



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Canada



CANADIAN NUCLEAR SAFETY COMMISSION

Michael Binder

President and Chief Executive Officer

Meeting with SNC-Lavalin Board of Directors

August 1, 2018



OUR MANDATE



Regulate the use of nuclear energy and materials to protect **health**, **safety**, and **security** and the **environment**

Implement Canada's **international commitments** on the peaceful use of nuclear energy

Disseminate **objective** scientific, technical and regulatory **information** to the public



CNSC STAFF LOCATED ACROSS CANADA



Fiscal year 2018–19
Human Resources: 915 FTEs
Financial resources: \$151 million
~70% cost recovery
~30% governmental appropriation
Licensees: 1,700
Licences: 2,500

Headquarters (HQ) in Ottawa
4 site offices at power plants
1 site office at Chalk River
4 regional offices

INDEPENDENT COMMISSION



Quasi-judicial administrative tribunal

Agent of the Crown (duty to consult)

Reports to Parliament through Minister of Natural Resources

Commission members are independent and part-time

Commission hearings are public and webcast

Decisions are reviewable by Federal Court

TRANSPARENT, SCIENCE-BASED DECISION MAKING



THE CNSC'S NEW PRESIDENT



Ms. Rumina Velshi has been appointed
President and Chief Executive Officer
for a five-year term effective
August 22, 2018.



Dr. Michael Binder
President and Chief Executive Officer
Canadian Nuclear Safety Commission
January 2008 to August 8, 2018



Ms. Rumina Velshi
President and Chief Executive Officer
Canadian Nuclear Safety Commission
August 22, 2018 to August 22, 2023

TRANSITION TO NEW LEADERSHIP

INDEPENDENT COMMISSION



**MS. RUMINA
VELSHI**

CNSC President
and CEO effective
August 22, 2018
Five-year term



**DR. SANDOR
DEMETER**

Reappointed
Mar 12, 2018
Five-year Term



**DR. MARCEL
LACROIX**

Appointed
Mar 12, 2018
Four-year Term



**MS. KATHY
PENNEY**

Appointed
Mar 12, 2018
Four-year Term



**MR. TIMOTHY
BERUBE**

Appointed
Mar 12, 2018
Four-year Term

THE CNSC REGULATES ALL NUCLEAR FACILITIES AND ACTIVITIES IN CANADA...



Uranium
mines and
mills



Uranium fuel
fabrication and
processing



Nuclear power
plants



Nuclear
substance
processing



Industrial and
medical
applications



Nuclear research
and educational
activities



Transportation
of nuclear
substances



Nuclear
security and
safeguards



Import and
export
controls



Waste
management
facilities

...FROM CRADLE TO GRAVE



MINING OPERATIONS



ACTIVE URANIUM MINING OPERATIONS (SASKATCHEWAN)

Cigar Lake Mine (Cameco)

