

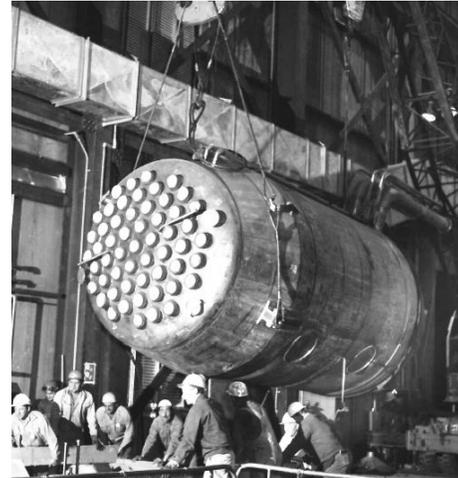


# Update on Atomic Energy of Canada Limited

PUBLIC MEETING

MAY 10 2018

- ▶ AECL's history, mandate and role
- ▶ The Government-owned, Contractor-operated model
- ▶ AECL's ongoing priorities
  - ▶ Nuclear science and technology
  - ▶ Decommissioning and waste management
  - ▶ Revitalization of the Chalk River Laboratories
- ▶ Recent accomplishments
- ▶ Key activities and upcoming milestones



- ▶ Established as federal Crown corporation in 1952
- ▶ Creation of Canada's nuclear technology and key enabler of its ongoing success
  - First sustained criticality outside the United States
  - Developed CANDU reactor technology – 19 operating in Canada and 30 internationally (CANDU and CANDU-like)
  - Nuclear research and development spanning the full nuclear lifecycle (e.g. design of novel fuel reactor (WR-1), safety (RD-14M), waste management (Underground Research Laboratory))
- ▶ Breakthroughs in medical isotopes (cobalt-60), production of other medical and industrial isotopes

# AECL at the heart of Canada's Nuclear Sector

16% of Canada's electricity mix supplied by CANDU reactors: 60% in Ontario and 30% in New Brunswick

Lifesaving medical isotopes to the benefit of over a billion people

2 Nobel prize winners:  
Dr. Bertram Brockhouse (1994)  
Dr. Art McDonald (2015)



\$6 billion/year domestic nuclear industry – 30,000 direct and 30,000 indirect jobs

Breakthroughs in radioactive waste management practices – e.g. research in support of deep geological repository; storage facilities

Nuclear goes beyond nuclear power: nuclear science has enabled innovations that have benefitted the lives of millions of people worldwide, including in nuclear medicine

