# 2023 Green Bond Impact Report

Enter

ONTARIO POWER GENERATION | Electrifying life

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# Overview

Ontario Power Generation's (OPG) mission is to build a sustainable future powered by our electricity, ideas, and people. Through our bold leadership, we are bringing to life our vision to electrify life in one generation. OPG recognizes that operating in a manner consistent with our ESG principles is critical to our future success, and our ability to deliver value to our stakeholders. As Ontario's largest low-carbon power generator with one of the most diverse generating portfolios in North America, OPG strives to implement operational and growth strategies that minimize OPG's environmental footprint, support reductions in greenhouse gas (GHG) emissions, increase resilience to climate change impacts and advance Reconciliation with Indigenous Peoples.

Proceeds from green bond offerings provide an opportunity for OPG to finance and refinance projects that offer tangible environmental benefits. Under OPG's Green Bond Framework (2021), proceeds from green bonds issued can be used for eligible projects in the following areas: renewable energy generation, nuclear energy efficiency and management, climate adaptation and resilience. Environmental benefits from these types of projects include avoided greenhouse gas (GHG) emissions, improved air quality, resilience to the impacts of climate change, and increased energy efficiency.

In 2024, OPG released its Sustainable Finance Framework replacing the Green Bond Framework. The Sustainable Finance Framework permits funding of a broader

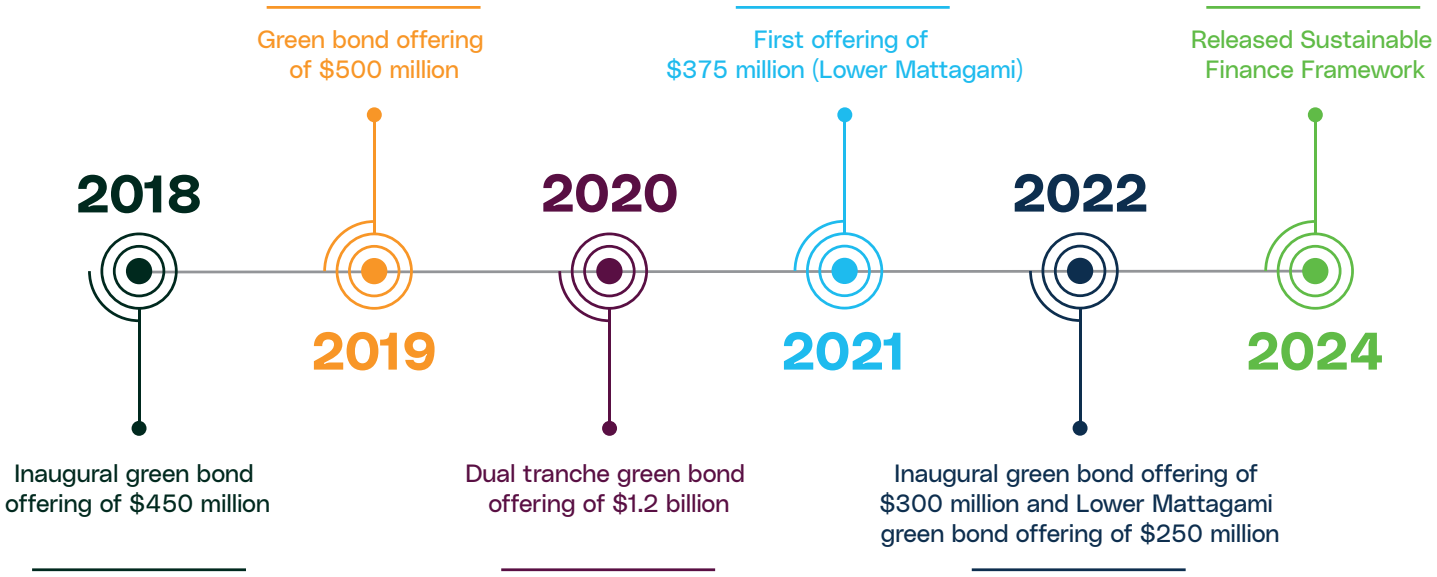
> ***"As Canada's largest corporate green bond issuer, expanding our eligible use of proceeds under this new Framework recognizes the growing demand for clean electricity and OPG's commitment to advancing economic Reconciliation with Indigenous Nations and communities."***
>
> Aida Cipolla, OPG's Chief Financial Officer and Corporate Services Officer

range of clean energy technologies as well as initiatives to create opportunities for Indigenous communities and businesses. Opportunities to facilitate Indigenous communities and businesses participating in OPG's projects and initiatives include through procurement, training, education and employment. Introducing social categories focused on Indigenous Reconciliation in this new framework will enable established bond investors and OPG to further commitments to engage and work with Indigenous communities, businesses, and organizations to advance Reconciliation.

