OVERVIEW OF NUCLEAR FACILITIES

1.0 PURPOSE

This evidence describes OPG's nuclear facilities and sets out an overview of OPG's nuclear mandate, objectives, organization, and governance framework.

The evidence is substantially the same as Ex. A1-4-3 submitted in OPG's last payment amounts application (EB-2016-0152) with the exception of an update to Section 3.0, Nuclear Organization.

2.0 OPG'S NUCLEAR GENERATING FACILITIES

OPG's nuclear generating facilities consist of the Pickering Nuclear Generating Station ("Pickering") and the Darlington Nuclear Generating Station ("Darlington") (collectively, the "nuclear generating stations").

All of OPG's nuclear generating stations are based on CANDU technology, a pressurized-heavy-water reactor using natural-uranium technology developed in Canada. CANDU reactors are unique in their use of natural uranium, deuterium oxide (heavy water) as a moderator/coolant, on-line refueling capability and two shut down safety systems. These plants serve as base load resources as they have been designed to operate at full power. Chart 1 below provides basic information about the nuclear generating stations.

Chart 1

Nuclear Generating Stations Basic Information

	Pickering		**Darlington**
	Units 1 and 4[1]	**Units 5-8**	**Units 1-4**
In-service dates	1971 - 1973	1983 - 1986	1989 - 1992
Net in-service capacity	1,030 MW	2,064 MW	3,512 MW
Number of units in-service and size in MW's	2 x 540	4 x 540	4 x 934

1 Pickering Units 2 and 3 were laid up in 1997 and have been placed into a safe store condition for eventual dismantling.

While OPG's ten nuclear units are based on CANDU principles, they reflect three generations of design philosophy and technology with Pickering Units 1 and 4, Pickering 5 to 8, and Darlington built in the 1960s, 1970s, and 1980s respectively. This results in significant variations among the three nuclear stations, including technology, system components and overall design.

Planning is underway to optimize the safe shutdown sequence of Pickering, with Units 1 and 4 operating to 2024 and Units 5-8 to the end of 2025 subject to Canadian Nuclear Safety Commission ("CNSC") regulatory approval (referred to as Pickering Optimized Shutdown). Further details regarding Pickering Optimized Shutdown are provided in Ex. F2-2-3.

Darlington continues to undergo refurbishment of all four units over the period to 2026, with the first unit to be refurbished, Unit 2, successfully returned to service in June 2020, as discussed in Ex. D2-2-1 and Ex. F2-7-1.

A summary of the legislative and regulatory framework applicable to OPG's regulated facilities is provided at Ex. A1-6-1.

3.0 NUCLEAR ORGANIZATION

In the second half of 2020, OPG implementated a realignment of the organizational structure that combined nuclear and renewable generation business units and centralized operations support groups under the leadership of a single Enterprise Operations organization. OPG also integrated major project planning, execution and support responsibilities across the company under a single Enterprise Projects organization, and amalgamated business development and other strategic activities under an Enterprise Strategy organization.

As it relates to the nuclear operations, the Enterprise Operations, Enterprise Projects and Enterprise Strategy is comprised of the following main groups described below, consistent with OPG's organizational chart shown in Ex. A1-5-1.

Enterprise Operations – led by the Chief Operations Officer and Chief Nuclear Officer and, relative to nuclear operations, comprised of:

- **Darlington and Pickering Stations** – led by the Senior Vice President, Pickering and Senior Vice President, Darlington and focused on the operation, maintenance, and performance of Pickering and Darlington.
- **Entreprise Engineering** – led by the Chief Enterprise Engineer and Chief Nuclear Engineer and focused on plant safety and reliability by provision of various engineering services (e.g., design engineering, component engineering, station engineering), as well as providing inspection and maintenance services to Darlington and Pickering facilities.
- **Security and Training** – while reporting to SVP Darlington, provides two main functions across the Nuclear fleet consisting of security services for nuclear sites and facilities as well as nuclear training of personnel to safely operate, maintain and improve performance of the Pickering and Darlington nuclear stations.
- **Integrated Fleet Management** – led by the Vice President, Integrated Fleet Management and, relative to nuclear operations, comprised of:
  - **Generation Strategy and Innovation** – drives improvement by developing, implementing and monitoring fleet-wide programs and procedures for the nuclear stations in operations, maintenance, performance improvement and human performance; also responsible for asset Management and generation planning.

