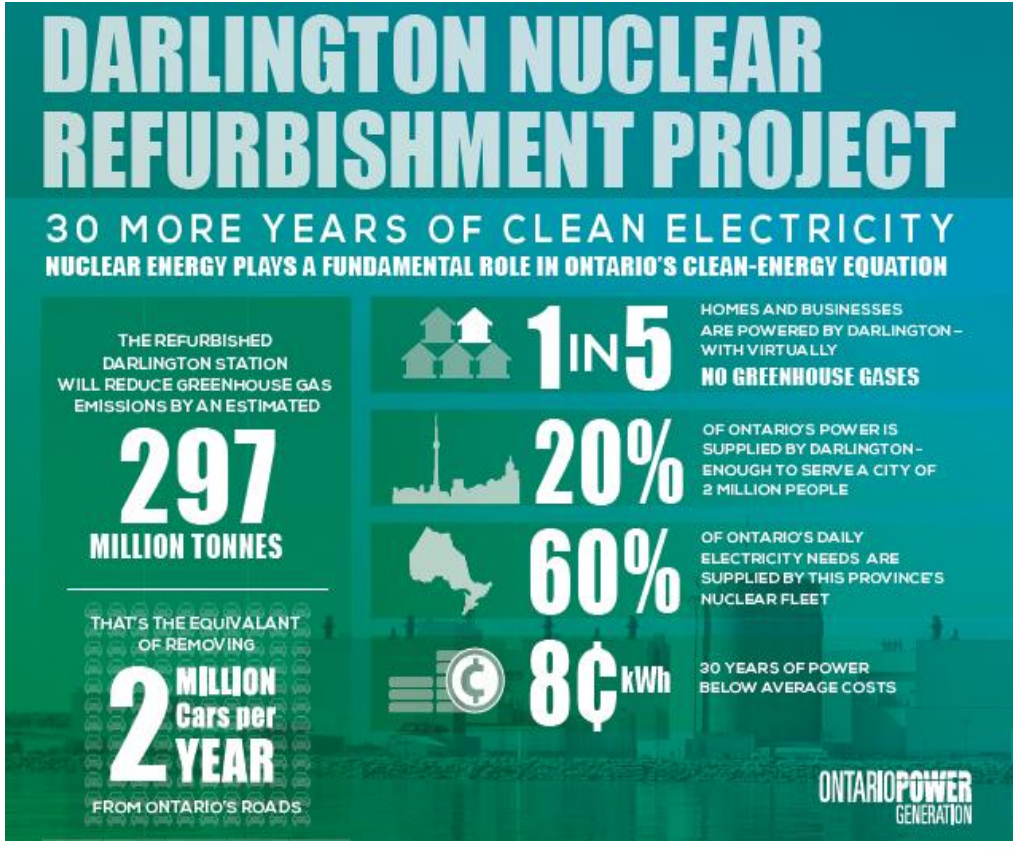
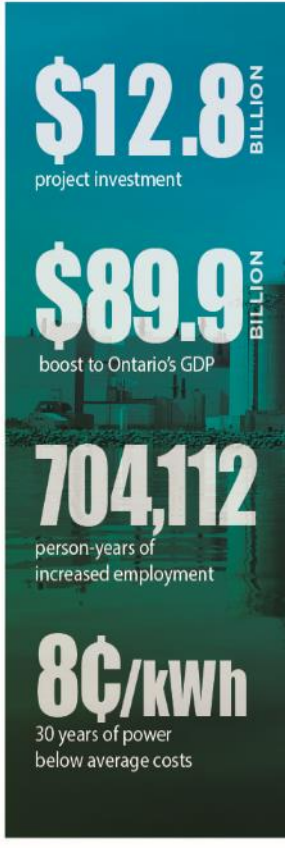
Darlington Refurbishment Update

February | 2020

GE | CANATOM POWER GROUP | FOX CONSTRUCTORS LTD. | BWXT Canada Ltd. | Black & McDonald | ONTARIO POWER GENERATION