OPG updates investors annually on the use of green and sustainable bond proceeds by OPG and its subsidiaries and this report includes qualitative and quantitative environmental performance indicators such as avoided GHG emissions, low-carbon energy generation, and capacity of renewable and low carbon energy plants constructed or rehabilitated. This report presents information about the environmental benefits of eligible projects under OPG's Green Bond Framework (2021), as of Dec. 31, 2023. This is OPG's sixth annual Green Bond Impact Report.

In conjunction with this report, OPG provides information about its environmental programs and performance, bond issuances, and the status of major projects in its Integrated ESG and Annual Report, annual information form, management's discussion and analysis reports, and consolidated financial statements, all of which are available on www.opg.com.

## Green Financing Timeline




## Green Bond Offerings

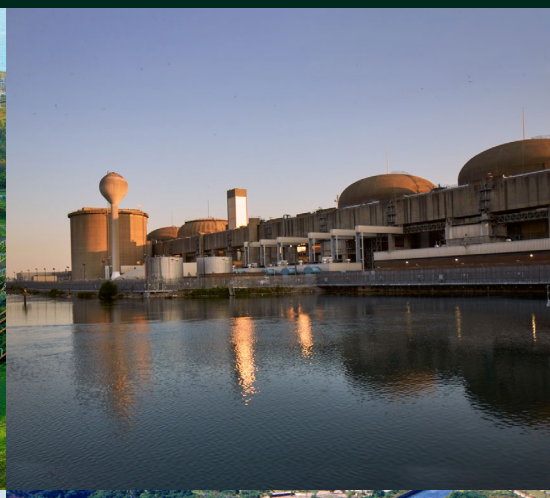
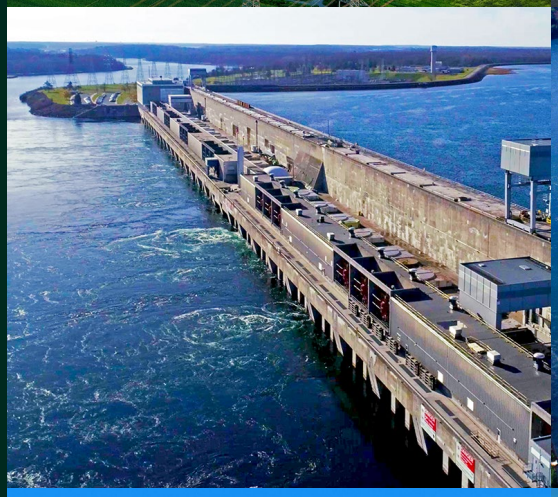
As of December 31, 2023, OPG was Canada's largest corporate issuer of green bond with total green bond issuances of more than $3 billion (including $625 million of green bonds issued by LME). OPG did not issue any green bonds in 2023.

# About OPG

As one of North America's largest, most diverse electricity generators, OPG invests in local economies and employs thousands of people across Ontario and the US. OPG and its family of companies are leading the development of new clean technologies, refurbishment of existing assets, and electrification initiatives to power the growing demand of a clean economy for decades to come. OPG's electricity generation portfolio had an in-service generating capacity of 18,236 megawatts (MW) as at December 31, 2023.

**18,236**
**megawatts**

Our diverse fleet includes nuclear, hydroelectric, biomass, natural gas, and solar generation


As at December 31, 2023, OPG owned and operated two nuclear generating stations, 66 hydroelectric generating stations, two biomass generating stations, one solar facility and four combined cycle gas turbine plants in Ontario, Canada. The combined cycle plants are natural gas-fired facilities owned and operated through OPG's wholly-owned subsidiary Atura Power. Through its US-based wholly-owned subsidiary, OPG Eagle Creek Holdings LLC (Eagle Creek), OPG also wholly or jointly owned and operated 85 hydroelectric generating stations and held minority interests in 14 hydroelectric and two solar facilities in the US as at December 31, 2023. In addition, OPG owns two nuclear generating stations in Ontario, the Bruce A Generating Station (GS) and the Bruce B GS, which are leased on a long-term basis to, and operated by, Bruce Power L.P.