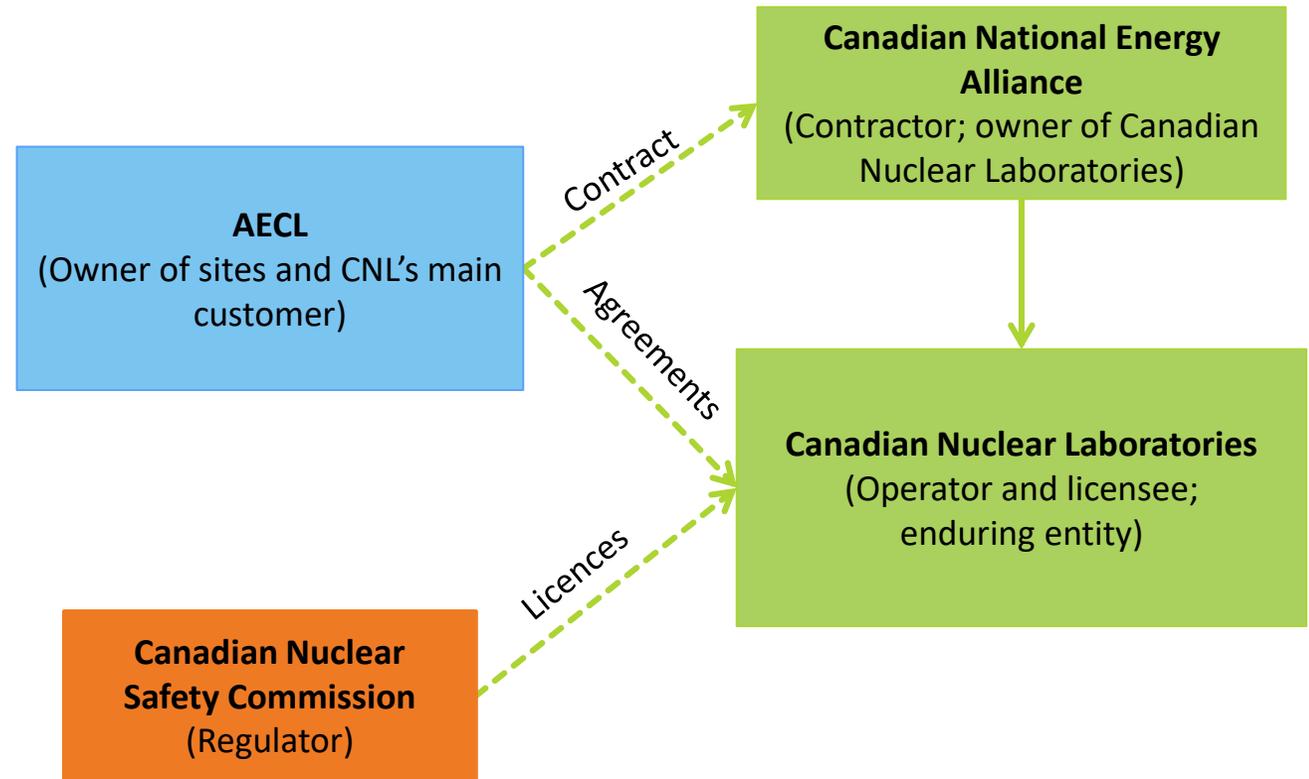
- ▶ Enabling nuclear science and technology
- ▶ Managing the Government of Canada's radioactive waste and decommissioning responsibilities

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



## Benefits of the Government-owned, Contractor-operated (GoCo) model

- ▶ Leverage experienced private-sector contractor and bring best practices
- ▶ Transform culture of organization
- ▶ Increase rigour and efficiencies
- ▶ Advance AECL and Canada’s priorities for decommissioning and waste management and the revitalization of the Chalk River Laboratories



Canadian Nuclear Laboratories is designed to be an enduring entity – both AECL and Canadian Nuclear Laboratories endure even if the “contractor” changes

1. Oversight: AECL brings best value to Canada by overseeing the work of Canadian Nuclear Laboratories under a Government-owned, Contractor-operated model:
  - ▶ Setting priorities
  - ▶ Overseeing compliance with terms and conditions of contracts
  - ▶ Measuring performance
  - ▶ Ensuring value for money for Canada and Canadians
2. Interface to Government: AECL continues to be an agent of the Government, delivering on the Government's priorities and providing advice that informs policy-making



AECL does not have a role in the day-to-day operations of Canadian Nuclear Laboratories – focus on the “What” not the “How”

AECL has asked Canadian Nuclear Laboratories to focus work on three main areas:

