspections and the gradual replacement of equipment which is performed during regularly scheduled maintenance outages.

Environmental Strategies and Policies

Bruce Power has an environment and sustainability policy to meet all compliance obligations with the objective to exceed compliance obligations. It has established an environmental management system and maintains registration for this system to the ISO 14001 Environmental Management System standard.

To support the fight against climate change, Bruce Power is taking steps to ensure it minimizes and offsets emissions to achieve Net Zero status by 2027. Bruce Power's commitment to achieving net zero greenhouse-gas (GHG) emissions will account for all direct and indirect emissions that occur from sources that are owned or controlled by the company. Bruce Power's direct emissions (Scope 1) are primarily the result of running safety system tests on standby generators, and secondarily from the on-site vehicle fleet that supports operations. The indirect site emissions (Scope 2) are the result of energy usage on site. Bruce Power primarily powers the two stations with internally generated nuclear power. However, an example of an exception to that would be when units are offline. They will then draw power from the grid. Over the period from 2015 to 2020, Scope 1 plus 2 CO_2 emissions, as recorded in accordance with the GHG Protocol, show a decline from some 18.5 $ktCO_2$ to about 15 $ktCO_2$. Bruce Power is currently starting work on assessing Scope 3 emissions but doesn't have complete data at this time.

Over the course of 2021, Bruce Power will work with an external third party to obtain enhanced insight into prioritizing emission-reduction projects that make the most sense from a business planning standpoint. Current ideas being scoped out include building efficiencies, optimizing the company's fleet inventory and usage and changing portions of the company's vehicle fleet to electric, and exploring and actively supporting carbon sequestration in the region.

The company acknowledges that at some point it will reach a plateau where further reductions with existing technology does not make sense from a business case standpoint. At this point the company will pursue the purchase of offsets[2] and removals, as well as renewable energy credits. In parallel to decreasing emissions, Bruce

[1] https://www.nrcan.gc.ca/science-and-data/data-and-analysis/energy-data-and-analysis/energy-facts/uranium-and-nuclear-power-facts/20070
[2] https://www.offsetguide.org/high-quality-offsets/

Power is partnering with the Nuclear Innovation Institute to find local carbon-offsetting and removal options and innovations.

Nuclear power generation is one of the most regulated industries in the world. Bruce Power goes to great lengths to ensure the radiological safety of its workforce, the public and the environment. These measures are part of their operating license. As required by the Canadian Nuclear Safety Commission, exposure and dose limits for all nuclear energy workers is closely tracked. There are also dose limits calculated for members of the public living near a nuclear power plant. The dose is determined through third-party studies, as well as the data from constant monitoring of emissions releases to the air and water and monitoring of plants, animals, air and water.

The regulatory maximum dose a member of the public can receive from living near a power plant is 1 millisievert (mSv) per year. The actual dose of a person living next to the property line of the Bruce site in 2020 was calculated at .0018 mSv. Thus, radiological effluents, consistently remain at small percentages of the Dose Release Limits (DRLs). For additional context, the 2020 dose was equivalent to a person eating 18 bananas per year according to the issuer.

Another element of the regulation is that Bruce Power carries out extensive and comprehensive risk analysis, including risks associated with climate change such as future warming of the cooling water, more extreme weather and other factors. These studies are, however, not easily publicly available, as recommended by TCFD, but this is something that the company is looking to address.

The Bruce Power nuclear generating stations and other site facilities are leased to Bruce Power for the production of electricity. OPG is responsible for the used fuel that is produced. Bruce Power manages and fully funds the storage and disposal of its waste in conjunction with Ontario Power Generation (OPG), a provincial crown corporation. Since the 1970s, OPG has managed, transported, stored and processed all waste from the Bruce site, following international best practices. All radioactive waste as well as used nuclear fuel is currently stored on an interim basis on the Bruce site[3] until long-term disposal facilities are established. (Upholding OPG's commitment to Indigenous communities, a proposal for a deep geologic repository at the Bruce Power site was ended in 2020. OPG is currently exploring alternative locations). Bruce Power has programs to actively minimise the production of nuclear waste. The Canadian Nuclear Safety Commission regulates Bruce Power's nuclear site, including the use of nuclear energy and materials to safeguard health and the environment, to ensure safety and security, and to respect Canada's international commitments on the peaceful use of nuclear energy.