**2** **Nuclear** Generating Stations

**2** Leased **Nuclear** Stations

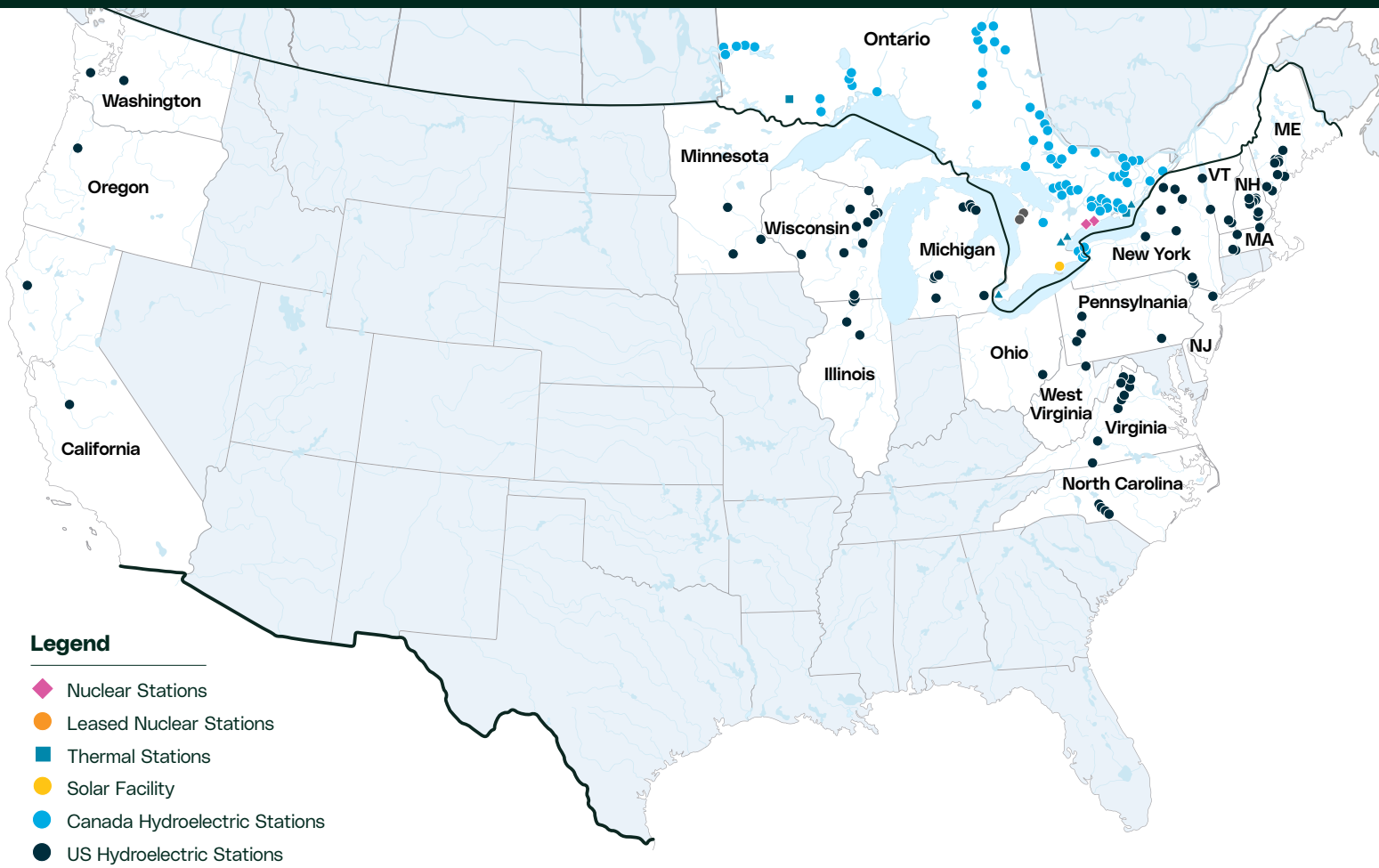
**66** **Hydroelectric** Generating Stations in Canada

**2** **Biomass** Stations

**1** **Solar** Facility

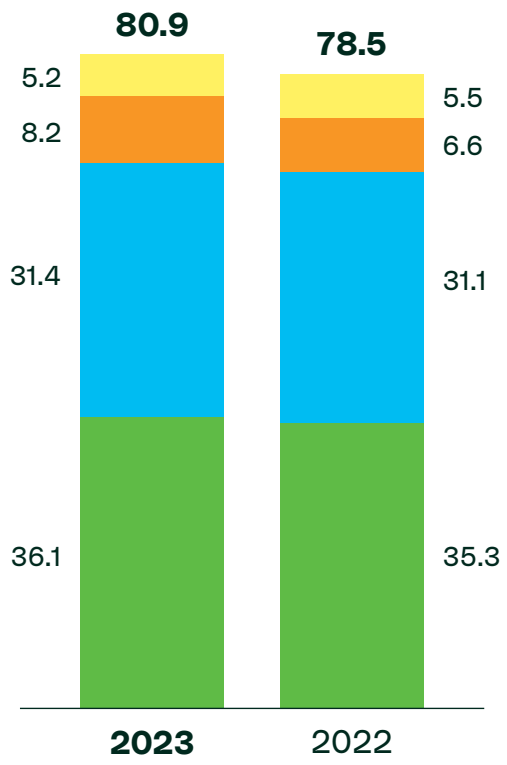
**85** **Hydroelectric** Generating Stations in the U.S.