Darlington Refurbishment & Cont'd Operations



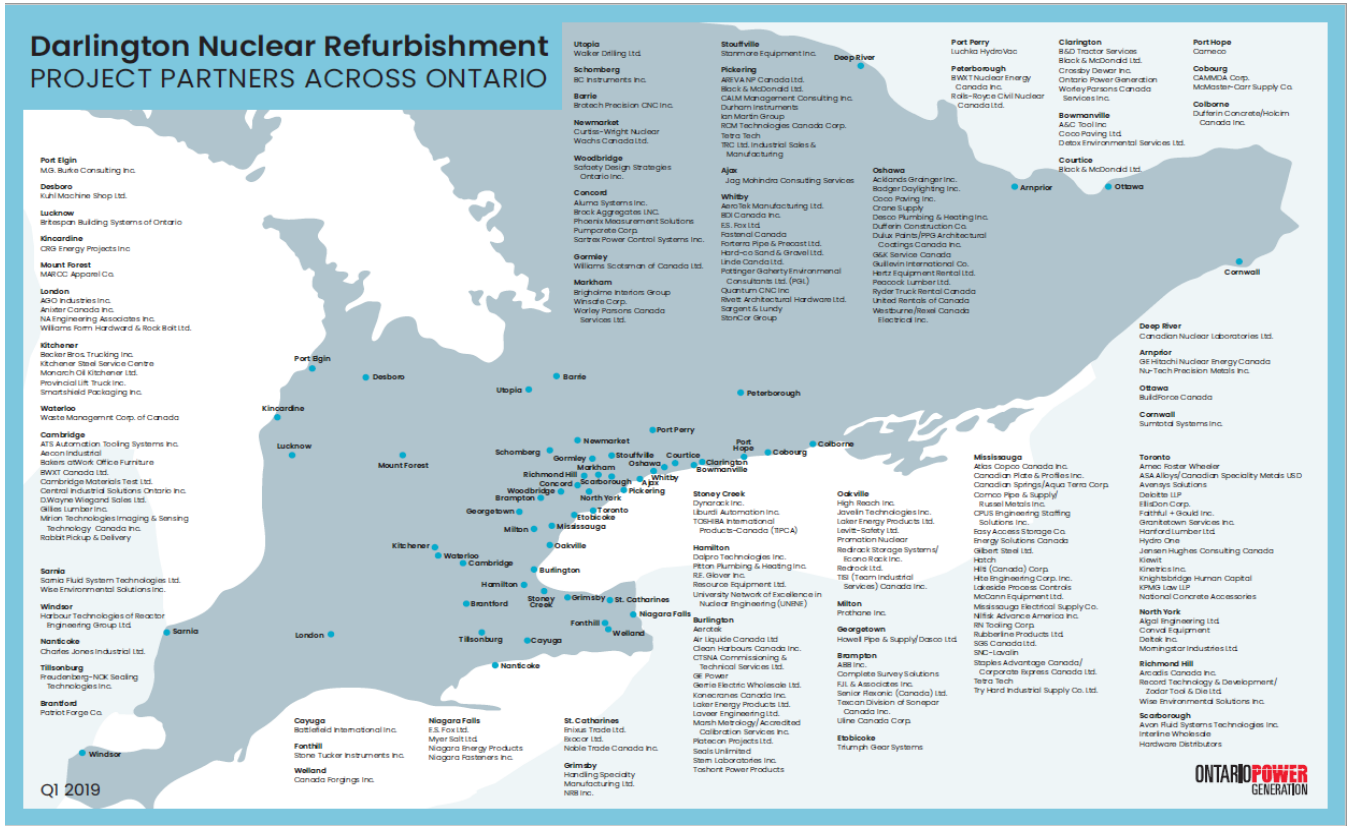


Average number of jobs per year
14,200

Government revenues
$9.3 billion

Corporate profits before tax
$7 billion