Bruce Power manages many different forms of non-radiological waste, including hazardous waste (oils, chemicals), recyclable waste (glass, plastic, metal, cardboard, paper, wood, batteries, and electronics), organic waste (compost), and landfill waste. Bruce Power complies with all waste regulations and requirements of the relevant Federal, Provincial, and Municipal authorities. Further, Bruce Power has taken an active role for many years to reduce all forms of waste. Thus, conventional waste declined from 1967 million tons in 2018 to 1713 million tons in 2020. Also, from 2018 to 2020 the conventional waste diversion rate has increased from 62% to

[3] In Canada there are two types of nuclear waste (excluding used fuel) classified according to their radioactivity: low- and intermediate-level waste. The vast majority of the waste (90% of total volume) is composed of only lightly contaminated items, such as tools and work clothing, and contains only 1% of the total radioactivity. Intermediate-level waste (ILW) contains higher amounts of radioactivity compared to low-level waste. It generally requires shielding, but not cooling. Intermediate-level wastes includes resins, chemical sludge and metal nuclear fuel cladding, as well as contaminated materials from reactor decommissioning. The Bruce Power site includes the Western Waste Management Facility (WWMF) operated by OPG where all waste from the Bruce Nuclear Power Stations is stored. The WWMF holds Low Level Waste (LLW), Intermediate Level Waste (ILW) and Used Fuel in Dry Storage Containers until the federal organization is ready to accept them for storage in the Deep Geological Repository (DGR). A typical value for LLW generation is $60m^3$/TWh and ILW values of around $1.5m^3$/TWh annually.

68%. 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.

Bruce Power uses the cold, deep Lake Huron water in a once-through cooling process and to supply operational needs including consumption for boiler feedwater and domestic water. It returns more than 99.9% of the water used for once-through cooling directly to the lake. This process is highly regulated, including provincial permits for water taking and imposing protective limits on water quality for water returned to the lake. Beyond considerations of water quantity management, Bruce Power is committed to monitoring and ensuring the protection of the quality of water, and the fish habitats in and around the shores and the greater region. Analyses and assessments are continuously performed and results using the most thermally sensitive species and life stage by month concluded that thermal effluent causes minimal to negligible risk to fish.

The environmental monitoring verifies water quality and extensive monitoring is conducted year-round. This includes sediments and soil, water, vegetation and biota such as fish. The aim is that environmental monitoring ensures, through measurement, sampling, and analysis, that the health of the environment and people are protected. Results are publicly available through annual Environment Protection Reports. According to the issuer, no harmful events arising from the release of radiation have been registered since Bruce Power started production in 2001.

Use of proceeds

A "Green Financing" is a debenture, bond, or other financing instrument where the proceeds are exclusively allocated to green projects and activities that promote environmental sustainability and have clear environmental benefits.

An amount equal to the net proceeds of each Green Financing will be allocated or used to finance or re-finance, in part or in full, new and/or existing green investments and expenditures made by Bruce Power that meet the Eligibility Criteria defined in table 1, as recognized by the Green Loan Principles and Green Bond Principles. Eligible investments include life extension and investments related to increasing incremental output of the existing nuclear units. The company informs us that to the best of their knowledge there is no fossil fuel related investments included in those two categories.

Eligible investments may include existing investments made by Bruce Power within a 36-month period before or after the date of the Green Financing issuance. The plan for the initial bond is to allocate it to refinancing as Bruce Power has already incurred significant costs on the life extension program.

All Eligible Investments are associated with Bruce Power's nuclear assets. Over the next decade, Bruce Power expects the majority of proceeds to be allocated to its Life-Extension Capital Program.

Selection

The selection process is a key governance factor to consider in CICERO Green's assessment. CICERO Green typically looks at how climate and environmental considerations are considered when evaluating whether projects can qualify for green finance funding. The broader the project categories, the more importance CICERO Green places on the governance process.

Bruce Power has established an Environment and Sustainability Oversight Committee (Committee) which will be responsible for the ultimate review and recommendation of investments that will qualify as Eligible Investments. The Committee will make decisions based on consensus. The Committee includes representation from the environment and sustainability departments of Bruce Power.

The Committee will align its selection and evaluation analysis with Bruce Power's Green Finance Framework, Bruce Power's sustainability objectives and internal policies and guidelines, and adherence to applicable provincial and national environmental laws and regulation for all its activities, including those financed with the proceeds of each Green Financing. The issuance of green bonds will be governed by the criteria laid out in the Framework.

As part of the annual reporting and disclosure process, the Committee will review the existing Eligible Investments to ensure that they continue to comply with the Eligibility Criteria, Bruce Power's sustainability objectives and internal policies and guidelines, and applicable regional and national environmental laws and regulation.