**4** **Atura Power Combined-Cycle** Generating Stations

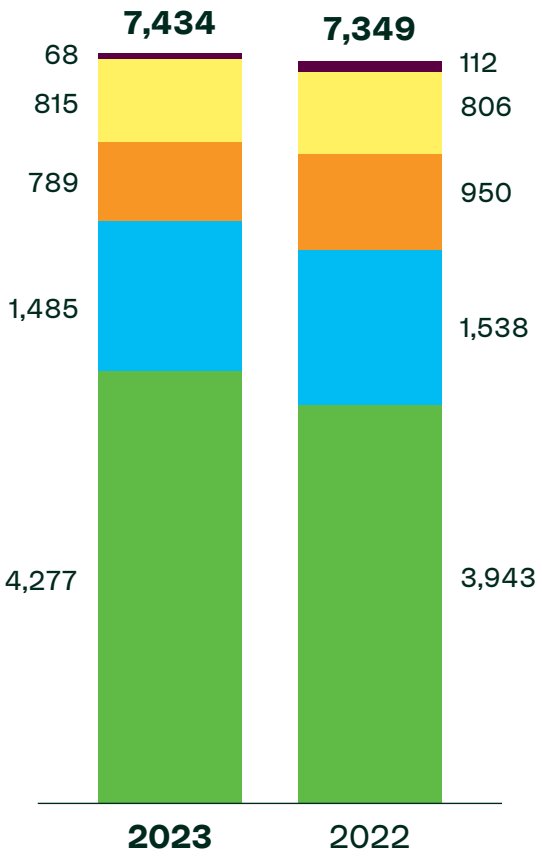


OPG's total electricity production in 2023 was 80.9 terawatt hours (TWh). Low-carbon emitting sources account for the majority of OPG's in-service generating capacity and electricity generation.

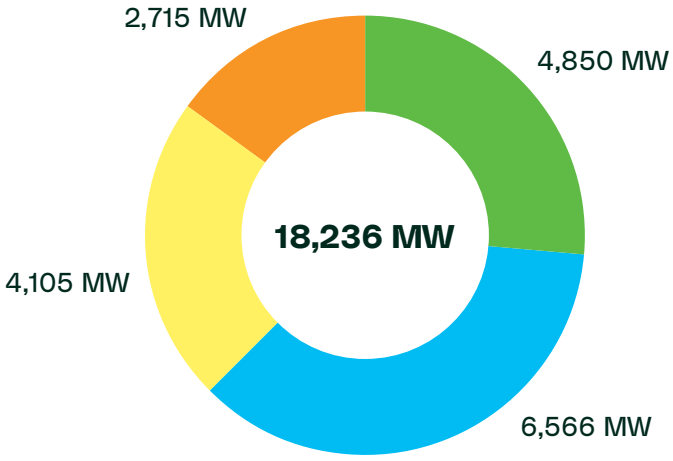
## **Electricity generation** (TWh)




## **Revenue** (millions of dollars)




## **In-service generating capacity** (MW) **as at Dec. 31, 2023**




- Regulated Nuclear
- Regulated Hydroelectric
- Contracted Hydroelectric and Other
- Atura Power
- Other

# Green and Sustainable Bond Frameworks

## Green Bond Framework

Proceeds obtained from green bond issuances have been used to finance or refinance eligible projects that offer tangible environmental benefits. OPG's Treasury group is responsible for reviewing and selecting eligible projects in collaboration with internal experts and stakeholders, which include Operations and Environment. Projects are evaluated using financial and risk-based analyses as well as strategic considerations.

Under OPG's Green Bond Framework (2021), eligible projects were expanded to include eligible nuclear projects in recognition of the critical role the technology plays in fighting climate change and in achieving OPG's climate change goals.

OPG's Green Bond Framework (2021) has been independently reviewed by CICERO Shades of Green which provided a second-party opinion on the quality of the Green Bond Framework (2021), and received a "CICERO Medium Green" shading as well as a governance procedures score in the framework of "Good".

Without limitation, eligible projects generally fall into the categories specified in the following table.