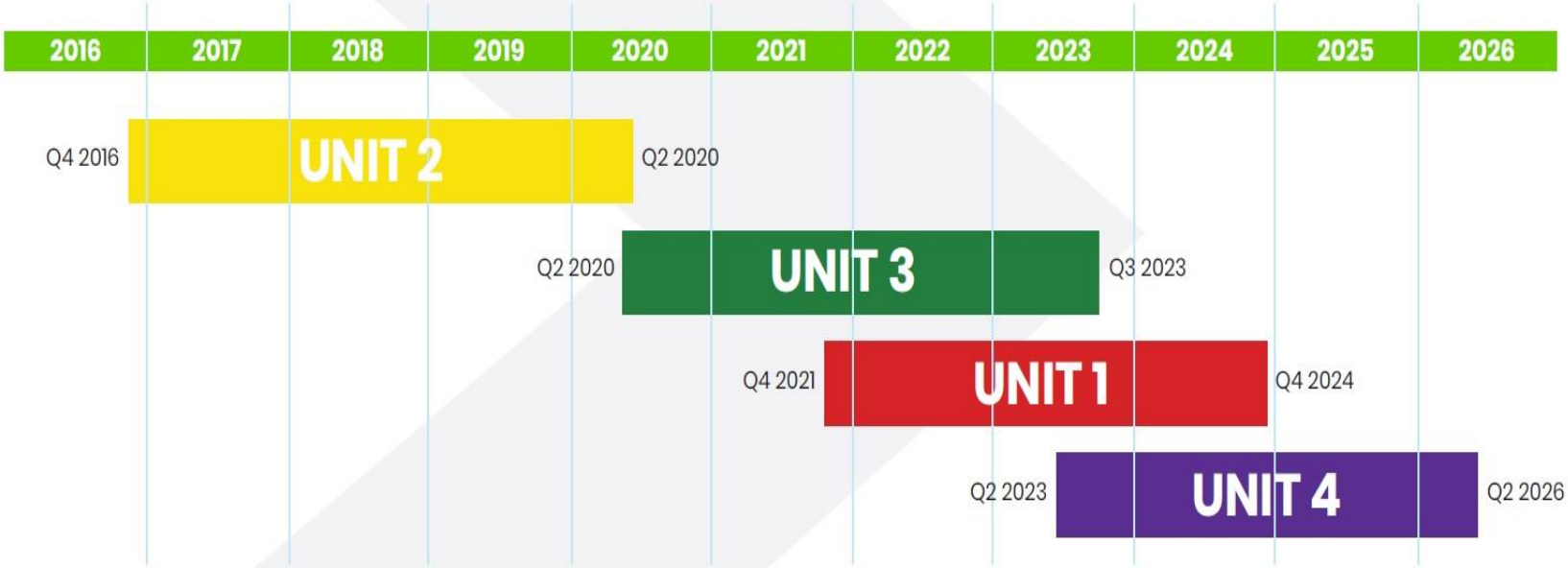
Darlington – Creating jobs for Ontario



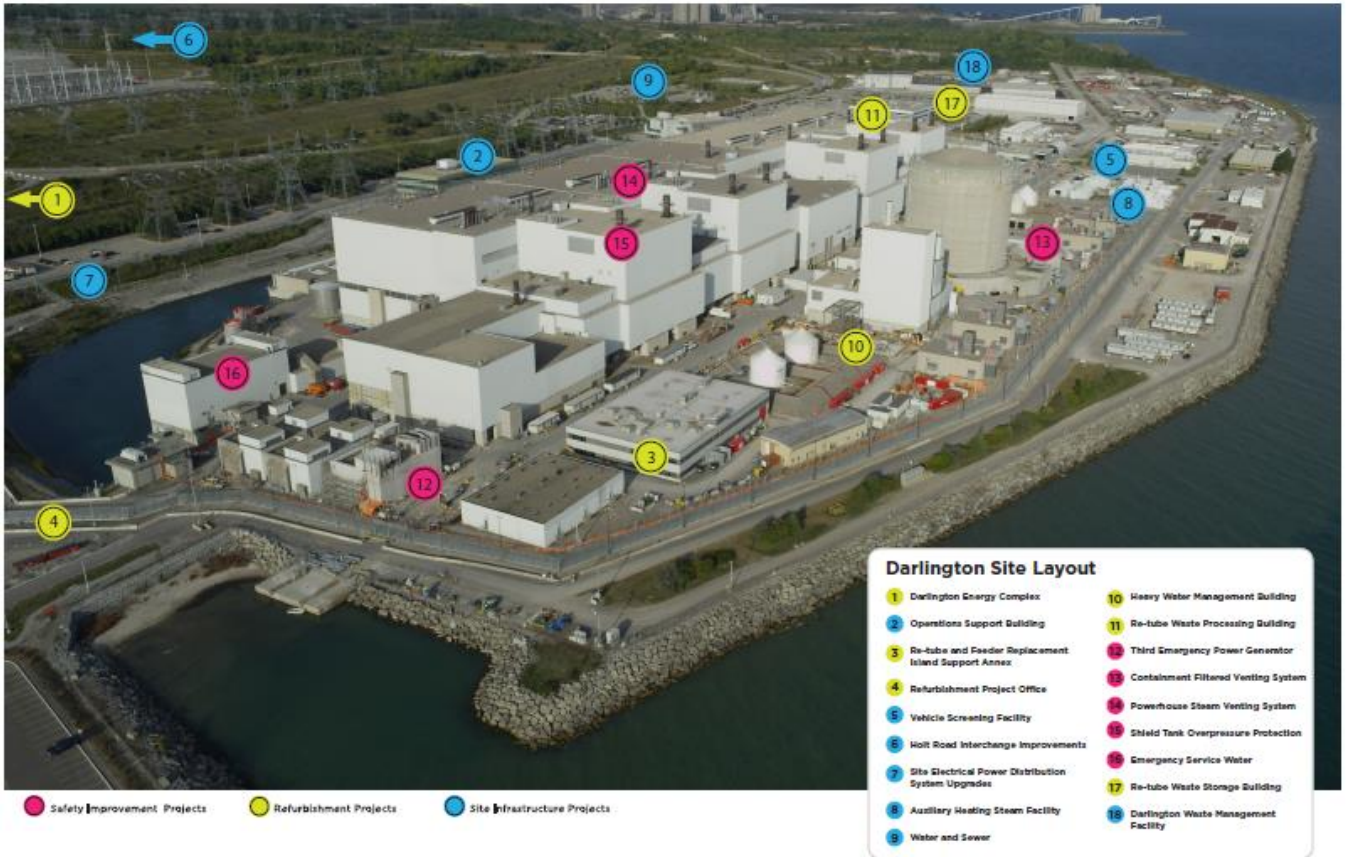
Meeting Canada's Climate Change Goals

One of Canada's largest infrastructure and clean energy projects.