- **Nuclear Oversight** – responsible for managing an independent assessment program that performs a comprehensive evaluation of all activities affecting OPG nuclear facilities for consistency with applicable laws, regulations, regulatory commitments, licences, and other requirements.
- **Nuclear Regulatory Affairs and Stakeholder Relations** – accountable for obtaining required CNSC approvals in a timely manner, ensuring compliance with licences, regulatory requirements and commitments, managing regulatory matters and maintaining working relations with the CNSC.

Enterprise Strategy – led by the Chief Strategy Officer and, relative to nuclear operations, comprised of:[1]

- **Nuclear Waste Management** – responsible for the ongoing long-term management of nuclear waste materials produced by OPG's operations, including low and intermediate level irradiated waste and used fuel, and is predominately funded from the nuclear liabilities. Further details on nuclear waste management including the funding of nuclear liabilities are provided in Ex. C2-1-1.
- **Commercial Services** – responsible for managing existing non-energy businesses (e.g., isotope sales) described at Ex. G2-1-1.
- **New Nuclear Development** – responsible for managing the planning and development of new nuclear at Darlington including small modular reactors as described at Ex. F2-8-1.
- **Decommissioning Strategy** – responsible for evaluating developing strategies for Pickering decommissioning.

[1] Enterprise Strategy also includes the Corporate Business Development & Strategy group, which is presented and attributed to the nuclear business as a corporate support group under the cost allocation methodology at Ex. F3-1-1, consistent with the nature of the function and its presentation in EB-2016-0152.

Enterprise Projects – led by the Chief Projects Officer and, relative to nuclear operations, comprised of:[2]

- **Nuclear Projects** – responsible for the planning, developing and execution of all nuclear projects (other than the Darlington Refurbishment Program).
- **Entreprise Project Management Office** – responsible for oversight of the processes, tools and project expertise necessary to deliver successful projects; serves as a source for best practices, training programs and an organizational focus for improving project performance across all portfolios.
- **Commercial Management& Project Assurance** – responsible for commercial relationships to support effective management of contracts during the post award, execution and close out phases, including Nuclear Extended Services Master Services Agreements and Engineering contracts.

A more detailed description of the roles and responsibilities of the various operating groups in the nuclear business is provided in Attachment 1 to Ex. F2-2-1.

4.0 NUCLEAR OBJECTIVES

OPG's nuclear operations have the following cornerstone major focus areas with the purpose of making the existing nuclear facilities more dependable, predictable, and cost effective:

- **Safety:** The Safety cornerstone makes nuclear safety, employee safety and environmental safety (e.g., radiation) the overriding priorities. It requires that all laws and industry/regulatory expectations are met, activities are performed conservatively and responsibly, and that business decisions are made with the full knowledge of the risks and potential impacts.
- **Human Performance/Leadership:** The Human Performance/Leadership cornerstone recognizes that minimizing individual fallibility and organizational programs/processes is the basis for operational excellence.

[2] Enterprise Projects also includes the Nuclear Refurbishment organization responsible for the planning and execution of the Darlington Refurbishment Program.

- **Reliability:** The Reliability cornerstone requires that OPG operate, maintain and engineer the nuclear facilities such that equipment, performance, availability and output are optimized.
- **Value for Money:** The Value for Money cornerstone delivers solutions that are the best combination of cost, quality and performance.

These cornerstone major focus areas are the basis for the establishment of performance targets and key initiatives during the benchmarking and business planning process, as discussed in Ex. F2-1-1.