## Nuclear Science and Technology



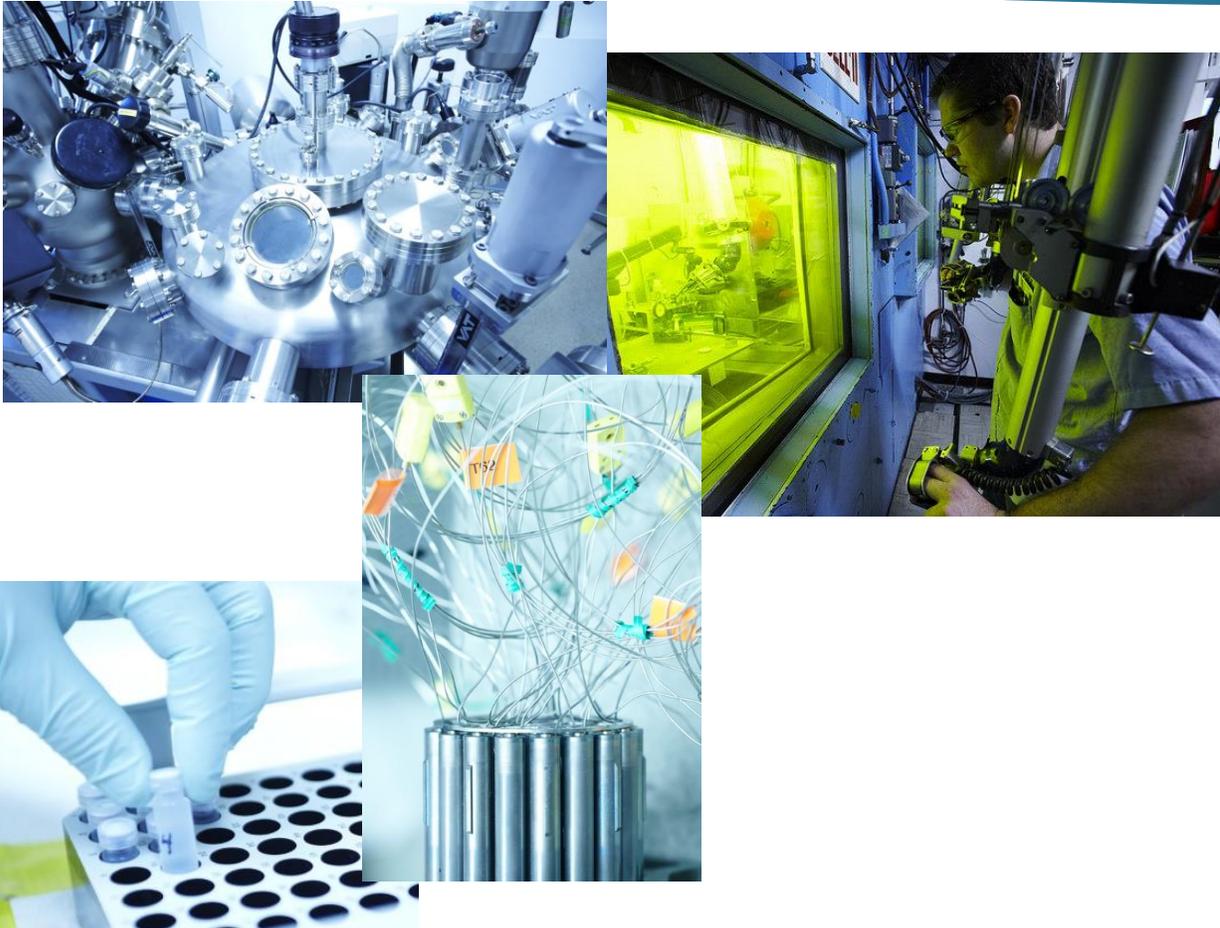
## Decommissioning and Waste Management



## Revitalization of the Chalk River Laboratories



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



Support for both the federal government and industry:

- ▶ AECL is responsible for delivering the Federal Nuclear Science and Technology Work Plan
  - ▶ Energy – nuclear industry, materials science for oil and gas
  - ▶ Health – understanding the effects of radiation isotopes
  - ▶ Emergency preparedness and response
  - ▶ Safety, security, non-proliferation – including border security
  - ▶ Environment
- ▶ AECL has asked CNL to grow the Chalk River Laboratories' science and technology stature and grow commercial work

The objective is to leverage the expertise, assets and capabilities of the Chalk River Laboratories in support of nuclear and non-nuclear industries