Darlington Refurbishment Schedule



Infrastructure and Safety Projects



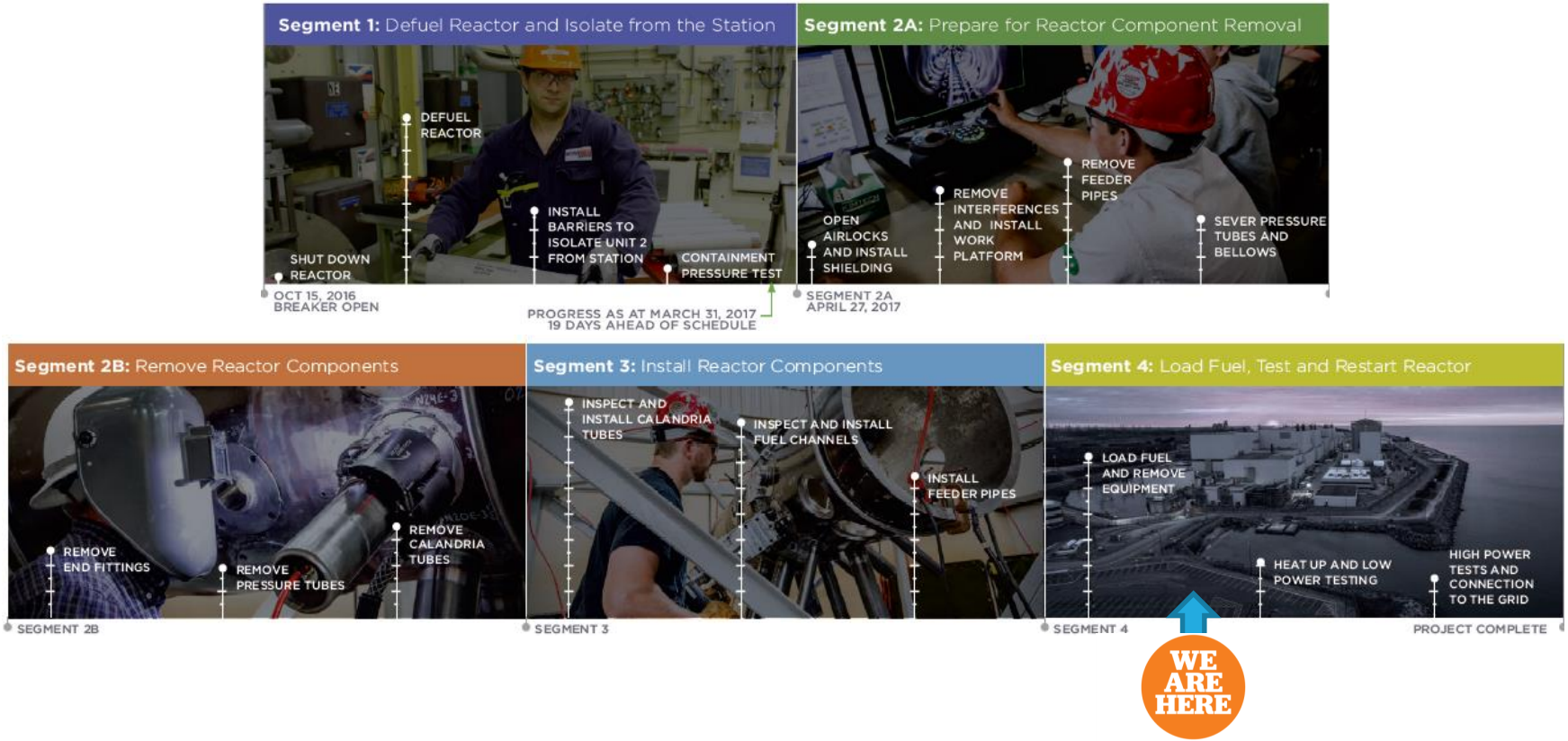
ALL 18

projects complete

Heavy Water (D2O) Storage Facility – Construction Complete

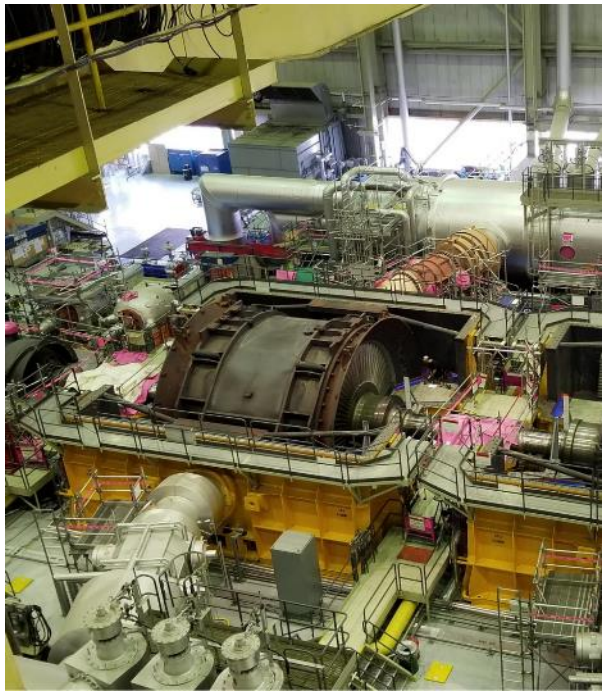
- Fit for purpose end of November –ahead of Unit 3 need date
- 32 systems completed
- Receive and store heavy water for overlap units in the province
- Water will be upgraded by Tritium Removal Facility

