

Enabling the Energy Transition

Fred Dermarkar, President and Chief Executive Officer
September 2022

Converging Energy Technologies
Conference CET2022
Oskarshamn, Sweden
Sept 21-23, 2022





Outline

- AECL's Mandate and Priorities
- Canada / Climate Change Plans
- SMRs – Plans and Roadmap
- AECL's Commitment to SMRs
- CEDIR Park – Demonstrating the Potential of Integrated Systems

Canadian government corporation

Mandate:

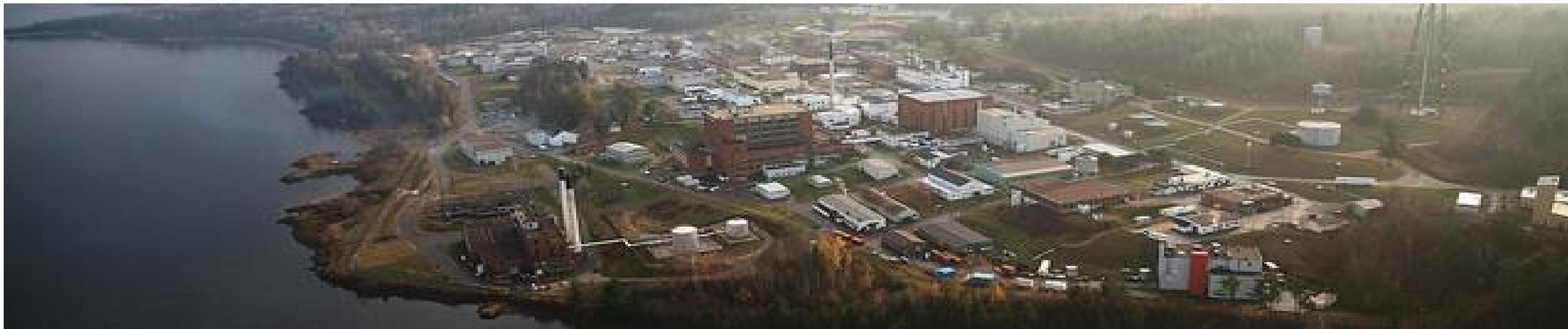
- Drive nuclear innovation
- Enable nuclear science and technology
- Manage government's responsibility for radioactive waste and decommissioning

AECL delivers its mandate through a long-term contract with Canadian Nuclear Laboratories for the management and operations of our sites





Chalk River Laboratories – Leading Innovation For 70 Years



Medical isotopes produced at Chalk River have benefited more than a billion people worldwide

- **Canada's largest science campus:**
 - 9,000 acres with 200-acre lab complex
 - 17 nuclear facilities, 70 major buildings including a research reactor and materials R&D center
- Birthplace of Canada's nuclear industry
 - 1947: First sustained criticality outside USA
 - **Developed CANDU reactor technology:** Avoided 40 Mt CO² in 2021; 2,400Mt cumulatively
 - Two Nobel prize winners
 - Instrumental in sustaining Canada's status as a Tier-1 nuclear nation
- Breakthroughs in medical isotopes used in the **treatment and detection of cancer** and other diseases



Our Priorities

Nuclear Science and Technology



- ▶ Energy, health, safety, security, environment
- ▶ Federal government
- ▶ Regulators
- ▶ Operators and industry

Decommissioning and Waste Management



- ▶ Addressing legacy and new liabilities to protect the environment
- ▶ Demolition of contaminated buildings; contaminated land remediation
- ▶ Responsibility for historic, low-level radioactive waste

Revitalization of the Chalk River Laboratories



- ▶ \$1.2 billion over 10 years
- ▶ Revitalization of the site with a view to building a world-class science campus

AECL commitment to health, safety, security, environmental stewardship and bringing value to Canada for the long term