### Renewable Energy Generation

Investments that help supply energy from renewable sources

***Solar Energy***

- Construction of new solar energy facilities
- Maintenance and/or refurbishment of existing solar energy facilities

***Wind Energy***

- Construction of new wind energy facilities
- Maintenance and/or refurbishment of existing wind energy facilities

**Hydroelectricity**

- Construction of new run-of-river hydroelectricity projects with low storage capacity
- Refurbishment, repowering, modernization, and/or maintenance of existing hydroelectricity facilities with the purpose of increasing generation efficiency, operational life span and/or renewable energy output while maintaining or improving the level of operational safety

## Nuclear

Investments that help supply energy from nuclear reactors

***Nuclear Energy***

- Maintenance and/or refurbishment of existing nuclear energy facilities

## Energy Efficiency and Management

Investments that help reduce energy consumption or help manage and store energy

- Transportation Electrification (e.g. development of electric vehicles related infrastructure)
- Industrial Efficiency
- Climate change and eco-efficient products, production technologies and process (e.g. energy storage or charging facilities)

## Climate Adaptation and Resilience

Investments that help reduce potential damages from extreme weather events

- Flood protection and stormwater management
- Extreme weather resistant infrastructure and other forms of flooding mitigation

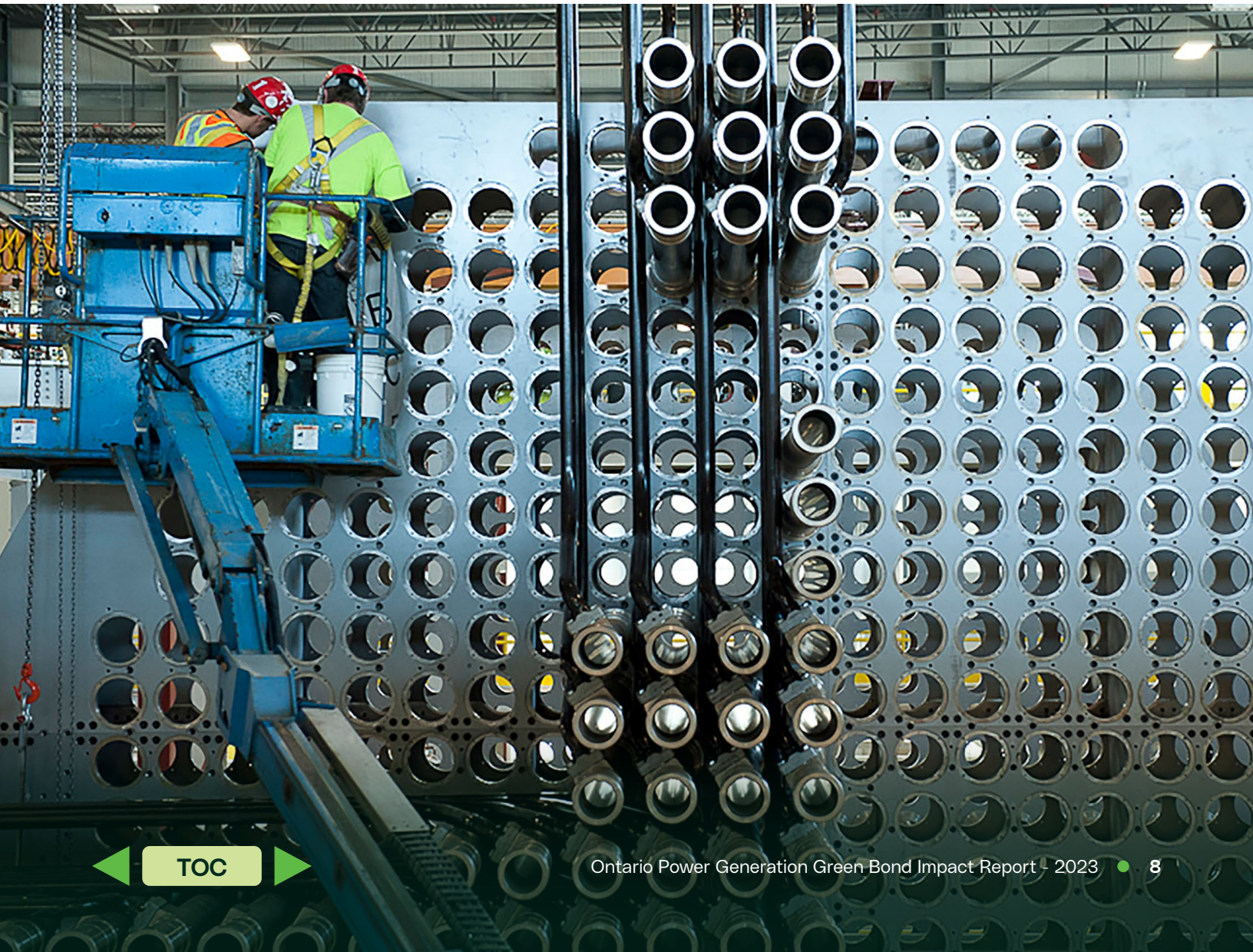
Green bond proceeds can also be used to finance the acquisition, including minority equity participation of eligible projects.