Unit 2 Progress



Steam Generator Work - Complete

Turbine Generator Major Overhaul - Complete



The Lower Pressure 2 Steam Inlet Casing installed

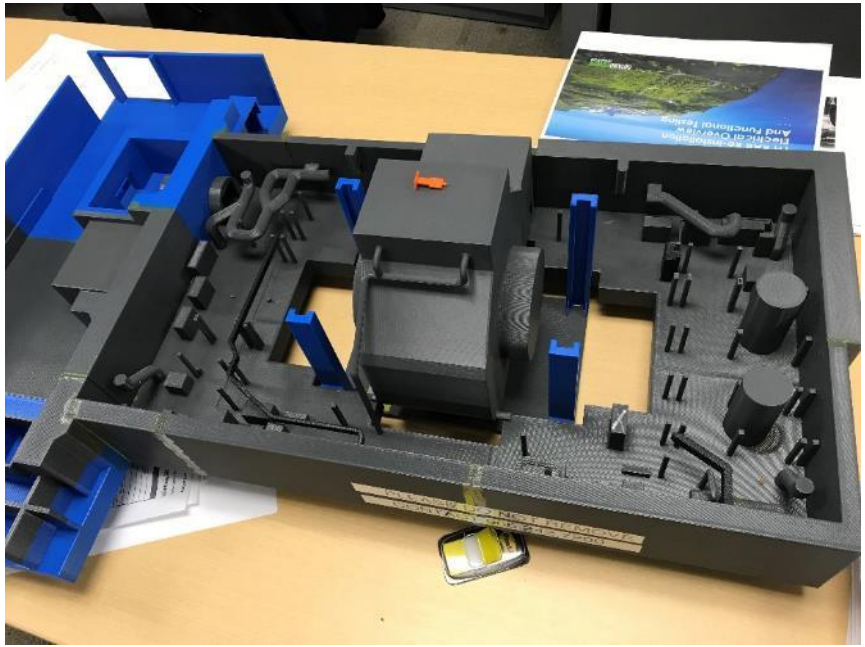
Re-installation of Lower Pressure 3 spindle

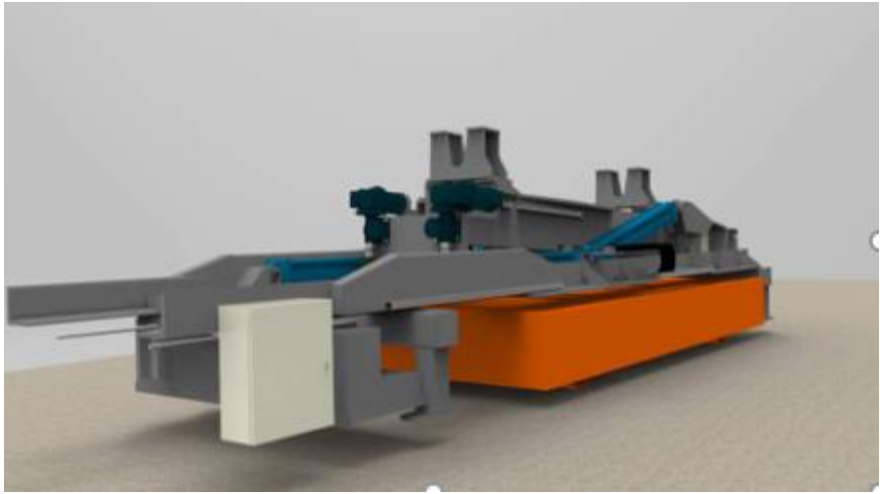
The Generator rotor being installed.

Feeder Campaign Complete

New Fuel Load - complete

VAULT RESTORATION – road to operations control





Safety Performance

- 22 million hours worked with only one lost time accident
- Since June 2019 there have been no High Maximum Reasonable Potential for Harm events
- As Unit 2 progresses through Vault Restoration, Safe Work Plans are being reviewed to identify and mitigate safety hazards from:
  - working at heights
  - material handling
- Radiological safety continues to report no unplanned events.

Performance

- Unit 2 on **budget**
- Unit 2 on **schedule** for revised commitment of end of June 2020
    - Overall, four unit project remains on budget and schedule
- **Environment** – no reportable events
- **Quality** - Lower feeder weld failure rates higher than expected during early feeder installation

Unit 2 Performance Summary

- All non-critical path work is 96% complete
- Unit 2 on target for June 25th, 2020
- Regulatory requirements are on track

Remaining Work:

- Vault Restoration
  - Re-tube Tooling Platform removal - complete
  - Installation of Fuel Handling equipment – nearing completion
  - Removal of Bulkheads to reconnect Unit 2 to station
- Unit Start Up – 52 days
  - Warm up and condition the reactor
  - Conduct operational testing of reactor, safety systems
  - Synchronize to electricity grid & high power testing