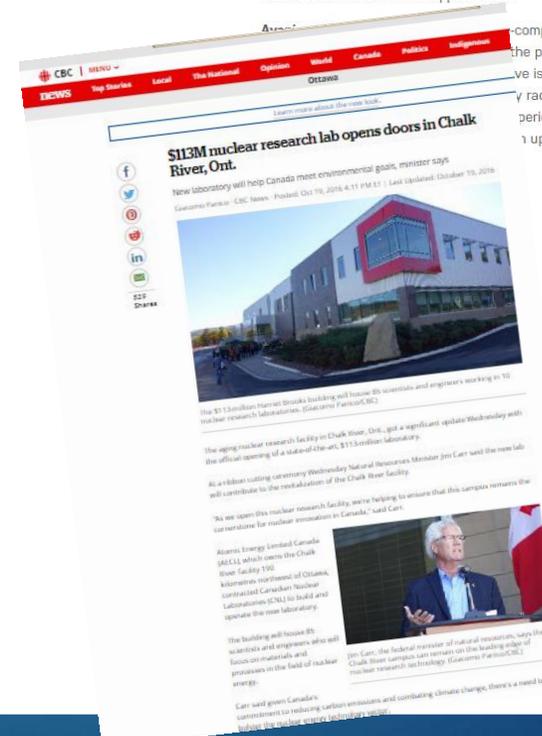
# Science and Technology – New Opportunities

- ▶ Canadian Nuclear Laboratories is leveraging its expertise and facilities to address government priorities and open new markets
  - ▶ Life extension and long-term reliability of existing reactors
  - ▶ Advanced fuel fabrication
  - ▶ Small Modular Reactors (SMRs)
  - ▶ Decarbonizing the transport sector and remote communities in Canada
  - ▶ Alpha Research Institute
  - ▶ Nuclear cyber security
  - ▶ Nuclear forensics



### Objective

The objective is to leverage existing, new and partner capabilities to drive new research and revenue opportunities.



### NUCLEAR ENERGY INSIDER

Analysis for the nuclear energy community

- Home
- New Build
- Supply Chain
- Small Modular Reactors
- Operations & M
- Waste Management

## Canada receives over 15 SMR proposals ahead of test center expansion

Aug 16, 2017

Canadian Nuclear Laboratories (CNL) plans to use a deluge of submissions from international SMR developers and stakeholders to shape the deployment of CA\$1.2 billion (\$940 million) investments in new CNL research facilities, laboratory directors told Nuclear Energy Insider.

Canada has emerged as a leading market for SMR development, driven by supportive regulatory regimes, research support and numerous deployment opportunities.

CNL has designated SMR technology as a research priority and the research centre aims to demonstrate the commercial viability of an SMR plant by 2026. CNL estimates the cost of hosting a prototype SMR at CA\$600 million, including contributions from commercial entities, although this figure will depend on chosen technology type.

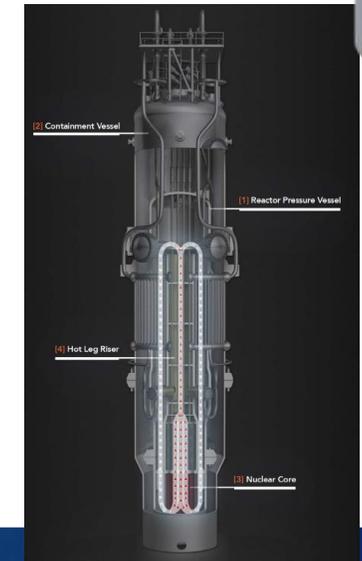
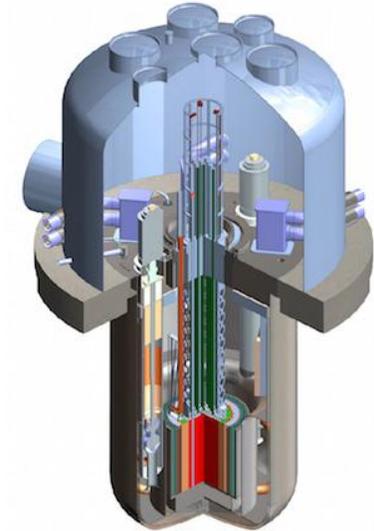
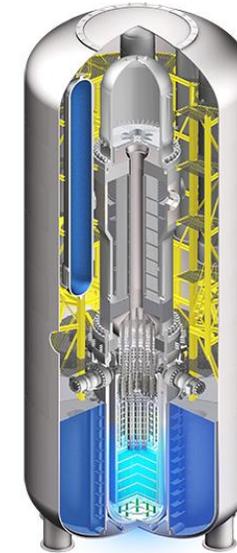
In June, CNL launched a Request for Expressions of



