

OPG's Small Modular Reactor (SMR) Development Plan

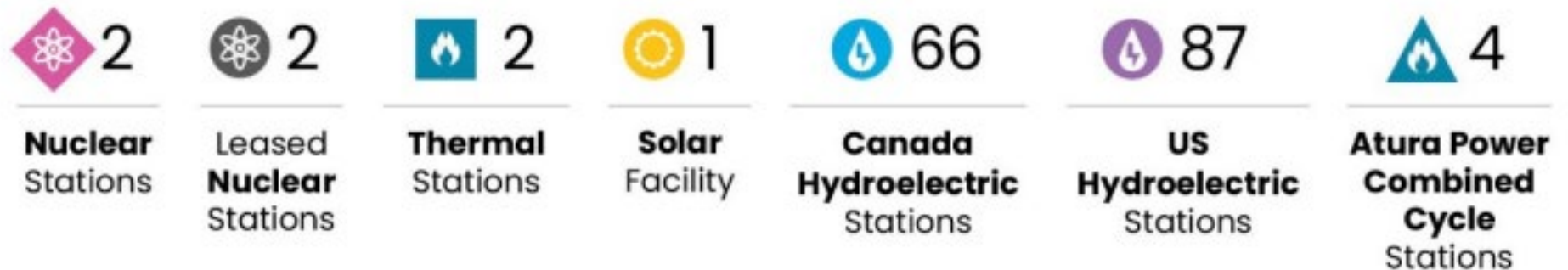
September 22, 2022

OPG's Small Modular Reactor (SMR) Development Plan


Christopher Deir, Director of Strategy and Acquisitions, Ontario Power Generation

Who are we?

- Largest low-cost power generator in Ontario
- 100+ years of operating experience
- 18,900+ MW generating capacity in Ontario
- Industry innovator & leader