## Sustainable Finance Framework

In June 2024, under OPG's new Sustainable Finance Framework, net proceeds from sustainable bonds may now finance a broader array of projects and programs including:

- New nuclear projects, such as small modular reactors and large new nuclear, in addition to maintenance or refurbishment of existing facilities
- Renewable energy projects like hydro refurbishment, solar, wind and hydrogen production
- Energy efficiency and management solutions such as energy storage and clean fuel storage
- Clean transportation initiatives such as zero-emissions vehicles, and
- Developing climate adaptation and resilience capabilities for flood protection and extreme weather.

Under the Sustainable Finance Framework, OPG and its subsidiaries may issue Green, Social, Sustainability Bonds, and other debt financing instruments which fund eligible Green and Social Assets/Projects.



# Green Bond Management of Proceeds

CICERO Green, in their second-party opinion, note that OPG's management of proceeds are aligned with the International Capital Market Association (ICMA) Green Bond Principles . In addition, Ernst & Young perform a reasonable assurance engagement review annually on the use of proceeds which is published in the Investor Relations section of our website. To date, OPG has used the majority of its green bond proceeds to fund projects that increase OPG's renewable energy generation capacity. The following table summarizes the projects with green bond financing as of December 31, 2023. OPG did not issue any green bonds in 2023.

[1] https://www.opg.com/documents/green-bond-second-party-opinion-from-cicero-november-2021-pdf/

| Eligible Project | Project Status | Allocated Proceeds *(millions of dollars)* | Approved Budget *(millions of dollars)* | Generation Capacity Added *(MW)* | 2023 Electricity Production *(Gigawatt hours (GWh))* |
|---|---|---|---|---|---|
| **Nuclear Refurbishment** | | | | | |
| Refurbishment of all 4 units at Darlington Nuclear Station. The project is expected to be completed in 2026. | In progress | 297.9 | 12,800 | - | 14,673 |
| **Renewable Generation - Acquisitions** | | | | | |
| Acquisition of Eagle Creek Renewable Energy in 2018 and Cube Hydro Partners in 2019. Now operating as Eagle Creek.* | In operation | 1,612.5 | - | 691 | 2,332 |
| **Renewable Generation - New Facilities** | | | | | |
| Peter Sutherland Senior hydroelectric GS. The station was in-service as of 2017. | In operation | 29.7 | 300 | 28 | 60 |
| Nanticoke Solar. The facility was in-service as of 2019. | In operation | 76.6 | 107 | 44 | 74 |

| Eligible Project | Project Status | Allocated Proceeds *(millions of dollars)* | Approved Budget *(millions of dollars)* | Generation Capacity Added *(MW)* | 2023 Electricity Production *(Gigawatt hours (GWh))* |
|---|---|---|---|---|---|
| **Renewable Generation - Existing Facilities** | | | | | |
| Lower Mattagami River redevelopment. New hydroelectric units were added to the existing Little Long, Harmon and Kipling stations. The station at the Smoky Falls site was replaced with a new three-unit station. The six new units were placed in-service in 2014. | In operation | 223.7 | 2,600 | 438 | 1,192 |
| **Renewable Generation - Existing Facilities *(continued)*** | | | | | |
| Sir Adam Beck Pump hydroelectric GS reservoir refurbishment. The project was completed in 2017. | In operation | 27.1 | 58 | - | - |
| Sir Adam Beck water conveyance system rehabilitation assessment. An extensive condition survey of the canal was completed in 2017-2018. | Assessment complete | 5.5 | 12.4 | - | - |
| Ranney Falls hydroelectric GS Unit 3 redevelopment. Completed in 2022. | In operation | 60.2 | 77 | 10 | 68 |
| Sir Adam Beck 1 hydroelectric GS Units G1 and G2 Replacement Project. Placed in service in 2022. | In operation | 2.6 | 128 | 115 | 2,522 |
| Sustaining capital. Various upgrades, replacements and other modifications at over 40 hydroelectric facilities. | In operation | 322.1 | - | - | - |
| **Climate Adaptation and Resilience** | | | | | |
| Little Long Dam safety improvements on the Mattagami River. The project is anticipated to be completed by December 31st 2024 | In operation | 397.4 | 700 | - | - |

***Status updates for OPG's eligible projects under construction are as follows.***

## Little Long Dam Safety Project

OPG is executing the Little Long Dam Safety project to provide additional discharge capacity for the Little Long Main Dam by adding four sluice bays at Adams Creek Sluiceway to comply with current dam safety requirements. The project will also replace end-of-life gates and associated equipment (two at Little Long and eight at Adam Creek Sluiceway) to meet current dam safety requirements and address equipment reliability. During 2023, construction activities on the sluiceway structures were completed and all gates were placed in service. The project has transitioned to site rehabilitation and closure activities. The project is on track to be completed by December 31st 2024 and is tracking within the approved revised budget of $700 million.