93%

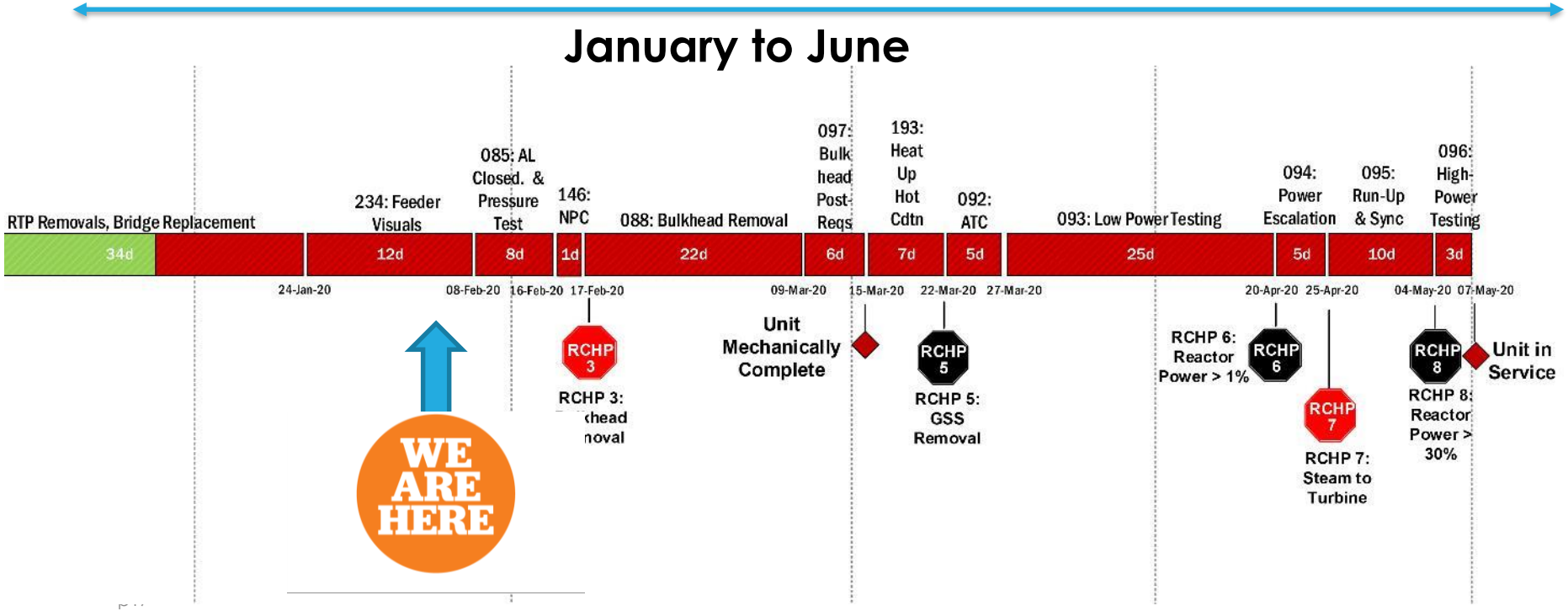
Complete

42/58

Systems in Service


Journey of
Excellence
ROAD TO RESTART
ONE TEAM WINS
Darlington Nuclear
for the future
Approach to Critical
TRF RTS
U3 SFCR
U3 Refurb
U2 Full Power
U3 Defuel
U2 Warm Up
Containment Restored
D2011
U3 Isolated
HTS Filled & Pressurized
Fuel Load
COMPLETE
Moderator Filled
COMPLETE
WANO
U4 Moly-99
Mo
U1 Breaker Open
ON
OFF
ONTARIOPOWER
GENERATION

Road to Restart Unit 2



Vault Restoration

We are Nuclear Professionals

- I understand how my tasks impact the core, my peers and our community. I care to take actions to protect them.
- Understand the **why, what and how** of being a nuclear professional.
- **Five key attributes:**
  - Understand and manage risks
  - Anticipate Effects of your actions
  - Understand and apply event prevention tools
  - Procedural Use and Adherence. Can't? Stop and ask for help
  - Practice Good Housekeeping and control work areas

Unit 3 Planning Readiness

98%

Engineering Design

Engineering design is 98% complete (EV) with no risk to Execution.

70%

Documentation

70% of Segment 1 CWPs are complete

55% of all Comprehensive Work Packages (CWPs) have been prepared.

91%

Procurement (Segment 1)

91% of known Materials on site

4% Scheduled for delivery 90 days prior to execution

Breaker Open

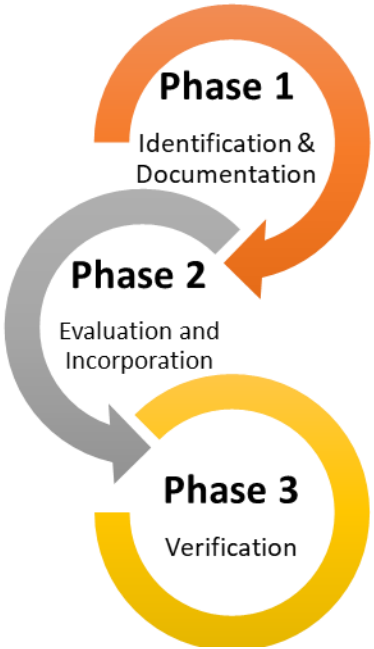
April 3

44 days and counting!

