

Ontario Power Generation



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Project Director | Balance of Plant, Nuclear Refurbishment

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ONTARIO
POWER
GENERATION

Darlington Refurbishment



\$12.8B investment



20-year project: 10 years of planning, 10 years of work. **35-44 months per unit.**



14,200 jobs per year.



\$89.9B dollars into Ontario's GDP.

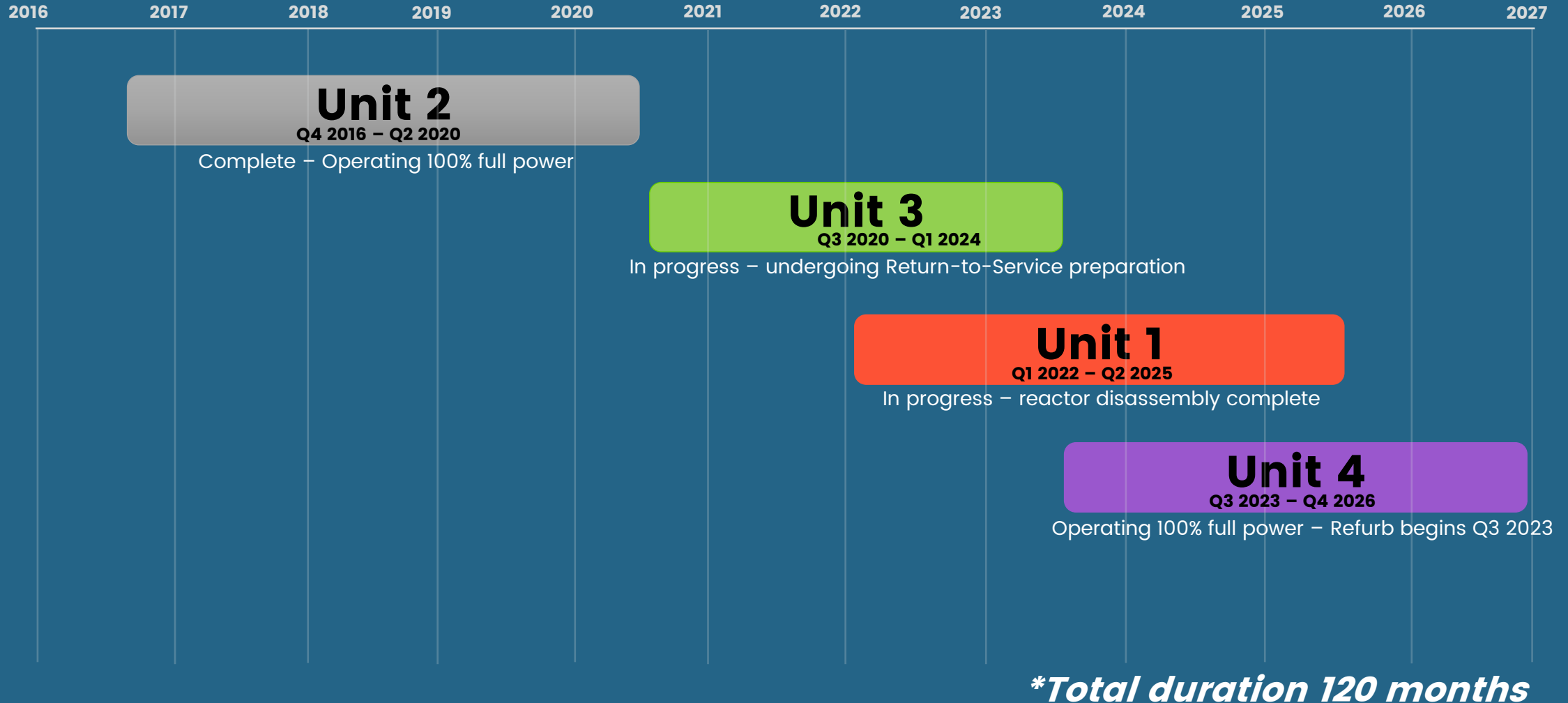


96% of expenditures **spent within Ontario.**





Refurbishment Outage Schedule



Scope and Vendors



Defuel, Fuel Handling



Retube and Feeder Replacement



Turbine/Generator



Steam Generators



Balance of Plant

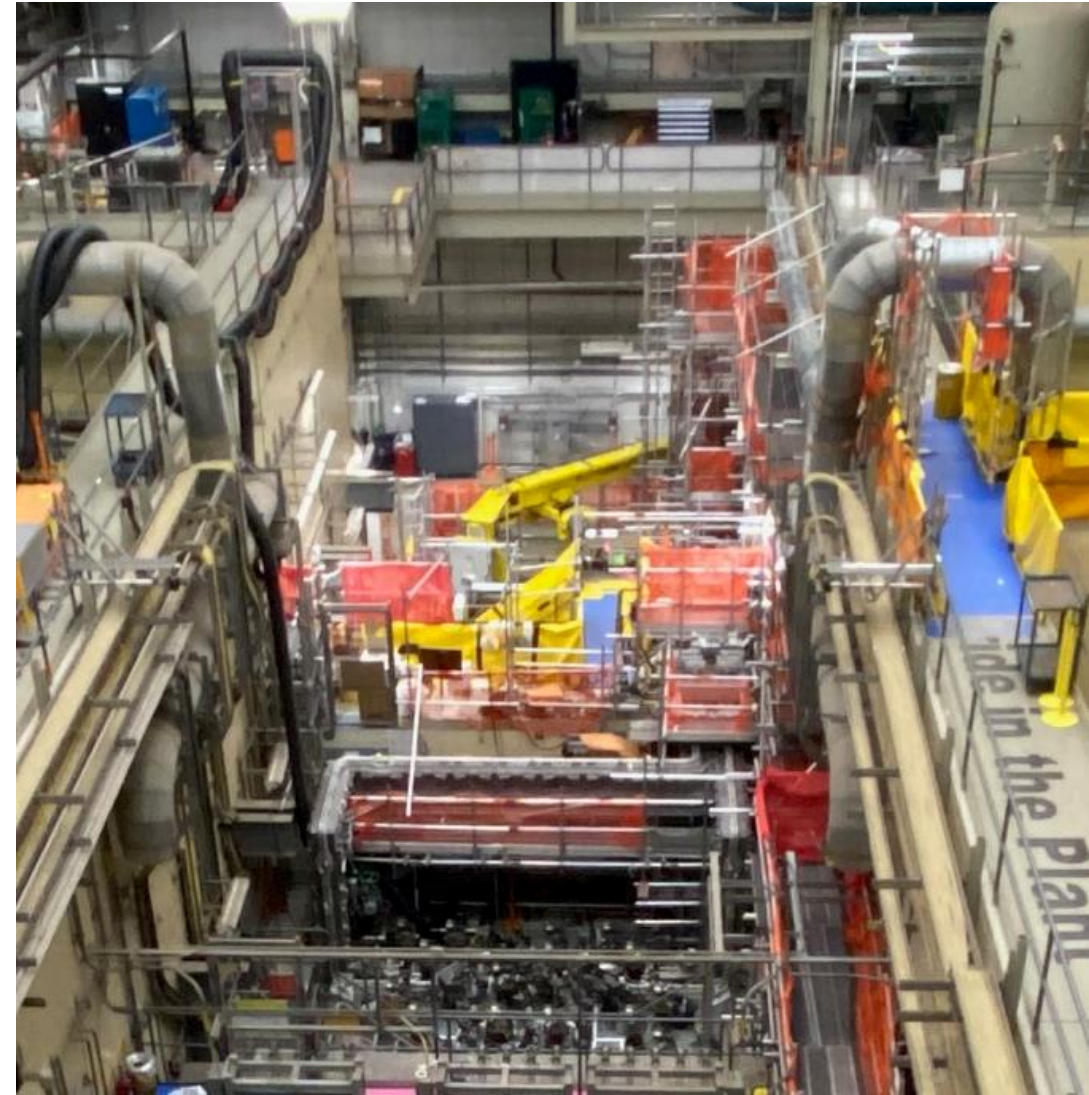


Cyclic Outage

Unit 2 – Complete & Lessons Learned

On June 4, 2020, Unit 2 was reconnected to Ontario's electricity grid, after a 44-month refurbishment.

- Over 4,000 lessons learned from the knowledge and experience gained on Unit 2 during planning and execution.
- Ongoing lessons learned built into plans for Units 3, 1 & 4.
- **UPDATE:**
 - Following the installation of an innovative Target Delivery System by Laurentis Energy Partners and BWXT Medical Ltd. in Dec 2022, life-saving Molybdenum-99 (Mo-99) isotope will be produced in Unit 2 reactor (pending CNSC and Health Canada approval)
 - A world-first for a commercial power reactor
 - Unit 2 is the only source of Mo-99 in North America
 - 30 million annual diagnostic procedures world-wide



Unit 3 Status Update

- Unit 3 Refurbishment started September 3, 2020.
- Static commissioning of Turbine Control modifications completed Sept 2022; successful first-of-a-kind at Darlington and in the nuclear industry
- 6,240 bundles of new fuel loaded into reactor (Dec 2022)
- Reactor construction complete; reactor and unit ownership transferred to Darlington station operations
- Undergoing operational testing and required CNSC approvals to return the Unit to commercial operations
- Ahead of schedule and forecasting to complete in Q3 2023
- **Update:**
 - Cobalt-60 production capabilities have been installed into Unit 3 reactor