Canada – Energy Governance Basics

Canada

- Confederation of provinces

Federal / National Government

- Responsible for overarching energy policy
- Nuclear regulation via Canadian Nuclear Safety Commission
- Nuclear innovation / legacy waste via AECL

Provinces

- Responsible for energy choices
- Resources / mix varies (e.g., 97% hydro in Quebec / 62% nuclear in Ontario)

December 2020

- Strengthened pan-Canadian framework to take action on climate change



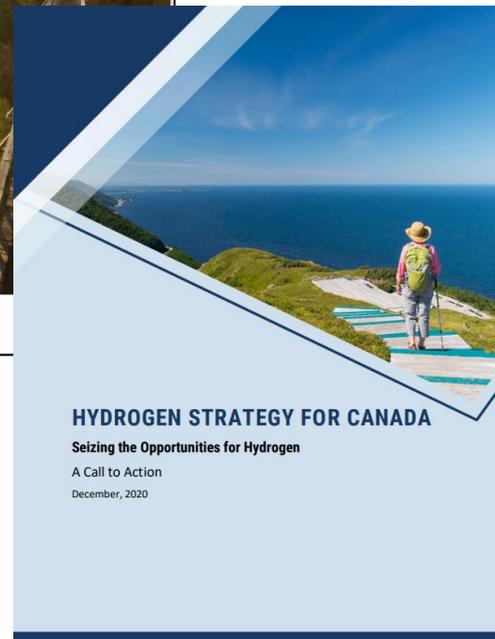
March 2022

- Roadmap to achieve 40-45% emission reductions below 2005 levels by 2030



December 2020

- Strategy to position Canada as a world-leading producer, user and exporter of clean hydrogen.





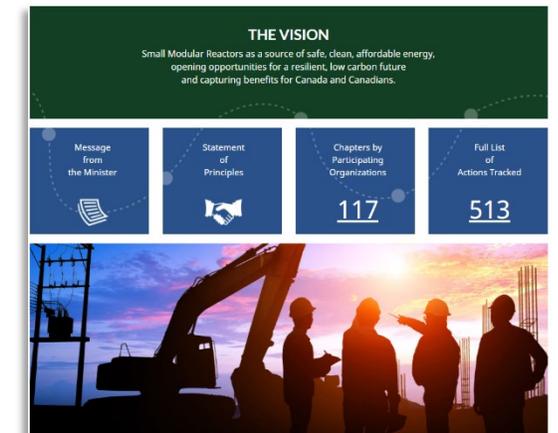
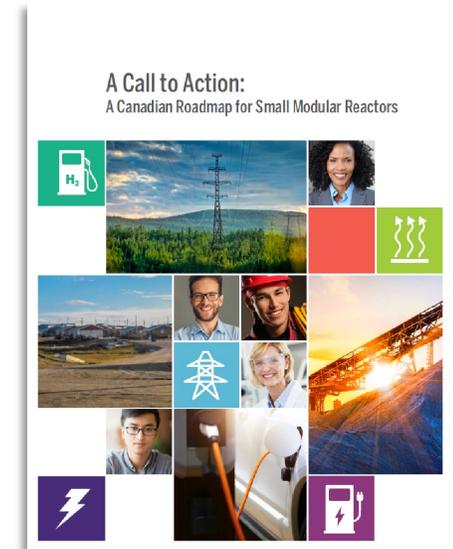
Canada – So what about nuclear?

COLLECTIVE VISION: SMRs as a source of safe, clean affordable energy, opening opportunities for a resilient low-carbon future and capturing benefits for Canada and Canadians

PATH FORWARD: success relies on strategic partnerships across the sector and internationally “no single organization can do this alone”

ROADMAP RECOMMENDATIONS: 53 recommendations specifically targeting supply chain, government, universities and research institutes, regulator, utilities, vendors etc.

