

# Impact Report for Bonds

## OPG Sustainable Finance Framework



### Impact Summary

**Evaluation Date** August 1 2025

**Issuer Location** Toronto, Canada

Sustainalytics has calculated the estimated impact achieved by OPG’s green bond issuances since the inaugural green bond issuance in 2018. As of 31 December 2024, OPG had a total green bond issuance of CAD 4.6 billion (USD 3.3 billion), including CAD 825 million (USD 600 million) of green bonds issued by Lower Mattagami Energy Limited Partnership (LME), a wholly-owned subsidiary of OPG. A total of CAD 4.6 billion has been allocated to projects under the Renewable Energy, Nuclear Energy, and Climate Adaptation and Resilience categories in Canada and the United States. For a representative year, Sustainalytics has calculated 1,047 kilotonnes of avoided emissions in CO<sub>2</sub>e.



**\$4.6 B**  
Allocated funds

**1,047**  
Annual emissions avoided (ktCO<sub>2</sub>e)

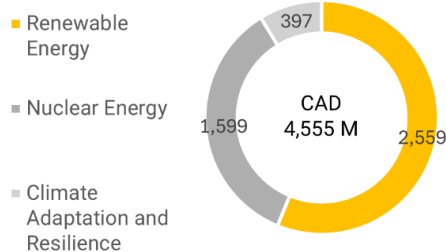
**8**  
Projects

**228K**  
Cars driven for one year

**2**  
Countries

**69M**  
Trees, yearly sequestration<sup>1</sup>

### Allocated Financing by Use of Proceeds Category and Number of Projects by Country



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<sup>1</sup> The figures relating to 69 million trees and 228,000 cars driven are both intended to be illustrations of the annual emissions avoided.

## Introduction

Ontario Power Generation, together with its subsidiaries (“OPG” or the “Company”) generates and sells electricity in Ontario, Canada, contributing approximately half of the electricity consumed in the province. The Company, a corporation wholly owned by the Government of Ontario, generated 82.1 terawatt-hours (TWh) of electricity in FY2024.<sup>2</sup>

OPG’s inaugural green bond was issued in 2018. As of 31 December 2024, OPG had total green issuances of CAD 4.6 billion (USD 3.3 billion), including CAD 825 million (USD 600 million) of green bonds issued by LME, a wholly-owned subsidiary of OPG. The Company has published four frameworks between 2018 and 2024: i) OPG Green Bond Framework – May 2018; ii) OPG Green Bond Framework – April 2021; iii) OPG Green Bond Framework – November 2021; and iv) OPG Sustainable Finance Framework June 2024.<sup>3</sup> The proceeds of these issuances were allocated according to the respective frameworks that were applicable at the time of issuance. Additionally, Sustainalytics provided second-party opinions on the OPG Green Bond Framework – May 2018 and the OPG Green Bond Framework – April 2021, evaluating them as credible, impactful and aligned with the Green Bond Principles 2017 and Green Bond Principles 2018, respectively.<sup>4</sup>

OPG engaged Sustainalytics to quantify the environmental benefits of the projects financed with the proceeds from OPG’s green bonds. Using established methodologies, Sustainalytics has estimated avoided emissions from OPG’s renewable energy and nuclear energy projects. This report presents the details of our findings, including a description of the methodology used to calculate the impacts.

## Scope of Work and Limitations

OPG has engaged Sustainalytics to calculate the environmental impacts of the projects financed through the green bonds. For this work, Sustainalytics relied on the data provided by OPG on the amount allocated and the technical data on the projects financed.

Sustainalytics’ impact reporting is aligned with ICMA’s June 2024 Handbook - Harmonised Framework for Impact Reporting.<sup>5</sup> The methodology and assumptions made for the impact calculation are outlined in the methodology chapter.

As part of this engagement, Sustainalytics exchanged information with various members of OPG’s management team to understand the sustainability impact of its projects. Through these exchanges, OPG’s representatives have confirmed that:

- (1) They understand it is the sole responsibility of the OPG to ensure that the information provided is complete, accurate and up to date;
- (2) They have provided Sustainalytics with all relevant information;
- (3) Any provided material information has been duly disclosed in a timely manner.