The Little Long Dam supports OPG's hydroelectric generating stations on the Lower Mattagami River, which are reported in the Contracted Hydroelectric and Other Generation business segment. The project costs are expected to be recovered under the ESA in place for the Lower Mattagami generating stations.

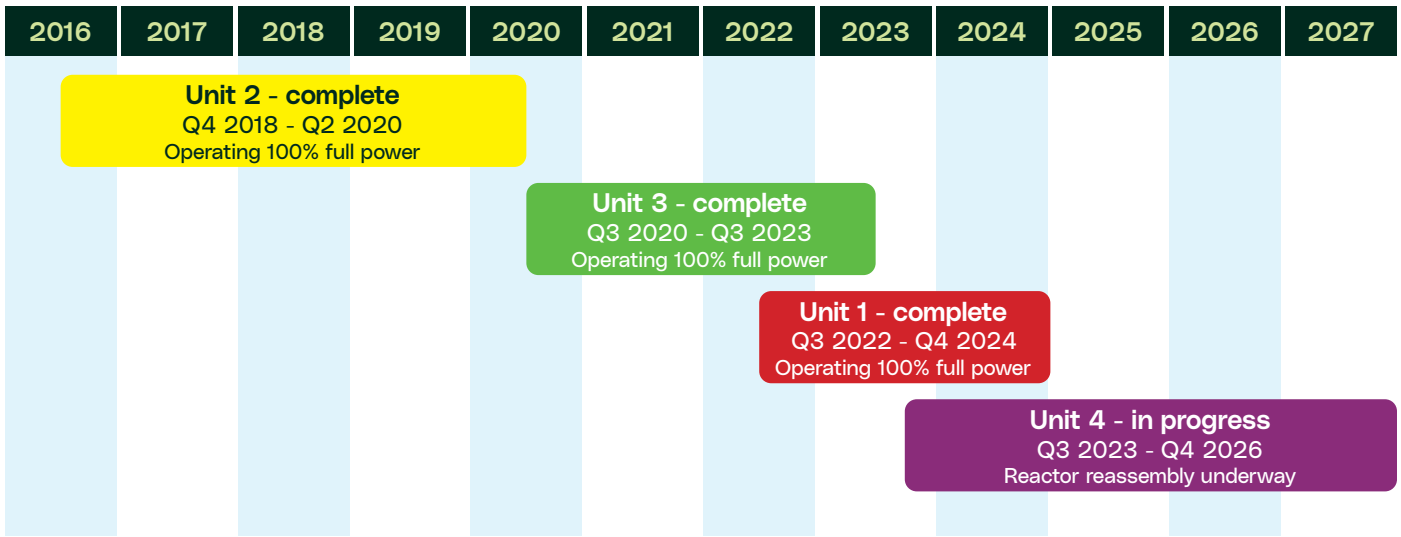

*OPG Treasury completing a site visit of Little Long Dam Safety Project September 2024.*


*Darlington Refurbishment Project – July 2023 – After close to 3 years of safe, quality work and dedication, the Darlington Refurbishment team has achieved a major milestone by successfully connecting Unit 3 back to Ontario's electricity grid.*

## Darlington Refurbishment Project

The Darlington Refurbishment project is expected to extend the operating life of the four units at the generating station by at least 30 years. The refurbishment of the first unit, Unit 2, was completed in June 2020 and the refurbishment of the second unit, Unit 3, was completed in July 2023, ahead of schedule. The third unit, Unit 1, commenced refurbishment in February 2022 and returned to service in November 2024. The refurbishment of the last unit, Unit 4, commenced in July 2023, and is now in the reassembly phase, and is scheduled to be returned to service by third quarter of 2026.

### Refurbishment outage schedule




*Updated November 27, 2024*

**Total duration 120 months*

# Green Bond Impacts

## Clean, Low-Carbon Energy

OPG is striving to build a sustainable future powered by low-carbon electricity. The backbone of Ontario's electricity system is low-carbon, reliable nuclear, which supplies roughly 50% of the province's electricity needs, followed by hydroelectric power, at 25%. Once completed, Darlington Nuclear Generating Station will provide at least 30 more years of low-carbon power to support Ontario's future.

Looking to the future, OPG is now planning to refurbish another major low-carbon energy asset, Pickering Nuclear Generating Station, as well as continuing to advance a project to build North America's first fleet of commercial Small Modular Reactors (SMRs) at our Darlington site.

On the hydroelectric side, OPG continues to advance projects to increase the generating capacity of our fleet of hydroelectric assets to optimize available water flows, and periodically invests in runner upgrades that can make more efficient use of water.