Lessons Learned Process

- OPG and its Contractors are focused on achieving continuous improvement as the Program proceeds through the refurbishment
- Both OPG and its Contractors have developed Lessons Learned processes to capture and implement the knowledge and experience gained in planning and executing the work.
- The majority of Technical issues incurred on Unit 2 have been resolved.
- **More than 3,500 Lessons Learned have been documented, dispositioned and or implemented, including:**

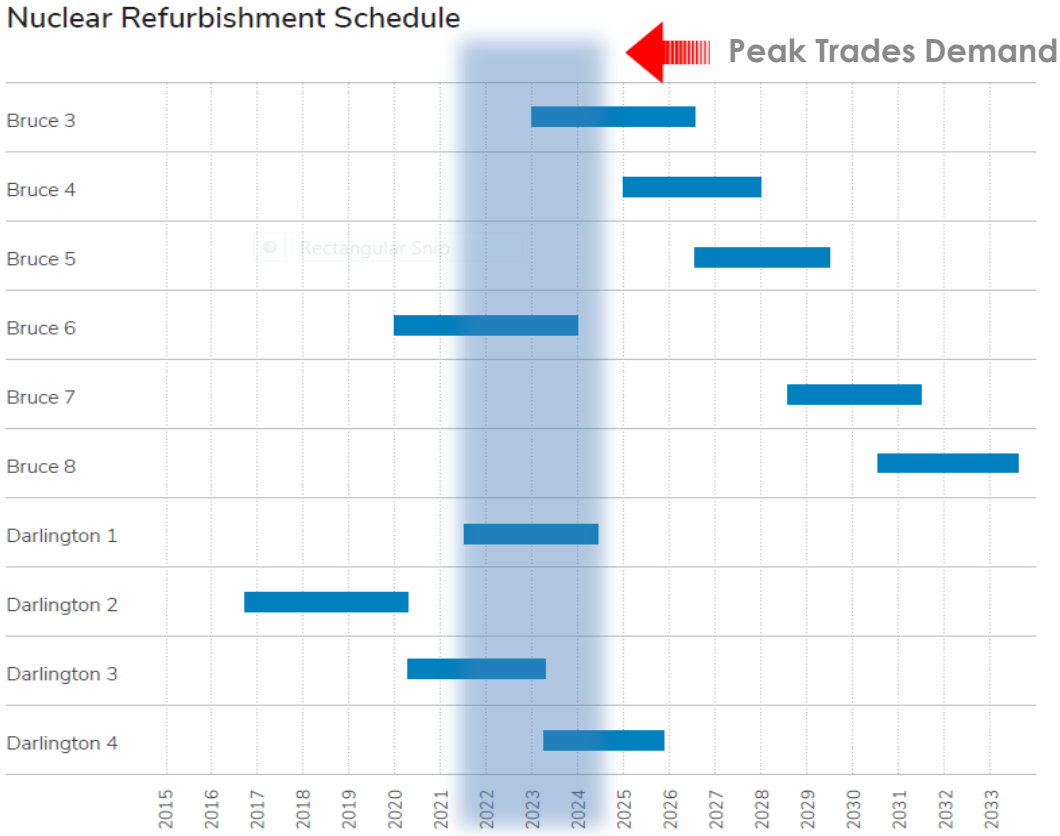
    1. Tooling changes/upgrades
    2. Critical task training
    3. LEAN/Kaizan process improvements
    4. Workstream organization/approach