Sustainalytics also reviewed relevant public documents and non-public information.

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<sup>2</sup> OPG, “OPG Reports 2024 Financial Results”, (2025), at: <https://www.opg.com/reporting/financial-reports/release/opg-reports-2024-financial-results/>

<sup>3</sup> OPG, “Investor Relations”, at: <https://www.opg.com/investor-relations/bonds/>

<sup>4</sup> The Green Bond Principles are administered by the International Capital Market Association and are available at <https://www.icmagroup.org/greensocial-and-sustainability-bonds/green-bond-principles-gbp/>

<sup>5</sup> ICMA, “Handbook - Harmonised Framework for Impact Reporting”, (2024), at [Handbook-Harmonised-Framework-for-Impact-Reporting-June-2024.pdf \(icmagroup.org\)](https://www.icmagroup.org/handbook-harmonised-framework-for-impact-reporting-june-2024.pdf)

## Impact Findings

For reporting, Sustainalytics follows the ICMA Harmonised Framework for Impact Reporting, which synthesizes market expectations and outlines recommendations for impact reporting to create a standardized reporting structure and to enhance the understanding of the impact for all stakeholders, including bond investors.<sup>6</sup>

Table 1 provides a summary of all projects, including under the Renewable Energy and Nuclear Energy categories, for which Sustainalytics has calculated the impact, as well as allocated amounts to Climate Adaptation and Resilience. Table 2 provides a summary of the Renewable Energy and Nuclear Energy projects. Project-level avoided emissions can be found in the appendices. Table 3 provides details on the amounts allocated to Renewable Energy projects by technology financed under these bonds. Lastly, Table 4 provides a high-level summary of the proceeds allocated to Climate Adaptation and Resilience projects. These metrics correspond to a representative year of the bond's life and are based on the share of project financing.

**Table 1: Summary of Impact – Portfolio Level**

Allocated Amount	Bond Tenor	Financed Emissions Avoided	Financed Emissions Avoided/M CAD <sup>7</sup>
CAD	Years	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year/M CAD
4,554,600,000	17	1,047,419	251.95

**Table 2: Summary of Impact by Use of Proceeds**

Technology	Allocated Amount	Financed Emissions Avoided	Financed Emissions Avoided/M CAD
	CAD	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year/M CAD
Renewable Energy	2,558,500,000	724,555	283.20
Nuclear Energy	1,598,700,000	322,865	201.95

**Table 3: Impact of Renewable Energy Projects by Technology**

Technology	Allocated Amount	Financed Emissions Avoided	Financed Emissions Avoided/M CAD
	CAD	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year/M CAD
Hydropower	2,481,900,000	701,648	282.71
Solar Photovoltaic	76,600,000	22,907	299.04

**Table 4: Summary of Climate Adaptation and Resilience Projects**

Technology	Allocated Amount
	CAD
Dam safety improvements	397,400,000

<sup>6</sup> ICMA, "Handbook - Harmonised Framework for Impact Reporting", (2024), at [Handbook-Harmonised-Framework-for-Impact-Reporting-June-2024.pdf \(icmagroup.org\)](https://www.icmagroup.org/Handbook-Harmonised-Framework-for-Impact-Reporting-June-2024.pdf)

<sup>7</sup> Climate Adaptation and Resilience projects are not included in this ratio, as they do not apply to avoided emissions.

## Methodology

Sustainalytics developed its own methodologies for quantifying GHG avoidance and other metrics, including leveraging publicly available best-in-class methodologies, protocols and frameworks that are currently industry best practice. First, our estimation practices and general principles rely on the GHG Protocol.<sup>8</sup> Our methodologies are based on guidance provided by the IFI Approach to GHG Accounting for Renewable Energy Projects,<sup>9</sup> notably on calculation methodology and global emissions. In addition, we rely on the Partnership for Carbon Accounting Financials' (PCAF) Global Accounting Standard<sup>10</sup> for guidance on estimation where data is not readily available and assumptions must be made. Finally, the UN's Clean Development Mechanism<sup>11</sup> provides guidance and information, serving as the foundation for these and other methodologies, including those implemented in this report.