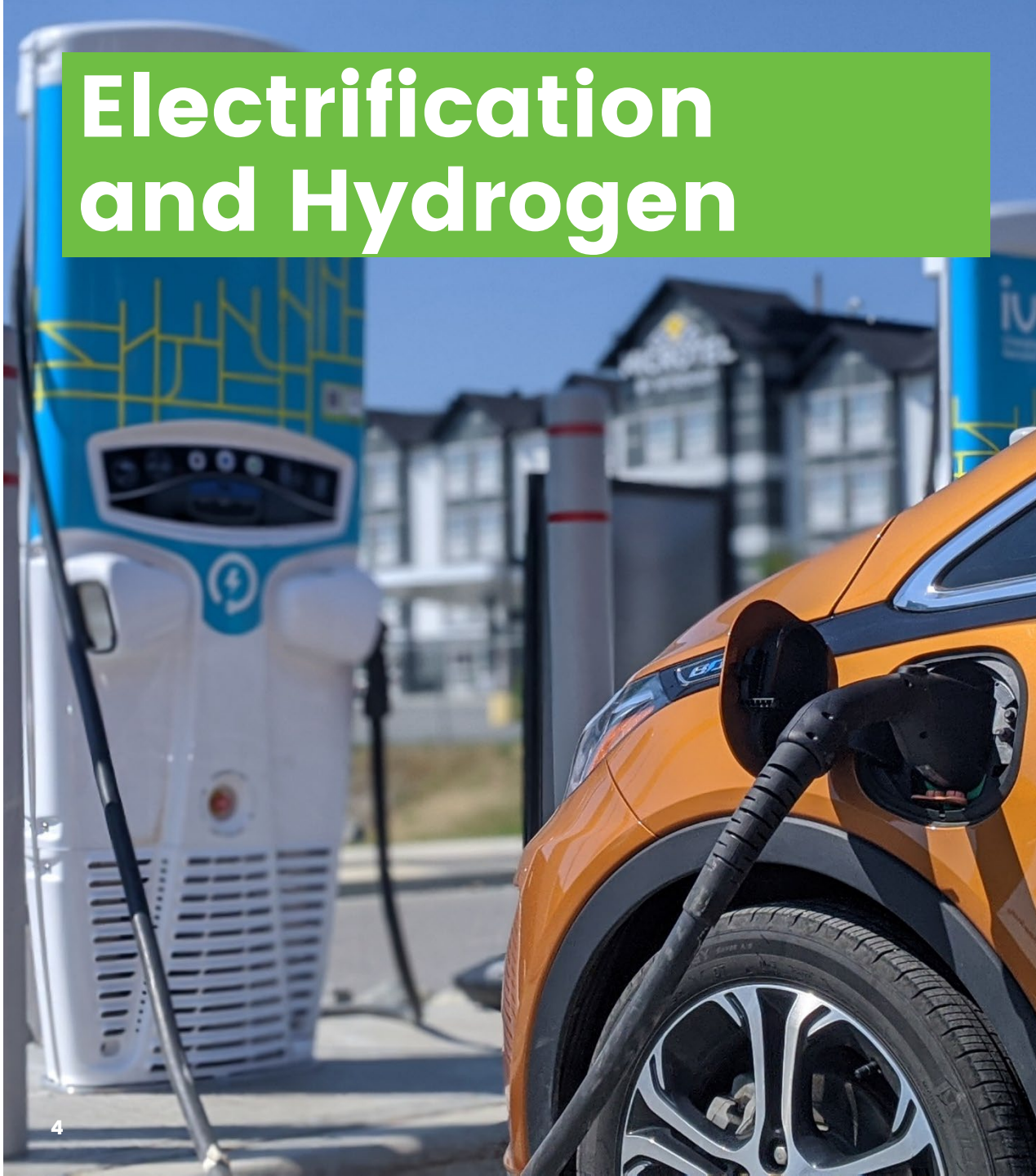
OPG's Climate Change Action Plan



A net-zero
carbon
company by
2040

A net-zero
carbon
economy by
2050

Electrification and Hydrogen



- **Decarbonizing through Electrification**
- **Current OPG Electrification Projects**
 - TTC eBus charging infrastructure
 - Ivy EV Fast Charger Network
 - Amherst and Wolfe Island electric ferry charging infrastructure
- **Potentially lower electricity rates.**

- **OPG, through its subsidiary, Atura Power is actively exploring Hydrogen**

- **Opportunity to leverage our clean energy assets to produce low-carbon hydrogen for:**
 - Long-haul transportation
 - Industry using onsite fuel burning
 - Blending with natural gas



hydro upgrades and Renewables

- Investing \$2.5-billion in our 66 units hydro fleet to sustain and/or increase generation through our turbine/generator overhaul program, which will span more than 20 years.
- Nanticoke Coal site converted to a 44 MW solar facility in First Nations.
- Partnered on an off-grid solar and storage micro solution for the Gull Bay First Nation community.
- Developed two other energy storage facilities for industrial companies' peak energy management.



small modular reactors



- **Smaller than traditional reactors.**
 - <1 MW to ~300 MW.
- **Ownership in a Micro Modular Reactor™.**
 - Joint venture with Ultra Safe Nuclear Corporation for SMR at Chalk River.
- **Work with GE Hitachi to SMR at Darlington by 2028.**
- **Leverage Ontario supply chain**

NUCLEAR

- **Darlington Nuclear Generation Station provides 20% of Ontario's power.**
- **The Darlington Refurbishment project is one of Canada's largest clean energy projects.**
- **A refurbished Darlington station will reduce carbon emissions by an estimated 297 million tonnes (2 million cars)**
- **Provides \$89.9 billion boost to Ontario's GDP.**



Small Modular Reactors

Helping us solve climate change

- SMRs are a type of advanced nuclear reactor, the **next evolution of nuclear energy**.
- Designed to be smaller in size than a traditional reactor, but also produce **safe, reliable, clean energy**.
- Based on the **same science** as larger reactors:
 - Fission to create heat energy, for electricity or other heat applications (e.g. district heating, water desalination, hydrogen production, process steam)
- Same technology, **different applications** (e.g. on-grid, off-grid, advanced).
- **Based on technology** that has existed around the world for 50+ years.

These three letters can help solve climate change.