Investing in low-carbon and renewable energy generation projects transform our goals to actions and further demonstrates our continued leadership on climate change. Impact metrics highlighted in this report align with the qualitative and quantitative impact reporting environmental performance indicators included in our Green Bond Framework (2021).


*Having delivered the world's single largest climate action to date by closing our coal stations, OPG will continue to be a climate leader by investing in and implementing $CO^2$ reductions and offsets to achieve net-zero carbon emissions by 2040.*

## 2023 Carbon Dioxide Emissions Avoided

OPG generates low-carbon electricity, which puts the environment at the forefront of what we do.

A commonly used metric to quantify the positive impact of clean energy is carbon dioxide ($CO_2$) emissions reduced/avoided. For the purposes of this report, OPG will consider the amount of electricity produced from its Eligible Projects that have added low-carbon generation capacity and use regional $CO_2$ grid emission factors to provide an estimate of $CO_2$ emissions potentially reduced/avoided. Values are presented in estimated tonnes of carbon dioxide equivalent ($tCO_2e$)

The calculation of $CO_2$ emissions reduced/avoided in Ontario is based on multiplying the annual electricity production from Eligible Projects by an estimated average $CO_2$ emission factor of 390 $tCO_2e/GWh$ from Ontario's natural gas fleet. The calculation of Eagle Creek's $CO_2$ emissions reduced/avoided are based on the United States Environmental Protection Agency Avoided Emissions and Generation Tool (AVERT) regional emissions factors. For 2023, AVERT has reorganized its regional calculations and now splits the contiguous 48 states into 14 regions.

[2] https://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/apo/Mar2024/Carbon-Pricing-Module.pdf

> ***At OPG, we are striving to build a sustainable future powered by low-carbon electricity. Every one of our 11,000 plus employees across Ontario and the United States is helping us toward this goal.***
>
> Ken Hartwick, Chief Executive Officer, Ontario Power Generation

***Note:*** *The actual amount of carbon emissions reduced/avoided by low-carbon electricity displacing electricity from fossil fuels depends on where and when electricity is produced. Regions that already have clean electricity systems have lower potential to reduce/avoid emissions, and the mix of generation sources serving an electrical grid system at particular time can impact which sources are displaced. For clarity, the estimated amount of emissions reduced/avoided represents the total amount displaced by Eligible Project, and not the proportionate amount financed by green bonds.*

| Eligible Project | Region | Grid Emission Factor *(tonnes $CO_2$/GWh)* | 2023 Electricity Production *(GWh)* | 2023 Estimated Emissions Avoided *($tCO_2e$)* |
|---|---|---|---|---|
| **Eagle Creek** *(includes Eagle Creek's 85 wholly owned and operated facilities)* | New England region | 540 | 380 | 205,391 |
| | New York region | 540 | 293 | 158,325 |
| | Mid-Atlantic region | 800 | 574 | 459,447 |
| | Midwest region | 910 | 173 | 157,046 |
| | Carolina's region | 780 | 812 | 633,167 |
| | California region | 540 | 59 | 32,042 |
| | Northwest region | 790 | 40 | 31,660 |
| **Darlington Nuclear** *(Unit 2 and Unit 3)* | Ontario | 390 | 10,601 | 4,134,390 |
| **Sir Adam Beck G1** | Ontario | 390 | 2,522 | 983,580 |
| **Ranney Falls** *(All units)* | Ontario | 390 | 68 | 26,520 |
| **Peter Sutherland Senior GS** | Ontario | 390 | 60 | 23,588 |
| **Nanticoke Solar** | Ontario | 390 | 74 | 28,681 |
| **Lower Mattagami River stations** *(incudes new units at Little Long, Harmon, Kipling and Smoky Falls GS)* | Ontario | 390 | 1,192 | 464,720 |
| | | **Total:** | **16,848.215** | **7,338,558** |

## OPG's Climate Change Goals

To underline our commitment to climate action, in 2020, OPG launched our Climate Change Plan. We continue to monitor and reflect on changing circumstances, share our progress, and make new commitments to climate mitigation, adaptation, innovation, and leadership, as well as new accountability measures for climate action. In alignment with OPG's vision to electrify life in one generation, we will continue to provide updates on our  two ambitious net zero goals:

1. OPG will be a net-zero carbon company by 2040. We will implement and invest in carbon reductions and offsets that achieve an overall balance between emissions produced and emissions removed or displaced from the atmosphere.
2. OPG will help support a net-zero economy in markets where we operate by 2050. We will be a leading energy innovation company, advancing clean technology solutions.

**OPG's Climate Change Plan can be found on the Company's website at www.opg.com.**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