### Renewable and Nuclear Energy

It is assumed that energy generated by the projects crowd out a mix of current and upcoming planned generation capacity and therefore, the associated emissions from those energy sources. The approach taken to derive GHG avoidance is based on the following:

- a) The emissions of the Renewable Energy projects, which are often (but not always) zero.
- b) The baseline emissions or emissions occurring in the absence of the project. For electricity generation, these emissions are based on the energy mix used to supply electricity to the local grid.
- c) Avoided emissions of the financed projects are calculated using the share of project financing of the total project emissions avoided from the above calculations.

### Data Sources and Assumptions

- For projects included under Renewable Energy, OPG provided energy generation data (in MWh) where available. Otherwise, the project capacity (in MW) was provided.
- For projects where only capacity data was provided, Sustainalytics estimated the annual energy generation based on the technology and location of the projects using historical energy data provided by IRENA.<sup>12</sup> For projects where only energy generation was provided, Sustainalytics estimated the project capacity using the same data.
- The projects consist of both operational assets and those under construction. The calculated emissions avoided make no distinction between the two, assuming all projects are operational for the representative year of the bond. For projects under construction, the expected energy generation is estimated using the project capacity.
- The baseline emissions factors for the countries where projects are located were sourced from the IFI.<sup>13</sup> To account for emissions from upstream activities, Sustainalytics applied an additional, indirect emissions factor.<sup>14</sup>
- For zero-carbon technologies, such as solar and wind energy, the emissions per unit of generation are assumed to be 0 gCO<sub>2e</sub>/kWh.
- For nuclear projects' emissions, emissions factors were sourced from IPCC.<sup>15</sup>

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<sup>8</sup> Greenhouse Gas Protocol, "About Us", at: <https://ghgprotocol.org/about-us>

<sup>9</sup> IFI, "IFI Approach to GHG Accounting for Renewable Energy Projects", (2015), at: <https://documents1.worldbank.org/curated/en/758831468197412195/pdf/101532-WP-P143154-PUBLIC-Box394816B-Joint-IFI-RE-GHG-Accounting-Approach-clean-final-11-30.pdf>

<sup>10</sup> PCAF, "About PCAF", at: <https://carbonaccountingfinancials.com>

<sup>11</sup> CDM, "Methodologies Booklet", at: <https://cdm.unfccc.int/methodologies/documentation/index.html>

<sup>12</sup> IRENA, "Statistics Time Series", (2023), at: <https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Statistics-Time-Series>

<sup>13</sup> UNFCCC, "The IFI Dataset of Default Grid Factors", at: <https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-methodologies>

<sup>14</sup> Calculated by Sustainalytics based on the UK government's conversion factors, the IEA's country profiles and GHG accounting standards.

Government of the UK, "Government conversion factors for company reporting of greenhouse gas emissions", (2025), at:

<https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

International Energy Agency, "IEA Country Profiles", at: <https://www.iea.org/countries>

UNFCCC, "Harmonized IFI Default Grid Factors", at: <https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-methodologies>

<sup>15</sup> Bruckner, T. et al. (2014), "Technology-specific Cost and Performance Parameters", Cambridge University, at: [https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc\\_wg3\\_ar5\\_annex-iii.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf)

- For sustaining capital for hydroelectric power plants, maintenance and similar expenditures, the allocated amount was used to estimate the amount of avoided GHG emissions by using the average of the other hydroelectric projects. Capital spent is assumed to accrue to the total project and is warranted a share of the impact.
- For hydropower projects' emissions, emissions factors were sourced from [hydropower.org](http://hydropower.org).<sup>16</sup>

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<sup>16</sup> IHA, "Hydropower's carbon footprint", (2024), [www.hydropower.org/factsheets/greenhouse-gas-emissions](http://www.hydropower.org/factsheets/greenhouse-gas-emissions)  
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## Appendix 1: Impacts of Renewable Energy by Project