Suppliers are to observe company policies, procedures and rules. Suppliers must ensure their outsourcing or subcontractor arrangements, if applicable, comply with the Supplier Code of Conduct. Bruce Power procures all its nuclear fuel from Cameco Corporation (Cameco), a Canadian based company. Cameco is responsible for all aspects of the fresh fuel production including Uranium, UO_2 conversion and final fuel bundle fabrication Cameco covers all aspects of fuel production and is ISO-14001 certified with extensive monitoring and control systems for avoidance of environmental pollution associated with mining, conversion and final fuel bundle production. Bruce Power expects their suppliers to support and respect human rights, diversity and equal opportunity within the workplace. Suppliers shall ensure all labour practices, wage payments and benefits comply with applicable laws and regulations. Most suppliers are required to register in ISNetworld and maintain the requested information. ISNetworld includes safety related metrics and grading and includes an environmental questionnaire (including questions such as ISO 14001 certification, waste, and spill management plans, etc.). The environmental questionnaire contributes to the suppliers' overall rating in ISNetworld. Selected sub-contractors must in most cases secure local economic content to encourage local economic development.

Management of proceeds

CICERO Green finds the management of proceeds of Bruce Power to be in accordance with the Green Bond Principles[4] dated June 2021 issued by the International Capital Markets Association (ICMA) as well as the Green Loan Principles[5] dated February 2021 issued by the Loan Market Association (LMA) and Loan Syndications and Trading Association (LSTA).

Bruce Power's Finance department will be responsible for the allocation of an amount equal to the net proceeds from the issuance of each Green Financing to the financing or refinancing of existing and future Green Investments.

The proceeds of each Green Financing will be deposited in its general funding accounts with an equivalent amount to be earmarked to clearly track the use of and allocation of funds for eligible investments. The proceeds of the first issuance will be allocated to historical eligible investments and used to pay down existing debt.

Per the green finance framework, Bruce Power will fully allocate an amount equal to the net proceeds of a Green Financing within 36 months from the date of issuance. Pending allocation, proceeds may be temporarily invested in cash or short-term investment instruments that do not include GHG-intensive projects or used to repay existing indebtedness in accordance with Bruce Power's normal liquidity management practices.

[4] International Capital Markets Association, "The Green Bond Principles (GBP)" https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Bond-Principles-June-2021-100621.pdf

[5] Loan Syndications & Trading Association and Loan Market Association, "Green Loan Principles", https://www.lma.eu.com/application/files/9716/1304/3740/Green_Loan_Principles_Feb2021_V04.pdf

Reporting

Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs. Procedures for reporting and disclosure of green finance investments are also vital to build confidence that green finance is contributing towards a sustainable and climate-friendly future, both among investors and in society.

As long as there are Green Financings issued under this Framework outstanding, Bruce Power will publish on an annual basis through its website an annual information report addressing the allocation of funds and associated impacts from all green bonds issued. The Treasury and Sustainability departments will be responsible for the reporting. The first reporting will take place in approximately June 2022. Reporting will include:

- A summary of outstanding Green Financings
- Amount of the net proceeds from the Green Financing allocated to green investments, on a project-by-project basis where possible (i.e., when the eligible projects are not too small)
- Updates with respect to the distribution of then-unallocated net proceeds (if any)
- Share of net proceeds allocated or used for new financing vs. refinancing
- Project updates on eligible investments

Where feasible, the impact report will include qualitative and/or quantitative environmental performance indicators, at the project level where possible. Examples of impact indicators that may be included are:

- Estimated annual greenhouse gas emissions reduced or avoided (tCO_2e), with disclosure of the methodology used
- Actual annual nuclear energy generation (kWh)
- Where feasible, specific details on methodology, baselines and assumptions used in impact calculations will also be included.

Grid factors used to calculate emissions avoided is based on the GHG Protocol[6]. The issuer informs us that the intention is for an independent party to verify both the allocation and the impact sections of the reporting.

[6] GHG Protocol https://ghgprotocol.org/corporate-standard: To quantify scope 2 emissions, the GHG Protocol Corporate Standard recommends that companies obtain source/supplier specific emission factors for the electricity purchased. If these are not available, regional or grid emission factors should be used. For more information on choosing emission factors, see the relevant GHG Protocol calculation tools available on the GHG Protocol website (www.ghgprotocol.org).

3 Assessment of Bruce Power's green finance framework and policies

The framework and procedures for Bruce Power's green finance investments are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where Bruce Power should be aware of potential macro-level impacts of investment projects.