Small Modular Reactors



On-grid SMRs

- 150 to 300 Mwe
- Reliable, baseload power
- Displace coal-fired generation
- Near term deployment; by the end of this decade

- GE-Hitachi BWRX-300



Advanced Reactors

- 10 to 150 Mwe
- Advanced reactors
- Heavy industrial applications
- Expected to be deployed in mid-2030s

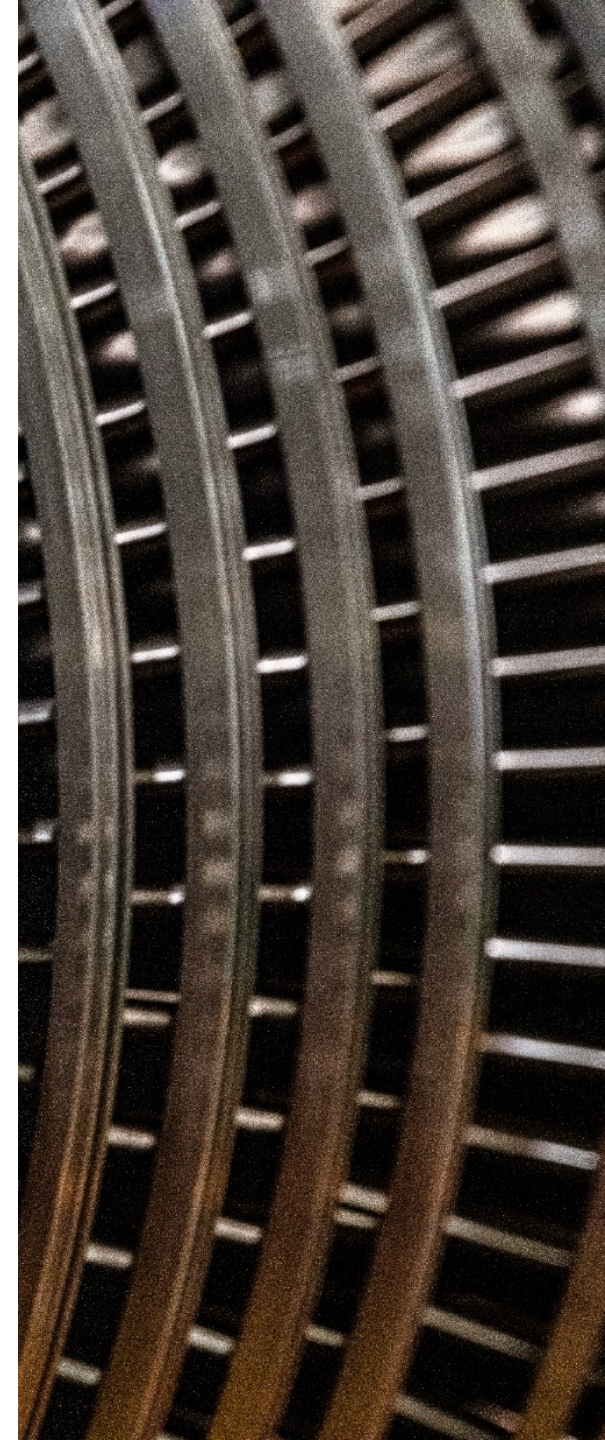
- ARC
- Moltex
- X-Energy



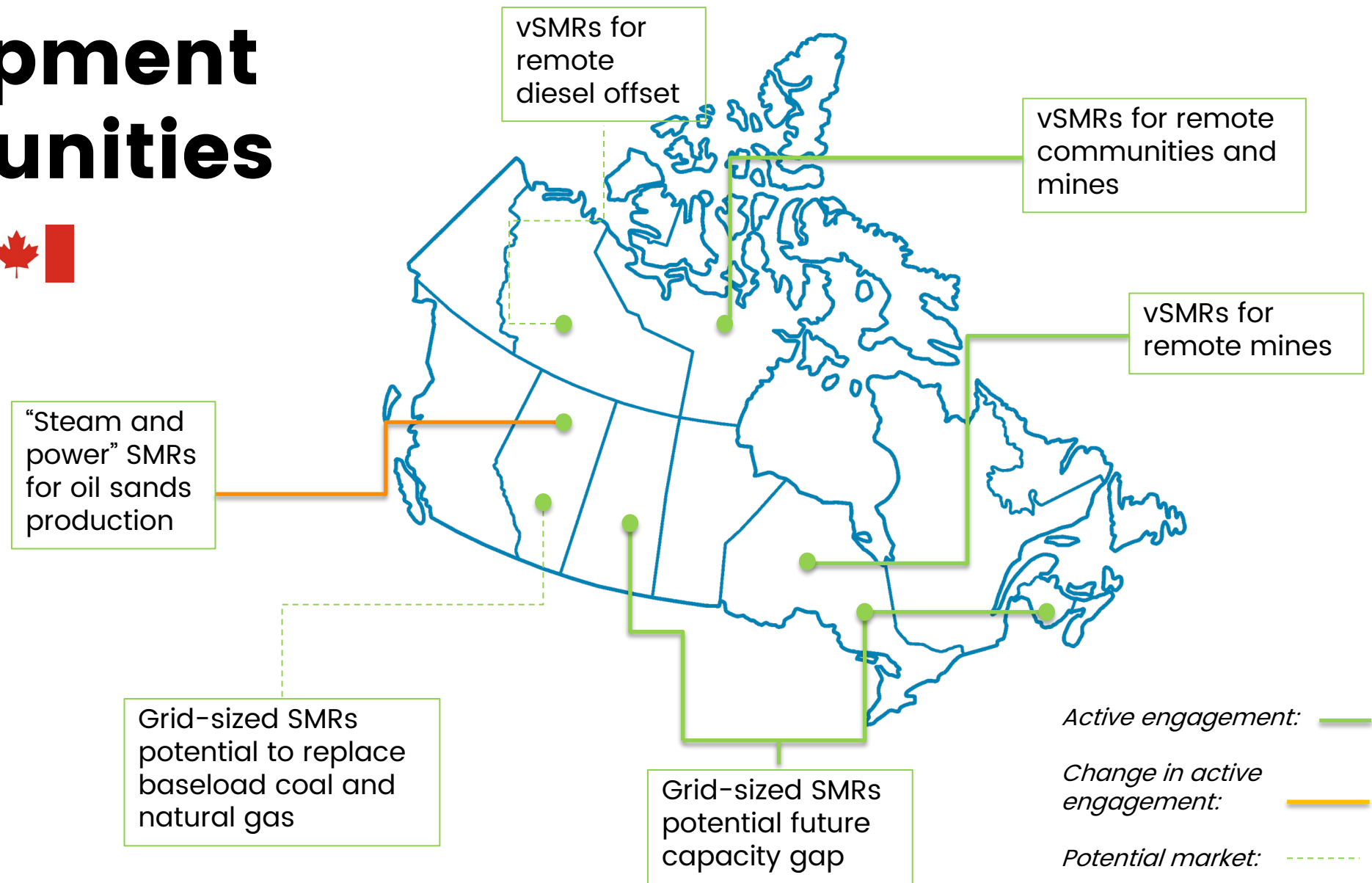
Off-grid SMRs

- 1 to 10 MWe
- Ideal for remote industrial and off-grid communities
- Commercial demonstration in the mid/late 2020s.

- Global First Power MMR
- Westinghouse eVinci



Development Opportunities SMRs





Darlington New Nuclear Project



On-gird SMRs

GE Hitachi: BWRX-300



OPG's SMR technology selection - **December 2021**
Contract for site preparation activities - **March 2022**



Darlington is the only site in Canada **licensed** for new nuclear build with an **accepted environmental assessment**.



Creating **new opportunities** for Ontario's robust nuclear sector and supply chain.



Allows **low-carbon** nuclear energy to continue playing an important role in **Ontario's future** energy mix.

