### SMR Deployment Program – OPG - Presentation to Fermi Energia

Robin Manley, *VP New Nuclear Development, Ontario Power Generation* Feb 8, 2022



Where a brighter tomorrow begins.

# We are OPG is Ontario's largest clean power generator and clean technology innovator.

A WOMAN ARNED WITH ANCESTRAL VISDOM IS AN UNSTOPPABLE FORCE

who

100% owned by the Province \$59.8 billion in assets More than 9,000 employees across Ontario Leading producer of nuclear isotopes

### our assets

# We have one of the most diverse generating portfolios in North America.

18,876 MW generating capacity

d 66 hydro g stations on 24 river systems 2 nuclear stations 2 leased nuclear stations

2 leased<br/>nuclear1 bio-<br/>massstations<br/>(Bruce Power)station

1 dual-<br/>fueled oil<br/>and gas4 gas<br/>stations<br/>(Atura Power)

<mark>1 solar</mark> facility 85 US hydro stations

### our climate goals

# A net-zero carbon company by 2040

# A catalyst for a zero carbon economy by 2050

### **OPG Climate Change actions**

- The ways we reach our goals are flexible. A lot can change in 20 to 30 years.
- For each carbon reduction measure identified, there is a range of potential applications which will be balanced to achieve our goals.
- The progress of the actions we are exploring over the next 5 years include these:

The potential range of annual carbon reduction achievable to reach our goals using today's available measures (Mt, million tonnes)



### Why Build Ontario's First-of-a-Kind SMR?

- Ontario has an upcoming need for **more clean electricity**, and analysis shows that **nuclear needs to be part of this mix**
- **Global leadership** opportunity for Ontario to capture first-mover benefits and export market opportunities
- Big **economic growth** opportunity for Ontario (i.e., jobs and GDP) and to leverage its nuclear supply chain
- OPG's Darlington site is **approved** to build new nuclear (i.e., SMR)
- OPG's strong project management and nuclear operational expertise
- SMRs are simpler to build and operate than large nuclear
- The Canadian Nuclear Safety Commission (CNSC) has an international reputation as a rigorous and strong nuclear regulator but also open to new ideas and designs



### Technology selection Methodology

OPG established **11** Assessment Areas to identify risks/potential mitigations and opportunities.

### **Assessment Areas**

- 1. Environmental Assessment (EA) Compliance
- 2. Project Management
- 3. Design Progress/Readiness
- 4. Safety Case
- 5. Fuel Supply & Security
- 6. Nuclear Materials & Used Fuel Management
- 7. Licensing Risk
- 8. Financial Review
- 9. Economic Development Potential
- 10. Economic Value to Ontario & Opportunity for Indigenous Communities
- 11. Contractual Agreements & Business Case Considerations

## **Developers in final review process**

#### **Developers considered:** ٠

- GE-H BWRX-300 (1x300MWe unit proposed) ٠
- ٠
- ٠
- X-Energy Xe-100 (4x75MWe units proposed)
  - Terrestrial IMSR-400 (2x195MWe units proposed)



# Darlington New Nuclear Project



### First SMRs in Western World

 On Dec. 2, 2021, we announced we will work together with GE Hitachi Nuclear Energy (GEH) to deploy a Small Modular Reactor at the Darlington new nuclear site

 OPG is also working on a micro-reactor project, called Global First Power, which is 5 MW (electric), design by Ultra Safe Nuclear Corporation, for a different site

# **Technology Overview**

GE Hitachi: BWRX-300

- **GEH SMR Technologies Canada** is the Canadian division of the world-leading provider of reactor technology and nuclear services.
- ~300 megawatt electrical (MWe)
- Light water, boiling water reactor technology
- Generation III+ Design
- Designed for a 60-year operational life



# A look to the future



### Darlington New Nuclear

**Our goal** is to build the first on-grid SMR on-schedule and onbudget at the Darlington site, as early as 2028.



Beginning of Site Preparation Activities



Application to the CNSC for a Licence to Construct



Further develop the accuracy of the cost estimate



Continue collaboration with GE Hitachi on SMR design, engineering, planning and licensing.

# These three letters can help solve climate change.



### Preliminary timeline for DNNP – on track

Darlington New Nuclear Project   Illustrative Timeline									
2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
	Technolo Selectio	9Y							Community
Technology Development		Design	Site Preparation		SMR Construction		Co	mmissioning/Run-up	Operation
Darlington Site Preparation Licence Renewal Issued			Licence to Construct Issued			Licence to Operate Issued			

### **Darlington SMR Program**

- Plan for an SMR program at Darlington that could potentially see 1,200MW on site
- Multi-phased approach:
  - First project occurs in phases
  - Subsequent projects conditional on the success of the first project and confirmation of demand requirements
- Optimize one-time costs, such as transmission, by spreading them over additional generation eventually needed by the electricity system
- Decisions along the way based on the eventual program needs (e.g. cooling infrastructure, how to minimize mobilization/demobilization costs)



# Development Opportunities SMRs

- Potential for "fleet approach" in other provinces:
  - MOU with Ontario, Saskatchewan, New Brunswick, and Alberta cooperating to advance SMRs
- Potential international interest:
  - Europe
  - United States
  - Australia