Overall shading

Based on the project category shadings detailed below, and consideration of environmental ambitions and governance structure reflected in Bruce Power's green finance framework, we rate the framework **CICERO Medium Green.**

Eligible projects under the Bruce Power's green finance framework

At the basic level, the selection of eligible project categories is the primary mechanism to ensure that projects deliver environmental benefits. Through selection of project categories with clear environmental benefits, green finances aim to provide investors with certainty that their investments deliver environmental returns as well as financial returns. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed and that the selection process should be "well defined".

Category	Eligible project types	Green Shading and some concerns
Clean Energy/Pollution prevention and control	• Investments associated with the Life-Extension Capital Program (which includes the MCR Program and the Asset Management Plan) - examples of such investments include component replacement, refurbishment and maintenance with the purpose of increasing operational life span while maintaining or improving the level of operational safety. • Investments related to increasing the output of the existing units used to displace other emitting electricity sector generators while maintaining or improving the level of operational safety of such units.	**Medium Green** ✓ Although empirical evidence shows nuclear power generation in Canada to be a safe provider of electricity (measured by GWh produced) and the risk of a nuclear incident to be remote, a significant nuclear incident at any nuclear power plant could have devastating consequences. Other concerns are related to the uranium sourcing and siting of long-term storage solution to spent fuel. Bruce Power informs us of safeguards and procedures that mitigates risks associated with environmental or social damages associated with uranium mining. The responsibility for storage of spent fuel resides with OPG. ✓ On the positive side, nuclear power is a low carbon source of electricity with a relatively small land use footprint. Refurbishing nuclear reactors is a good way to provide low carbon electricity, in part due to the avoidance of decommissioning emissions.

	✓ The issuer informs us that fossil fuel standby generators cannot be financed with green bond proceeds. ✓ We further note that the total activity on site is covered by an extensive environment protection program, including monitoring and (publicly available) reporting. ✓ Bruce Power indicates that all existing design and approaches to environmental assessment remain best in class and that they are leading in many areas such as climate updates, thermal modelling, approaches for evaluation of fish impacts, research on fish impacts, broader ecosystem understanding, development of a joint coastal waters monitoring program with a local first nation, and working on invasive species control to maintain shoreline diversity.

Table 1. Eligible project categories

Background

Electricity needs are poised to rise substantially in the decades to come. An analysis of over 400 recent long-term energy scenarios suggests a 20% to 330% increase in electricity consumption by 2050. An increasing role for nuclear power is seen across many scenarios. For example, in the IPCC's special report on 1.5 degrees scenarios[7], the majority of pathways assessed to limit global warming to 1.5 degrees with no or limited overshoot include a strong increase in nuclear energy. Typical increases are 59-98% from 2010-levels by 2030, or by 150-501% by 2050 – depending on the scenario. We also note that the recent IEA Net Zero Emission 2050 scenario[8] shows roughly a doubling of nuclear power to 2050. There are, however, also scenarios compatible with limiting global warming to 1.5 degrees that include a full phaseout of nuclear power by 2060. Among the 1.5-degree scenarios deemed most realistic[9], only a few show reduced nuclear power supply compared to today's level (~10 EJ).

But whilst some countries are investing heavily in increasing their nuclear energy supply, others are taking their plants offline. The role that nuclear energy plays in the energy system is therefore very specific to the given country. What sets nuclear energy apart from other electricity generation technologies is its association with ionising radiation and radioactive waste, an association which attracts considerable public attention.

Globally, in 2019, around 10% of electricity comes from 442 operable nuclear power plants. France, the USA, China, Russia and Canada all produce relatively large amounts of nuclear power. Four active nuclear power plants are in operation in Canada, with 19 operating nuclear reactors. Three plants are located in Ontario and one in New Brunswick. In 2017, an estimated 15% of all electricity production in Canada came from nuclear power. In Ontario, nuclear is the largest source of power generation, accounting for an estimated 60% of total electricity produced in 2019.

Analysis of levelized cost of electricity in Europe and the USA indicates that cost of nuclear power is comparable to the cost of solar and wind power, in particular when the cost relates to extension of the operating lifetime of

[7] https://www.ipcc.ch/sr15/
[8] https://www.iea.org/reports/net-zero-by-2050
[9] https://doi.org/10.1088/1748-9326/abfeec

nuclear reactors. However, this cost does not take into account the cost of decommissioning. Other reviews report that "Nuclear power plants are expensive to build but relatively cheap to run. In many places, nuclear energy is competitive with fossil fuels as a means of electricity generation. Waste disposal and decommissioning costs are usually fully included in the operating costs.[10]" In the case of Bruce Power, waste disposal and decommissioning costs are fully included in the operating costs.

We note that in Europe there are examples of huge cost overruns in construction of new reactors[11].