Technology Overview

GE Hitachi: BWRX-300

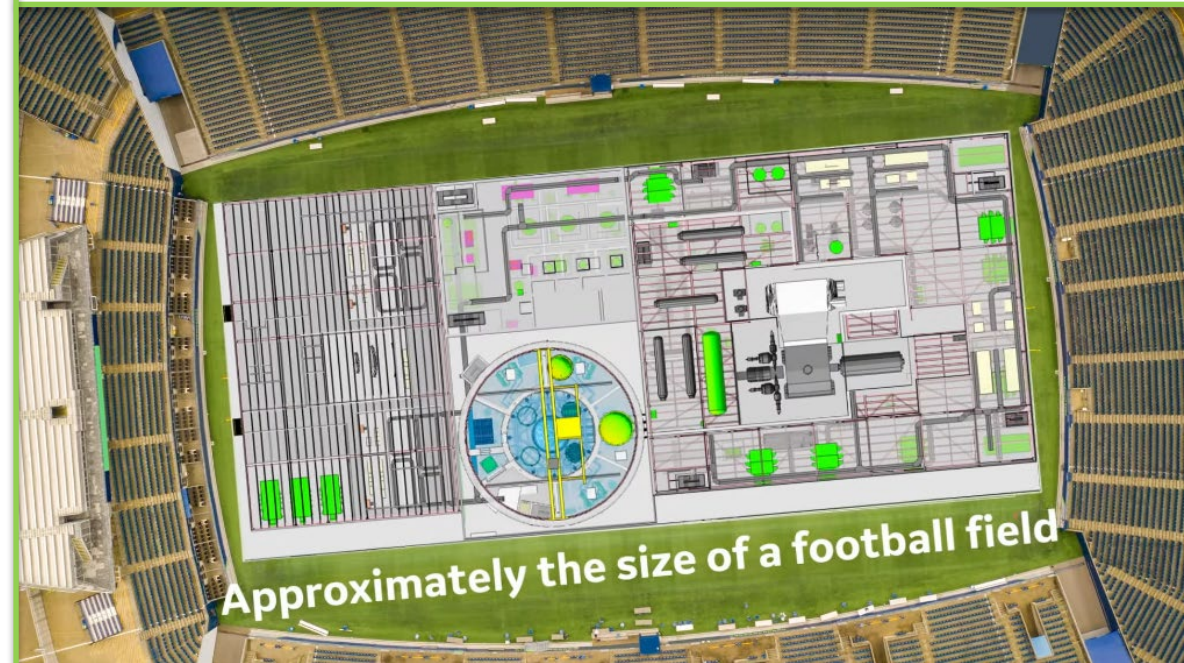
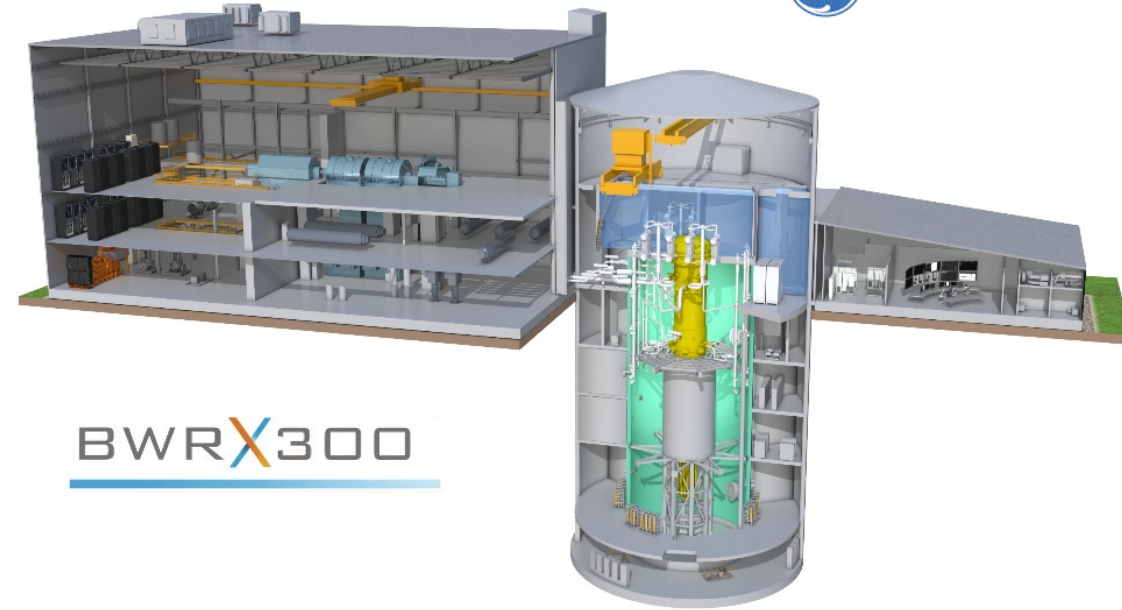
Designed for a 60-year operational life

~300 megawatt electrical (MWe)

Light water, boiling water reactor technology

Generation III+ Design

GEH SMR Technologies Canada is the Canadian division of the world-leading provider of reactor technology and nuclear services.



2022 Project Look Ahead

OPG's goal is to build the first on-grid SMR on-schedule and on-budget at the Darlington site, towards the end of this decade.