Project Name	Country	Technology	Allocated Amount	Share of Total Project Financing	Annual Project Generation	Financed Generation	Project Capacity	Financed Capacity	Direct Emissions Avoided	Indirect Emissions Avoided	Financed Emissions Avoided	Financed Emissions Avoided/MCAD
			CAD M	%	MWh	MWh	MW	MW	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year/M CAD
Eagle Creek <sup>17</sup>	US	Hydropower	1,613	100	2,026,000	2,026,000	691	691.0	498,215	66,453	564,668	350.18
Sir Adam Beck 1 GS <sup>18</sup>	Canada	Hydropower	35	17.7	571,703 <sup>19</sup>	101,431	115 <sup>20</sup>	20.4	121,980	11,497	23,681	672.77
Ranney Falls GS <sup>21</sup>	Canada	Hydropower	60	79.7	33,500 <sup>22</sup>	26,702	10 <sup>23</sup>	8.0	7,148	674	6,234	103.56
Peter Sutherland Senior GS <sup>24</sup>	Canada	Hydropower	30	11.5	90,000	10,360	28	3.2	19,203	1,810	2,419	81.44
Lower Mattagami River Redevelopment <sup>25</sup>	Canada	Hydropower	422	16.9	1,121,000	189,449	438	74.0	239,180	22,543	44,231	104.76
Sustaining capital, hydroelectric facilities <sup>26</sup>	Canada	Hydropower	322	N/A	N/A	N/A	N/A	N/A	62,320	5,874	60,415	211.72
Nanticoke Solar <sup>27</sup>	Canada	Solar photovoltaic	77	80	76,000	60,8000	44	35.2	23,728	4,905	22,907	299.04

<sup>17</sup> The Eagle Creek project includes the acquisition of Eagle Creek Renewable Energy in 2018 and the Cube Hydro Partners project in 2019, now jointly operating as Eagle Creek.

<sup>18</sup> The Sir Adam Beck 1 hydroelectric GS project includes the replacement of two decommissioned generating units and was completed in 2022. Proceeds allocated to Sir Adam Beck includes amounts allocated to eligible projects on common facilities.

<sup>19</sup> The total annual station generation for Sir Adam Beck 1 was 2,774,000 MWh in 2024, inclusive of the 571,703 MWh this project added in incremental generation.

<sup>20</sup> This project added incremental capacity, resulting in a total station capacity for Sir Adam Beck 1 of 558 MW,

<sup>21</sup> The Ranney Falls GS project consists of a redevelopment of Unit 3 which was completed in 2022.

<sup>22</sup> This project added incremental capacity, resulting in a total annual station generation for Ranney Falls GS of 67,000 MWh in 2024.

<sup>23</sup> This project added incremental capacity, resulting in a total station capacity for Ranney Falls GS of 20 MW, inclusive of 10 MW of incremental capacity.

<sup>24</sup> The Peter Sutherland Senior hydroelectric GS station was in service as of 2017.

<sup>25</sup> The Lower Mattagami River redevelopment includes new hydroelectric units that 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.

<sup>26</sup> The impacts associated with the sustaining capital was calculated based on the estimated carbon avoidance associated with similar projects, as there was no data available on the amount generation associated with this financing.

<sup>27</sup> The Nanticoke Solar facility was in service as of 2019.

## Appendix 2: Impacts of Nuclear Energy by Project

Project Name	Country	Technology	Allocated Amount	Share of Total Project Financing	Annual Project Generation	Financed Generation	Project Capacity	Financed Capacity	Direct Emissions Avoided	Indirect Emissions Avoided	Financed Emissions Avoided	Financed Emissions Avoided/M CAD
			CAD M	%	MWh	MWh	MW	MW	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year	tCO <sub>2</sub> e/year/M CAD
Darlington Nuclear Station Refurbishment <sup>28</sup>	Canada	Nuclear	1,599	11.2	11,721,000	1,315,277 <sup>29</sup>	3,512	394	2,500,824	376,361	322,865	201.95

<sup>28</sup> The Darlington Nuclear Station includes a refurbishment of all four units at the generating station that is expected to extend the operating life. The project is expected to be completed in 2026.

<sup>29</sup> The impacts of the refurbishment were calculated based on the total impacts of the asset divided by the share of project financing.

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