 - Ontario CANDU reactors produce 50 per cent of the world's supply of Cobalt-60



Unit 1 Status Update

Breaker opened on Unit 1 (Feb. 15, 2022) marked the halfway point in the Darlington Refurbishment Project **and** the refurbishment of two different units at the same time for the first time ever at Darlington,

- Reactor disassembly complete (Apr 2023)
 - 960 feeder tubes, 960 endfittings, 480 calandria tubes and 480 pressure tubes
- Inspections and installation of new reactor components are progressing on plan



Unit 4 Status Update

- Work planning, design engineering efforts, procurement and execution of pre-requisite work continues to progress well.
- Planning for Unit 4 is underway and scheduled to commence its Refurbishment execution in Q3 2024.
- Lessons learned and future opportunities from Units 2, 3 and 1 are being incorporated into Unit 4 planning.



Our Vendor Partners

At various times throughout the project, we have over **3,000** additional skilled trades on site supporting Refurbishment.





DARLINGTON NUCLEAR REFURBISHMENT PROJECT

30 more years of clean electricity

Nuclear energy plays a fundamental role in Ontario's clean-energy equation

The refurbished Darlington Station will reduce greenhouse gas emissions by an estimated

297
million tonnes

That's the equivalent of removing

2 million cars per year
from Ontario's roads



1 in 5

homes and businesses are powered by Darlington with virtually no greenhouse gases



~20%

of Ontario's power is supplied by Darlington – enough to serve a city of 2 million people



60%

of Ontario's daily electricity needs are supplied by this province's nuclear fleet



8¢ kWh

30 years of power below average costs

Summary

Safety performance continues to exceed the construction industry in Ontario.

- Project execution continues to progress well.
- Overall program on schedule and budget.
- Darlington Refurbishment is one of OPG's key climate change initiatives.
- The refurbishment of the four Darlington units remains on plan for completion by the end of 2026.





Questions?

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