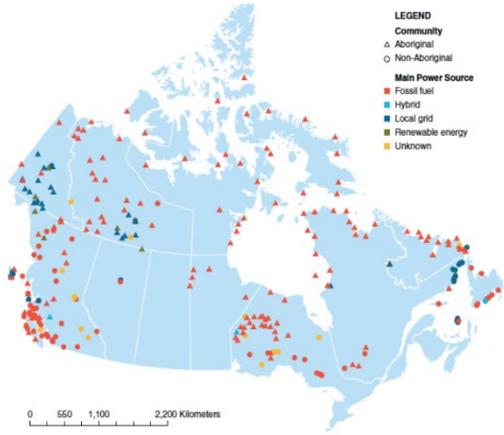
ACTION PLAN: 513 actions being tracked from input/participation of 117 organizations including governments, universities, research institutes, utilities, vendors, communities and Indigenous organizations



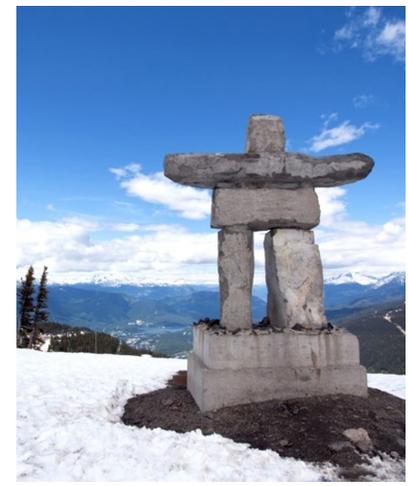
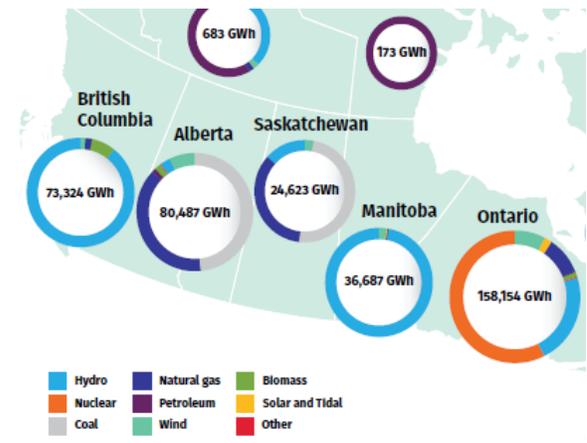
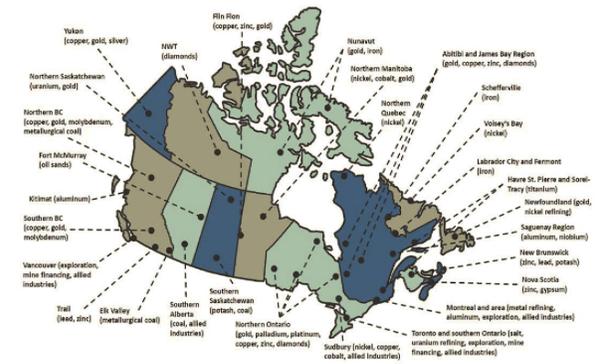
www.smrroadmap.ca/
www.smrreactionplan.ca



SMRs Opportunities for Canada



Sources: The Conference Board of Canada; Arriaga, Sector Profile



Northern Canada

- ▶ Over 200 off-grid communities rely on diesel generation.
- ▶ Health & well being, climate, and financial advantages

Resource extraction

- ▶ Hydrogen production for oil sands bitumen upgrading
- ▶ Power for in-situ and surface extraction sites
- ▶ vSMR for mineral mining sites

Low Carbon Energy

- ▶ Grid-sized SMR designs could replace coal-fired generation
- ▶ Ontario: 1st in North America to drop coal