Beginning of Site Preparation Activities



Application to the CNSC for a
Licence to Construct



Further refine
the cost estimate

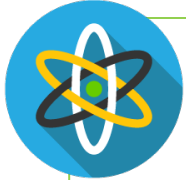


Continue collaboration with GE Hitachi on SMR
design, engineering, planning and licencing.



Off-grid SMRs

Global First Power Micro Modular Reactor



Demonstration project at the **Chalk River Laboratories** site; Ultra Safe Nuclear Corporation (USNC) designed **Micro Modular Reactor (MMR)**.



Applied for a **Licence to Prepare Site** and **Environmental Assessment (EA)** underway.



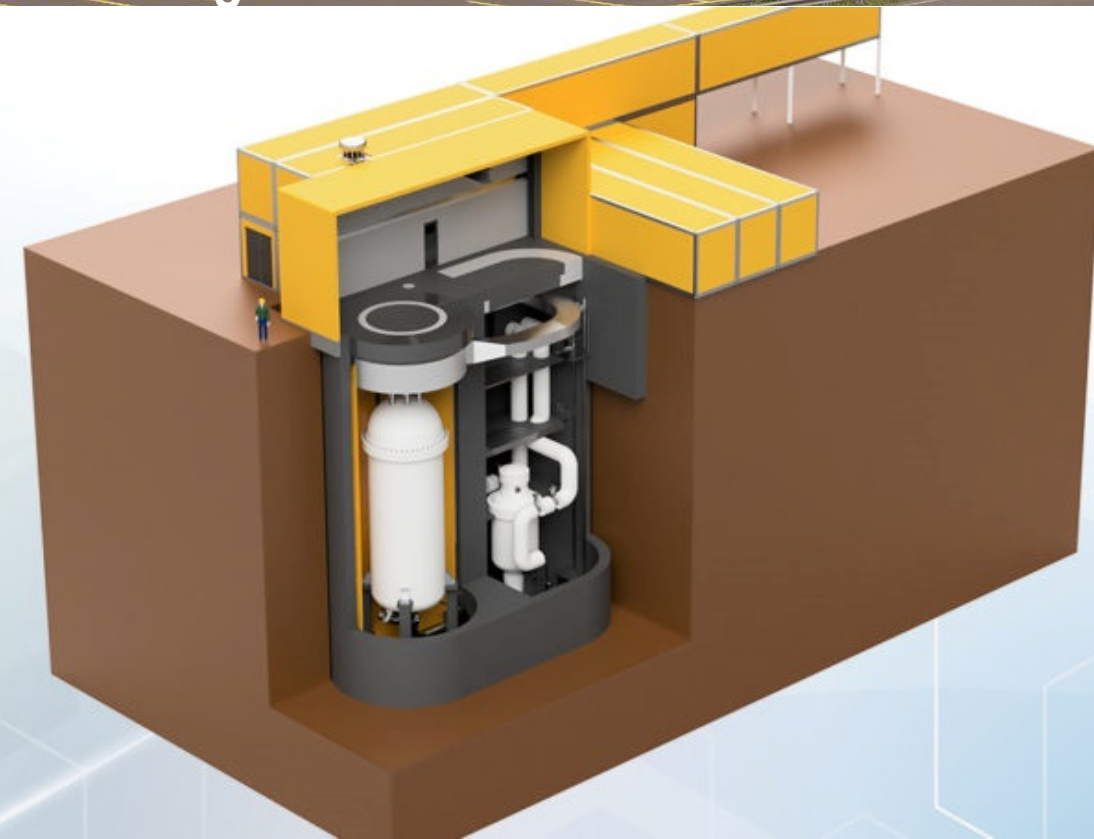
15 MW of heat energy (approx. 5 MW of electricity).



Lifespan anticipated to be **20 years**, after which the reactor will be decommissioned and the site restored.



Rendering of the MMR® at Chalk River



Advanced Reactors

X-Energy Xe-100



OPG and **XE** developed a framework agreement to evaluate opportunities to **deploy the Xe-100 for industrial applications** in Ontario, and support efforts to deploy across Canada.