A draft plan of expanded Canadian Nuclear Laboratories (CNL) facilities expected to

# Small Modular Reactors

- ▶ AECL and CNL see potential in SMRs
  - ▶ Helping to meet climate change goals
  - ▶ An alternative to coal-based electricity generation
  - ▶ Providing clean electricity to large industry
  - ▶ Delivering clean, reliable energy to remote communities
  - ▶ Creating jobs and growing the economy
- ▶ Opportunity in Canada
  - ▶ Building on a strong legacy of nuclear innovation
  - ▶ Strong supply chain
  - ▶ Internationally-recognized regulator with a framework that can accommodate new technology
- ▶ There is a window of opportunity now
  - ▶ In many countries, policy priorities around low-carbon energy, innovation, jobs and growth are driving interest in SMRs
  - ▶ On April 17, CNL launched an invitation for SMR proposals
  - ▶ The Government of Canada is undertaking an SMR road mapping exercise



- ▶ AECL is responsible for addressing the Government of Canada's decommissioning and waste management responsibilities
- ▶ AECL has asked CNL to accelerate activities in this area in order to reduce risks and protect the environment
  - ▶ AECL reviews and approves CNL's high-level plans to ensure alignment with priorities and value for money for Canada



***Contaminated lands***



***Redundant buildings***



***Accumulated waste  
(buried and stored)***

AECL has a responsibility to address its decommissioning and waste management challenges in order to reduce environmental and safety risks, remediate contaminated lands and leave a positive legacy for future generations

## Closure of the Whiteshell site



- ▶ Site undergoing decommissioning since mid-90s
- ▶ Proposal to decommission the WR-1 reactor in situ by cementing it in place

## Near Surface Disposal Facility



- ▶ Proposed to be built at the Chalk River site to dispose of AECL's low-level radioactive waste
- ▶ Will enable the revitalization of the Chalk River site and the remediation of contaminated lands

## Port Hope Area Initiative



- ▶ 1.7 million cubic meters of low-level radioactive waste being emplaced in two near surface long-term management facilities

## Nuclear Power Demonstration reactor



- ▶ Proposal to decommission the NPD reactor in situ by cementing it in place
- ▶ Will further protect the environment and workers

Three of CNL's projects are undergoing Environmental Assessments, a process designed to identify potential environmental impacts and engage the public and Indigenous groups. The Canadian Nuclear Safety Commission, Canada's independent nuclear regulator, will only license projects if it can assure itself that they are safe.

# A Closer Look – Closure of Whiteshell Laboratories

14



- ▶ Decision to close the site made in mid-90s; decommissioning underway since



# A Closer Look – Closure of Whiteshell Laboratories

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- ▶ Proposal to decommission the WR-1 reactor in situ



# A Closer Look – Closure of Whiteshell Laboratories

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- ▶ Site closure expected 2024
- ▶ AECL and CNL working with Economic Regeneration Partnership to facilitate access to site for future economic development opportunities



Revitalization of the site with a view to building a world-class science campus:

- ▶ New and renewed science facilities
- ▶ Basic site infrastructure upgrades



AECL and the Government of Canada are investing \$1.2 billion over ten years for the revitalization of the Chalk River Laboratories