The European Union Taxonomy Regulation sets up a framework for the development of an EU classification system ("EU Taxonomy") of environmentally sustainable economic activities for investment purposes. For an economic activity to be included in the EU Taxonomy, it must contribute substantially to at least one environmental objective and do no significant harm to five other defined objectives[12]. The Joint Research Centre was tasked with assessing the Do-No-Significant-Harm aspects of Nuclear energy. In their report, which also received some public criticism, they concluded[13]:

"It can be concluded that all potentially harmful impacts of the various nuclear energy lifecycle phases on human health and the environment can be duly prevented or avoided. The nuclear energy-based electricity production and the associated activities in the whole nuclear fuel cycle (e.g., uranium mining, nuclear fuel fabrication, etc.) do not represent significant harm to any of the TEG objectives, provided that all specific industrial activities involved fulfil the related Technical Screening Criteria."

With regard to Ontario, next to hydro, nuclear is the cheapest form of baseload energy Ontario has. Ontario's Financial Accountability Office has stated "there is currently no portfolio of alternative low-emissions generation which could replace nuclear generation at a comparable cost." The federal government has also recognized the inherent value of nuclear energy's role in the fight against climate change. Natural Resources Minister Seamus O' Regan has stated "there is no path to net-zero without nuclear power."

Public polling shows a very high level of support for nuclear power in Ontario, with more than three-quarters of respondents supporting refurbishment of Ontario's existing nuclear units. While some continue to criticize a proposed Deep Geologic Repository to help manage the industry's spent fuel, this concept is considered the gold standard internationally, and a federally led, fully transparent consultation process is continuing regarding final site selection.

Bruce Power's reactors use CANDU (Canada Deuterium Uranium) technology. CANDUs have a number of unique design features and characteristics not seen in other reactor designs. They include:

- A reactor core comprising of several hundred small diameter fuel channels rather than one huge pressure vessel.
- Heavy water (D_2O) for moderator and coolant. However, heavy water is expensive. Also, when heavy water absorbs one neutron, it becomes tritium (H_3), which is a low-level radioactive hazard. Tritium is

[10] https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx
[11] E.g., Olkiluoto Nuclear Power Plant that has been completed with over 10 years of delays and large cost overruns and is now waiting for fuel loading. Flamanville Nuclear Plant in France is years behind schedule, plagued by structural problems and well over budget at €12.4 billion. Hinkley in UK is also behind schedule, with operator Electricité de France SA recently raising the project's cost estimate by £500 million to between £22 billion and £23 billion, in 2015 currency, as a result of COVID-19.
[12] The objectives are: Climate change mitigation; climate change adaptation; the sustainable use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control; and the protection and restoration of biodiversity and ecosystems.
[13] https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf

difficult to contain and enters biological systems readily. CANDUs create more tritium than light-water reactors.
- Separate low-pressure moderator and high-pressure fuel cooling systems.
- Reactivity devices that are located in the cool low-pressure moderator, and not subjected to high temperatures or pressures.
- Natural uranium fuel, which is not enriched and cannot be used for weapons.
- CANDU reactors produce only half as much plutonium by discharged fuel mass as light-water reactors.
- Reactors can be refuelled while still safely operating at full power.
- Two fully capable shutdown systems, independent from each other, which are designed to act automatically in the unlikely situation a reactor requires immediate shutdown.

Overall, CANDU reactors use 30–40% less mined uranium than light-water reactors per unit of electricity produced. This is a major advantage of the heavy-water design; it not only requires less fuel, but as the fuel does not have to be enriched, it is much less expensive as well.

Governance Assessment

Four aspects are studied when assessing the Bruce Power's governance procedures: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify eligible projects under the framework; 3) the management of proceeds; and 4) the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

Bruce Power's main contribution to climate change mitigation is the production of near zero carbon electricity. In addition, Bruce Power is taking steps to ensure it minimizes and offsets emissions to achieve Net Zero status by 2027. Bruce Power's commitment to achieving net zero greenhouse-gas (GHG) emissions will account for all direct and indirect emissions that occur from sources that are owned or controlled by the company, and hence exclude Scope 3 emissions. Any remaining greenhouse gas emissions will be compensated by 'high-quality' offsets.