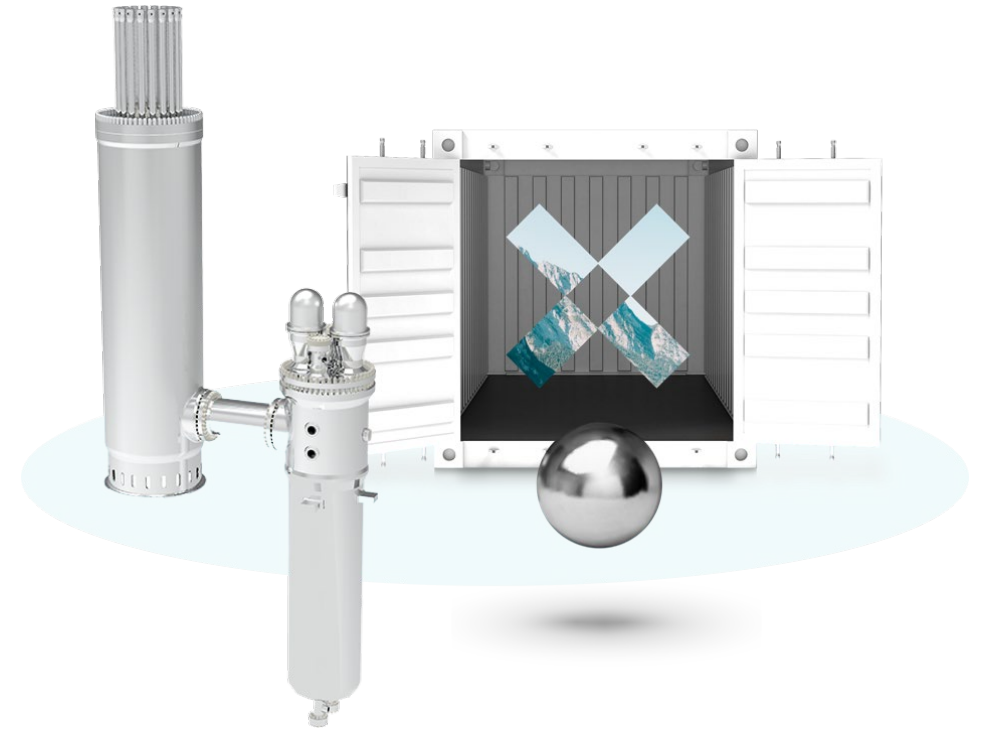
The **Xe-100 builds and improves** on decades of high-temperature gas reactor research, development, and operating experience.



One Xe-100 unit can generate up to **80 MW of electricity** from **200 MW of thermal power**.



The Xe-100 can directly support heavy industry including **oil sands operations** and **mining applications**.





Building on OPG experience, Laurentis is a leading **SMR Service Provider**



Who are we? A Diverse and Innovative Company

Founded in 2012, as a
subsidiary of Ontario
Power Generation (OPG)

- Originally named Canadian Nuclear Partners (CNP)
- Rebranded in 2020 as Laurentis Energy Partners
- Retains the name CNP SA in Romania as a subsidiary of Laurentis

ONTARIO / Pickering / Hamilton / Port Elgin /
Toronto

NEW BRUNSWICK / Saint
John

ROMANIA / Bucharest /
Cernavoda



Moving the Global Energy Industry Forward

Built on 50 years of nuclear operations experience and combining strategy, safety, innovation, design and engineering, we lean on our Pillars to Nuclear Success to deliver:

- Leading-edge nuclear expertise
- Responsible business
- Forward-looking
- Positive customer impact
- Safety-oriented

BUSINESS LINES

Small Modular Reactors

Inspection Services

Isotope Production

Refurbishment

Nuclear Materials &
Decommissioning



Why OPG?

**Why not
OPG?**



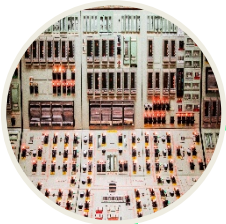
Highly trained staff



Project execution
success



Strong nuclear
supply chain



Operational
expertise



A large industrial facility, likely a power plant, with a prominent grid of circular openings in a metal structure. Two workers are visible: one in a blue sweater and orange hard hat in the foreground, and another in a green shirt and white hard hat in the background. The scene is filled with pipes, scaffolding, and industrial equipment.

Thank you. Questions?