Strategic Initiatives for DNRU314

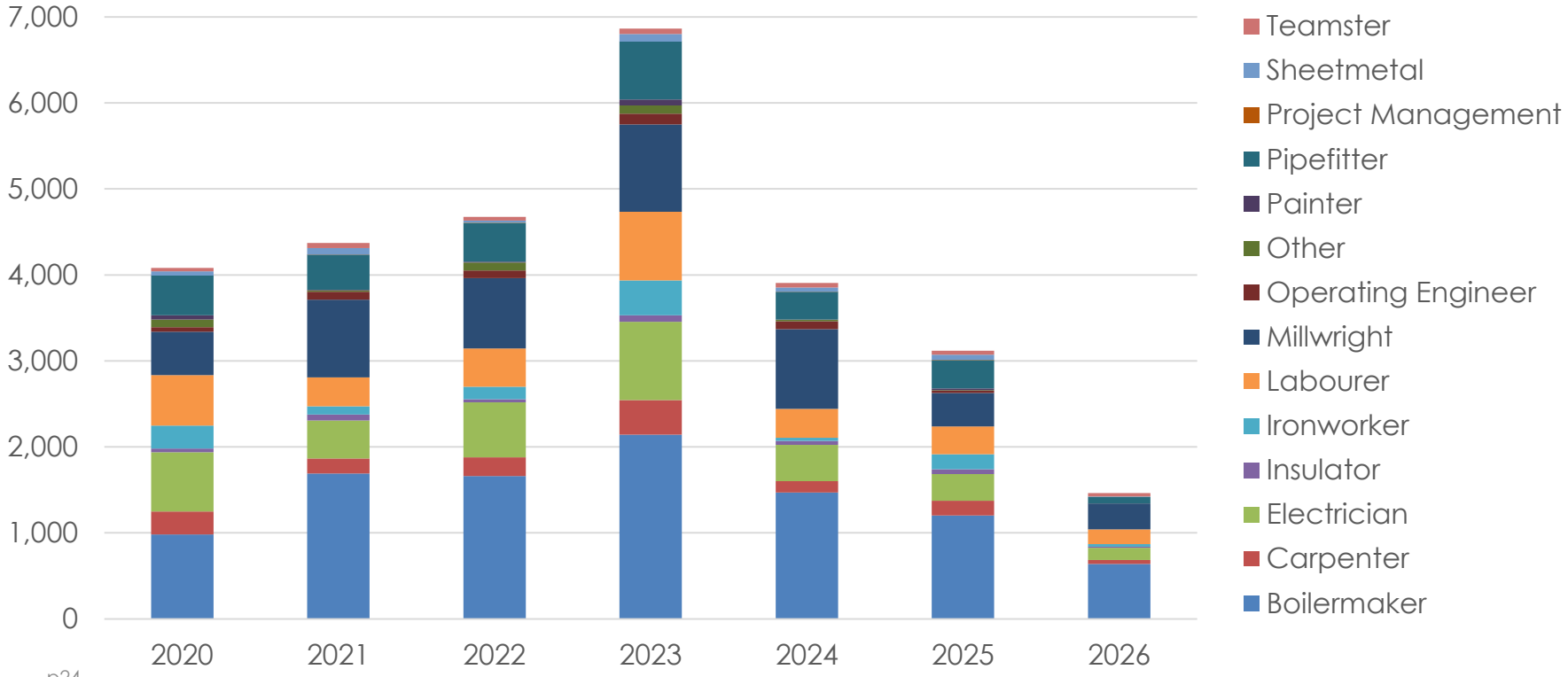
- One Team
- Radiation Protection
- 24x5 schedule
- Supervisory Leadership
- Feeder Strategy
- Digitization/Documentation/CWP Improvements

Provincial Nuclear Refurbishment Schedule



OPG & Bruce Power Trades Demand Profile

Total Demand for Trades for OPG and Bruce Power Refurbishments*



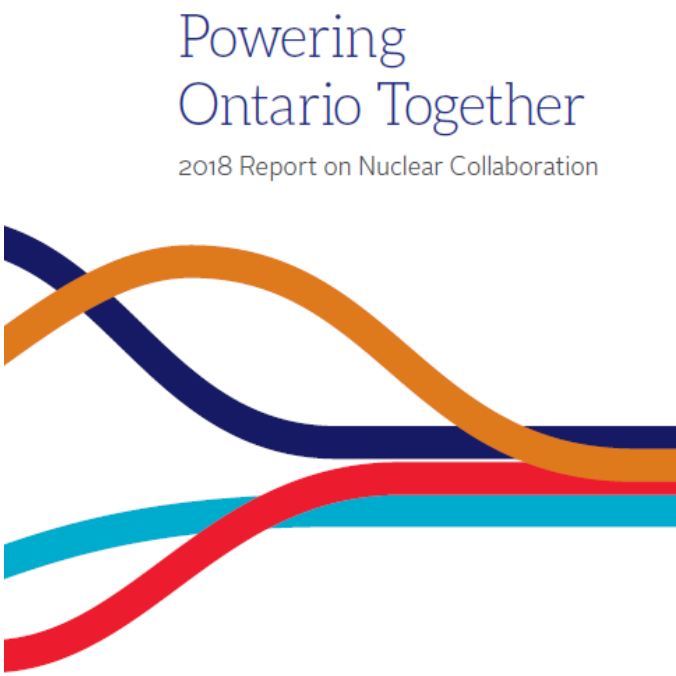
OPG/Bruce Power Collaboration

To maximize efficiencies for Ontario and deliver the projects safely, with quality on time and on budget. By taking a pro-active approach in applying lessons learned to date we are aligned around:

- Investing in our people: to build strong project managers and develop strong leadership capabilities.
- Owner oversight and involvement with our project partners and contractors to ensure commercial commitments are met.
- Maintaining a "Project-Centric" approach with clear lines of accountability and authority.
- Rigorous layered oversight at all levels of our organizations to ensure transparent and accurate information flows and resolution of issues and learnings shared.
- Build trusting collaborate relationships to drive for efficiencies and to maximize on opportunities.

Job Ready Dispatch (JRD, Jan 2020)

- allow the transfer of training credits for Business Trades Union (BTU) staff between OPG and BP; avoid retraining as well as decrease the time required to get BTU staff working at site



Updated Nov 2019

We are part of something special

Thank You!

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