# Accomplishments

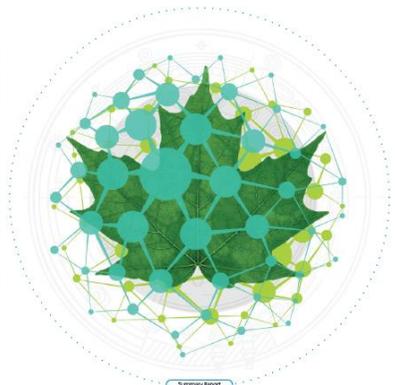
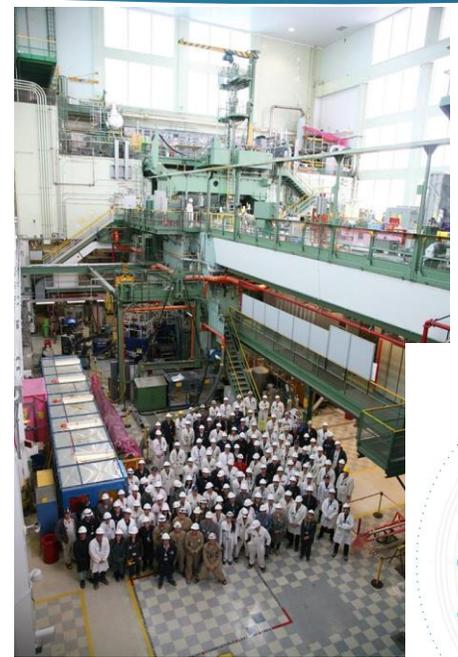


Canadian Nuclear Laboratories

UNRESTRICTED

## 2016-2026 10-YEAR INTEGRATED PLAN SUMMARY

This document contains forward-looking statements, and many proposed projects are subject to rigorous regulatory review and licensing processes. This document is intended to evolve through time.  
CRL-50300-PLA-001, REVISION 0, 2017 APRIL 18



### PERSPECTIVES ON CANADA'S SMR OPPORTUNITY

Summary Report: Request for Expressions of Interest—  
CNL's Small Modular Reactor Strategy



## Nuclear Science and Technology

- ▶ Small Modular Reactors
  - ▶ Open invitation for SMR demonstration projects
- ▶ Targeted Alpha Therapy
  - ▶ CNL will be jointly hosting (with TRIUMF) the 11<sup>th</sup> International Symposium on Targeted Alpha Therapy April 1-5th 2019, in Ottawa
- ▶ Advanced Reactors
  - ▶ International Conference on Generation IV and Small Reactors G4SR-1, Nov 6 -8, 2018, Ottawa

## Decommissioning and Waste Management

- ▶ CNL continuing activities to advance Near Surface Disposal, NPD and WR-1 projects as per Environmental Assessment
  - ▶ Continued stakeholder and Indigenous engagement
- ▶ Port Hope Area Initiative: start of remediation activities at residential properties and Centre Pier; remediation of waterfront sites to begin in 2018
- ▶ Continued repatriation of highly-enriched uranium to the US

## Revitalization of the Chalk River Laboratories

- ▶ Commissioning of the new tritium laboratory
- ▶ Detailed design of the new Advanced Nuclear Materials Research Centre
- ▶ Advance towards construction for the new office building, maintenance facility and logistics/warehouse facility
- ▶ Complete construction of the storm water management system

## **AECL is pursuing Canada's long-term interests in nuclear innovation**

**Building the science of tomorrow: small modular reactors, hydrogen technologies, alpha therapies, etc.**

**Addressing government priorities in health, energy, safety and security, and the environment**

**Leveraging \$1.2 billion to revitalize the Chalk River Laboratories**

## **AECL is committed to environmental stewardship**

**Protecting the environment**

**Cleaning up radioactive waste liabilities which are under the responsibility of the Government of Canada**

**Enabling the remediation of contaminated lands and revitalization of the Chalk River Laboratories**

**AECL commitment to: health, safety, security, environmental protection, stakeholder and Indigenous engagement and bringing value to Canada for the long term**

# QUESTIONS?