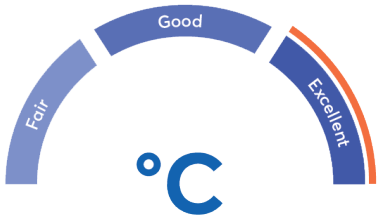
The supply chain of Bruce Power includes Comeco's uranium sourcing from different countries. The Bruce Power uranium contract now restricts origins to Canada, Australia, United States and Kazakhstan[14] based on the known environmental, social, and regulatory standards to which they operate. Bruce Power informs us that they will only consider accepting material from other jurisdictions subject to confirming the environmental, social, and regulatory standards in such jurisdictions ensure the do no significant harm principle is met. Bruce Power will conduct due diligence through publicly available information, its primary supplier Cameco, industry reports like the UXC suppliers annual and direct discussions/visits with primary suppliers where the information available in the public domain is limited. Following due diligence, a report will be put together with recommendation to the Environment and Sustainability Oversight Committee for approval. Bruce Power informs us that they will continuously monitor the approved origins and provide the Environment and Sustainability Oversight Committee with an annual report

[14] All uranium production from Kazakhstan involves the majority state owned company Kazatomprom, which is publicly traded on the London stock exchange. Being listed on the London stock exchange and partnering with other international public companies subject to various international rules and regulations ensure there are strict controls in place to avoid any corrupt practices. All Kazatomprom production facilities have implemented an environmental management system based on the ISO-14001 standard and an occupational safety management system conforming to the OHSAS-18001 standard. In March 2020, Kazatomprom successfully passed an occupational health and safety management audit and received the certificate of TÜV International Certification. It certifies that the Company has the environmental management system and occupational health and safety systems in place that comply with the requirements of DIN EN ISO 14001:2015 (Environmental management systems certification) and DIN EN ISO 45001:2018 (Occupational health and safety management system certification) and use them to organize export supplies of natural uranium.

which details the origins of all uranium purchased along with any changes in environmental, social and regulatory standards or performance to standards in the approved jurisdictions.

Given the heavy regulation of the nuclear power industry in Canada, Bruce Power carries out extensive risk analysis covering a broad set of issues, including potential impacts from climate change. Although not aligned with the TCFD guidelines, we find that Bruce Power fulfils some of the intention of the guidelines.

The selection process is good given that the selection criteria are clear and well specified, and the management of proceeds is in accordance with the Green Bond Principles. Bruce Power has good social safeguards in place vis a vis employees and selected sub-contractors. They inform us that no serious accidents affecting employees or neighbouring stakeholders have ever been registered. The intended reporting is comprehensive, and the issuer informs us that the intention is for an independent party to verify both the allocation and the impact sections of the reporting. There is currently no reporting on Scope 3 greenhouse gas emissions.



The overall assessment of Bruce Power's governance structure and processes gives it a rating of **Excellent.**

Strengths

The Bruce Power Green bond framework has a clear focus on life extension and efficiency improvements of all of their nuclear reactors, while excluding fossil fuel related assets and activities. The life extension prolongs the life of an important low carbon power source in Ontario, while at the same time avoiding emissions associated with decommissioning the plant. Nuclear power plants in Canada are heavily regulated, leading to a strong risk management culture, including the impacts of climate change. The eligible projects are further backed up by a solid governance structure in the company with comprehensive risk analysis, monitoring and reporting. These are all clear strengths of the framework. The CANDU technology used in Canada also have some advantages compared to ordinary and commonly used light water reactors, in that low enriched uranium is used as a fuel reducing the chances for weapon proliferation. In our opinion, refurbishment of CANDU reactors is by itself a valuable climate change mitigating activity. However, the solution for final disposal of spent fuel is still not in place, which together with residual risks and broader concerns reduces the acceptability of the nuclear technology for the general public.

Weaknesses

Within the limited scope of the framework, we find no material weaknesses in the Green Finance Framework of Bruce Power.

Pitfalls

The reporting from a highly regulated activity such as nuclear power generation is extensive and comprehensive. Still, it is not formalised along the guidelines recommended by TCFD, so it can be challenging to get a clear picture of the climate related risks confronting Bruce Power. While a great many physical risks have been mapped out, it is less clear whether this also covers climate risks to major suppliers.

Bruce Power is taking steps to ensure it minimizes and offsets emissions to achieve Net Zero status by 2027. While Bruce Power pledges to only use high-quality offsets, we note that Scope 1+2 emissions show only a small reduction over the last few years. Also, in a wider context, Scope 3 emissions associated with nuclear power is probably more important than scope 1 and 2. Bruce Power has only just started work on analysing part of their

Scope 3 emissions and only recently made their net zero commitment. However, the ultimate cost of decommissioning the generating stations at the Bruce Power site and Bruce Power's waste storage is fully funded.