Source	2003 (%)	2014 (%)
Coal	25	0
Nuclear	42	60

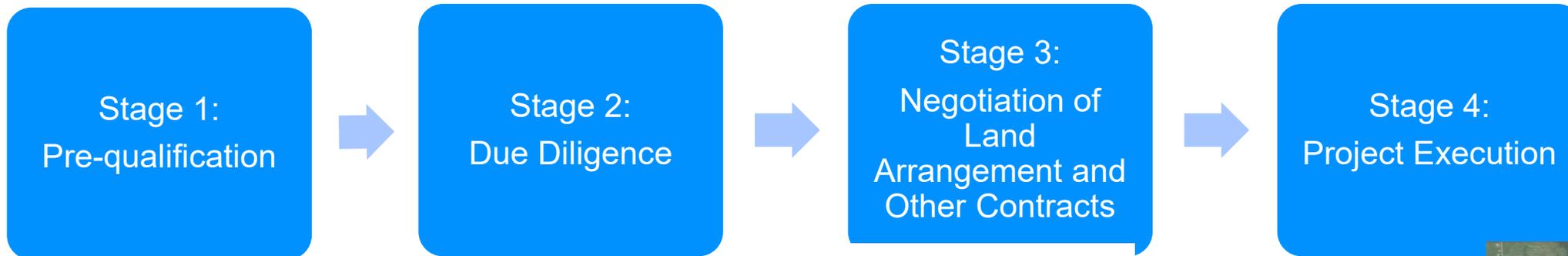
Partnerships & Growth

- ▶ Collaboration, resource sharing with Indigenous communities



Invitation for Demonstration at an AECL Site

A CNL-led process to site SMR demonstration projects



- Well-characterized sites
- close proximity to S&T infrastructure
- Opportunity for demonstration of an SMR-based energy ecosystem (e.g. heat, H2, etc.)



AECL Path to SMR Demonstration

Demonstration Project at Chalk River Site

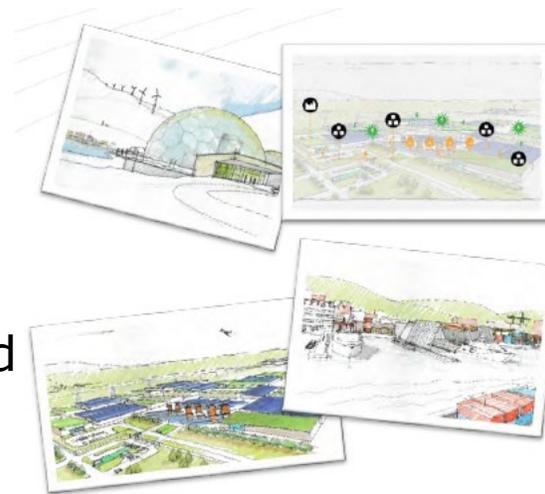
- ✓ Micro Modular Reactor (USNC design)
- ✓ Developers: GFP, USNC
- ✓ Utility: OPG
- ✓ 15 MW heat / 5 MWe
- ✓ License application and environmental assessment underway



An artist rendering of the MMR® at Chalk River

Canadian Nuclear Laboratories - Ready

- ✓ Opportunities at Chalk River and Whiteshell sites
- ✓ Local technological support and expertise
- ✓ Understanding of regulations
- ✓ Supporting government, regulator (TSO function) and industry
- ✓ Federal Nuclear S&T Plan
- ✓ AECL investing in Chalk River S&T infrastructure



*CEDIR Park –
Clean Energy
Demonstration
& Innovation
Research Park*

(Show Video)



Challenges and Path Moving Forward

Key Topics for Consideration / Discussion

- More important and urgent than ever – Energy Security / Climate Action Now
- Holistic approach needed
 - Working together / Like-minded / Harmonization
- Public acceptance and, for Canada, Indigenous engagement
- Build awareness on long-term opportunity for nuclear to play its important role in getting Canada and world to Net Zero by 2050
- Optimization / Prepare for uncertainty
 - Optimal technology mix – unknown, will vary
 - Must be prepared to invest
 - Be nimble and be ready to pivot