While sourcing of uranium and deposition of spent fuel are outside the direct responsibility of Bruce Power, the issuer is clearly exposed to risks from mishandling of these operations. Over the last three years, some of the uranium used for fuel by Bruce power has come from mines in developing countries, some of which have weak regulations or implementation of regulations. This has posed social, environmental and reputational risks to Bruce Power. Bruce Power has informed us that going forward, the countries of origin will generally be restricted to Canada, USA, Australia and Kazakhstan. With the regulations, certifications and monitoring activities taking place in relevant companies in these countries, we assess that necessary safeguards against social and environmental damages are in place to minimize these risks.

The main concerns related to nuclear power generation as an industry are final waste disposal, potential contribution to nuclear weapon proliferation and accidental release of radioactivity, those concerns are mitigated by the below factors:

Weapon proliferation is mitigated by use of the CANDU technology and Canadian regulations.

No material accidental radiation events or other harmful impacts on the environment have been recorded since Bruce Power started operation in 2001. Still, there is a residual risk associated with a maximum credible accident with devastating consequences.

While a host site for the long-term storage of Bruce Power's nuclear waste has not been determined, a Deep Geological Repository is a scientifically accepted method for long-term storage of such waste[15]. All aspects of operations are highly regulated by the Canadian Nuclear Safety Commission. The Nuclear Waste Management Organization (NWMO) is responsible for Canada's plan for the safe, long-term management of used nuclear fuel. While Bruce Power is not directly responsible for waste and spent fuel storage, investors should note that on-site storage is managed by OPG, a provincial crown corporation. Furthermore, despite the fact that the long-term storage of nuclear fuel is outside the direct responsibility of Bruce Power, as is the mining and conversion of uranium into nuclear fuel, it is still exposed to some risks from mishandling during these operations. We note that transport emissions and associated risks are not considered by Bruce Power.

Extending the operating life-time of nuclear reactors leads to continued mining of uranium for fuel with its associated greenhouse gas emissions and environmental impacts that should be mitigated.

We note that the local communities around the site of Bruce Power mostly support the operation of the plant, according to stakeholder surveys. While it is not within the scope of this second opinion to assess and weigh all potential risks associated with nuclear technology, we note that to some, it will be a concern that extending the life of nuclear reactors leads to a life extension of nuclear related activities for many decades that may be considered controversial.

[15] See e.g., https://www.gov.uk/government/collections/demonstrating-the-safety-of-a-geological-disposal-facility-gdf

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Appendix 1:
Referenced Documents List

Document Number	Document Name	Description
1	Bruce Power Green Financing Framework – Final	Bruce Power Green Finance Framework dated June 2021
2	ESG_DEI Deck_April 16 2021 – Compatibility Mode	Diversity, Equity and Inclusion Strategy
3	Community Link	Link to web site describing Bruce Power's support for the local community
4	210058A_CommunityUpdate_MAR2021	An example of community update from Bruce Power
5	150466_IndigenousEmployment_Book_R007	Bruce Power's Indigenous Employment Guide
6	Workplace Harassment and Violence Policy – 01JAN2021	Workplace Harassment and Violence Policy dated January 2021
7	ThePoint-Vol06-Mar262018	Quarterly Ethics Corner article intended to communicate information regarding Code of Conduct cases dated March 2018
8	SupplierCodeofConduct	Bruce Power's Supplier Code of Conduct
9	October 2018 Code of Conduct Oversight Committee ToR	Terms of Reference – Code of Conduct Oversight Committee, 2018
10	BP-PROC-00409 R007 – Workplace Human Rights and Harrassment	Document describing procedure for raising, reporting and addressing concerns regarding Discrimination and Harassment
11	BP-PROC-00385 R006 – Violence in the Workplace	Document describing procedure for raising, reporting and addressing concerns related to Workplace Violence

12	BP-PROC-00276 R006 – Code of Conduct	Document describing procedure for raising, reporting and addressing concerns regarding Code of Conduct concerns
13	2021-04-28 – BPI Board Committees & Member	Bruce Power Board members and committees 2021
14	2021-03-26- BPI Board Compliance Report	Bruce Power board compliance report 2021
15	2020-01-30- Bruce Power Inc. Board Terms of Reference	Terms of reference for the board of directors of Bruce Power 2020
16	2020 ISO 14001 Certificate of Registration	ISO 14001:2015 Certificate for the operations and maintenance of a nuclear generation facility, including the Bruce Power Visitor's Centre facility
17	200114C_VMBPoster_CodeofConduct	Poster with Code of Conduct
18	190309A_CofC_ManagerPresentation v3	Presentation of Supervisor obligations under Bruce Power's Code of Conduct
19	180432A_SupervisorGuide_R000 – Code of Conduct	Supervisor Pocket Guide to the Code of Conduct
20	160183_CodeofConduct_R004sm	The Code of Conduct – a report
21	BP_EnergyReport2020_LR	Bruce Power 2020 Energy report
22	BP_annual_report_2020	Bruce Power 2020 Annual report
23	10141A_NZ2027BrucePower_InformationSheet_R001	Bruce Power's commitment to achieving Net Zero GHG emissions by 2027
24	200062C_OverallGreenRibbonBookFINALOCT10	Report from the 2020 Green Ribbon Panel
25	190484A_OntElectricityReport_R002_DIGITAL	The 2019 Ontario energy report
26	190200_SustainabilityReport_Book_R000_DIGITAL	Bruce Power Sustainability Report 2019
27	OccupationalHealthandSafety_Policy_2020	Official health and safety statement
28	Emergency Preperedness	Link to Web site with information on Bruce Power's emergency preparedness

29	BP-PROG-00.02 R013 – Environmental Management	Document describing in formal detail Bruce Power's environmental management procedures
30	BP-PROG-00.02	Bruce Power's Management System Manual (BPMS)
31	B-REP-07000-00013	Bruce Power's 2020 Environmental Protection Report
32	180462F_EnvironmentPolicy_8.5x11_R000	A one-page statement of Bruce Power's environmental policy
33	180391A_CleanAirCanada_Book_R001	A 2018 joint report from Asthma Canada and Bruce Power
34	180125_LifeXMCR_FoldoutGuide_17x22_R002-DIGITAL	Informational brochure on the process of major component replacement (of unit 6)
35	160072_GuidetoBrucePowerReport_R001_Digital	Informational brochure on Bruce Power
36	Backgrounder-2021-What-is-used-nuclear-fuel	Popular informational brochure on nuclear fuel
37	2nd AR UFW and CO60 FINAL	Agreement between OPG and Bruce Power on nuclear waste handling
38	U6 MCR Supplemental agmt to LILW jun19-18 signed	Supplemental agreement between OPG and Bruce Power on nuclear waste handling
39	Amendment 1 to AR LILW apr26-17 signed	Amendment to agreement between OPG and Bruce Power on nuclear waste handling
40	Amended and Restated LILW agreement dated dec4-15	Amendment to agreement between OPG and Bruce Power on nuclear waste handling
41	APM_REP_00440_0015_R001	Deep geological repository conceptual design report Crystalline/Sedimentary rock environment
42	March-2011-Regulating-Radioactive-Waste-in-Canada-Fact-Sheet_e	Informational brochure on radioactive waste regulations in Canada

43	Financial_Guarantee_Commission_Member_Document	Request for acceptance of OPG's financial guarantee
44	Lifecycle Carbon Emissions of Electricity Generation Sources – Energy For Humanity	Informational note on life cycle carbon emissions of electricity generation sources
45	2020 Certificate of Registration[1]	ISO 14001 certificate for Bruce Power
46	180462F_EnvironmentPolicy_8.5x11_R000 2021 FINAL	Statement on Bruce Power's environment & sustainability policy
47	Historical Waste Volumes	Excel sheet showing historical nuclear waste volumes.
48	8319 U3O8 supply agmt	Uranium concentrates service supply agreement 2018-2030
49	8320 UO2 conversion services supply agmt	Uranium conversion supply agreement 2018-2030
50	8321 Fab NFMA	Nuclear fuel manufacturing agreement 2018-2030
51	Cameco_-_2020_Sustainability_Reporting_GRI_Index_Update	Cameco's 2020 Sustainability Report
52	190323B SON Environmental Workshop_Radiological_5	One page flyer explaining radiation exposure
53	210009A_SustainabilityReport_R000	Bruce Power's Sustainability report 2021
54	Bruce Power Amending Agreement (2021-07-12)	Amended fuel supply agreement with Cameco
55	Bruce Power Uranium Origin Sourcing (2021-07-15v2)	Description of Bruce Power's fuel sourcing

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Appendix 2:
About CICERO Shades of Green

CICERO Green is a subsidiary of the climate research institute CICERO. CICERO is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international cooperation. CICERO has garnered attention for its work on the effects of manmade emissions on the climate and has played an active role in the UN's IPCC since 1995. CICERO staff provide quality control and methodological development for CICERO Green.

CICERO Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

We work with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions (ENSO). Led by CICERO Green, ENSO contributes expertise to the second opinions, and is comprised of a network of trusted, independent research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University and the International Institute for Sustainable Development (IISD).