McClellan Lake Mine/Mill (Orano)
licence renewed until June 30, 2027

Key Lake Mill (Cameco)
indefinite suspension starting July 2018

McArthur River Mine (Cameco)
indefinite suspension starting July 2018

Rabbit Lake Mine/Mill (Cameco)
announced suspension – April 2016

**GLOBAL PRICE NOT SUPPORTIVE OF
PRODUCTION – LOW DEMAND AND
OVERSUPPLY**



CANADIAN NUCLEAR ENERGY PROFILE

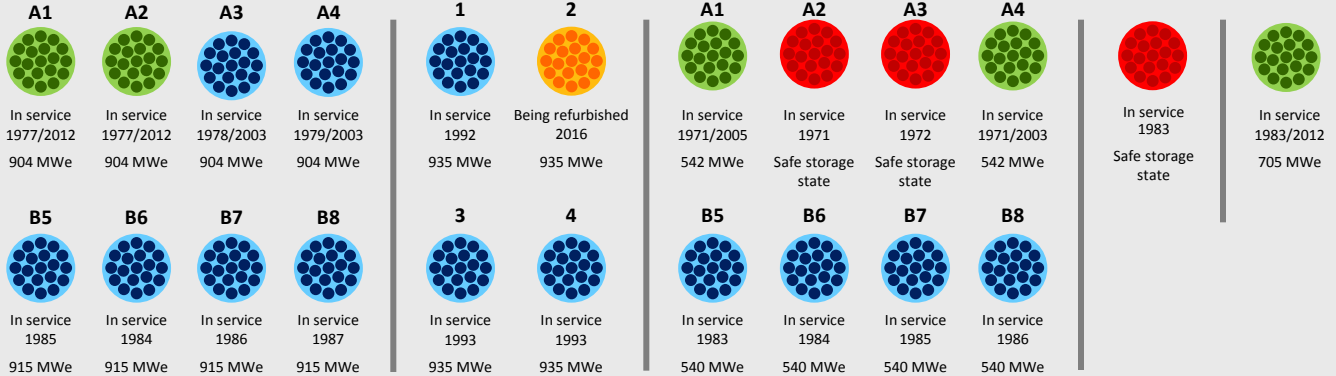
Bruce A and B

Darlington


Pickering


Gentilly-2


Point Lepreau







Typical share of nuclear energy in total electricity generation

 **Canada – 16.6%** (CNA Factbook 2017)

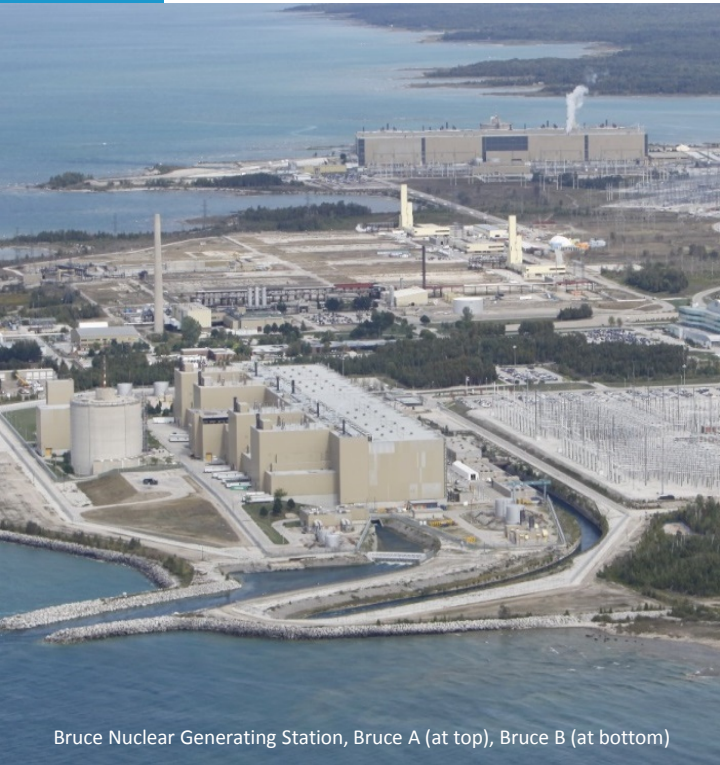
 **Ontario – 63%** (IESO, 2017)

 **New Brunswick – 33%** (CNA Factbook 2017)

-  In service within design life
-  Refurbished and returned to service
-  Safe storage state
-  Refurbishment in progress



CANADA'S NUCLEAR POWER PLANTS



Bruce Nuclear Generating Station, Bruce A (at top), Bruce B (at bottom)

BRUCE NUCLEAR GENERATING STATION (ONTARIO)

Licence expires on May 31, 2020.
Letter of intent for refurbishment
filed on June 30, 2017

\$13 billion cost for Major
Component Replacement (MCR)

MCR projected completion by 2033

Public Commission hearing
(Part 2) held May 28 to 31, 2018

Commission decision pending



CANADA'S NUCLEAR POWER PLANTS



DARLINGTON NUCLEAR GENERATING STATION (ONTARIO)

Licence expires on
November 30, 2025

Refurbishment project began in
October 2016 and is scheduled for
completion by 2026

\$12.8 billion cost for
refurbishment



CANADA'S NUCLEAR POWER PLANTS



PICKERING NUCLEAR GENERATING STATION (ONTARIO)

Licence expires on August 31, 2018

Application for a 10-year licence renewal during which time Pickering will undergo permanent shutdown in 2024.

Public Commission hearing (Part 2) held June 25 to 29, 2018

Commission decision pending



CANADA'S NUCLEAR POWER PLANTS



POINT LEPREAU NUCLEAR GENERATING STATION (NEW BRUNSWICK)

Licence expires on June 30, 2022

Refurbishment completed –
returned to service
November 2012

\$2.4 billion cost for refurbishment



CANADIAN NUCLEAR LABORATORIES



CHALK RIVER LABORATORIES (ONTARIO)

Licence expires on March 31, 2028

Commission hearing for renewal of Chalk River Laboratories' operating licence took place in January 2018

Go-Co Model was a major topic of discussion at public hearings



CANADIAN NUCLEAR LABORATORIES



Proposed Near Surface Disposal Facility: aerial view

EA PROCESS DELAYED

Translation of Documents
Indigenous Consultation
Characterization of waste

THREE ENVIRONMENTAL ASSESSMENTS UNDER WAY FOR DECOMMISSIONING PURPOSES

Near Surface Disposal Facility (NSDP) Project
(Chalk River)

Nuclear Power Demonstration (NPD) Closure
Project (Rolphton)

Decommissioning of the Whiteshell Reactor #1
(Pinawa)

Petitions: 6 total (3 environmental, 2 e-petitions,
1 letter to Mr. Amano, IAEA)

ATTRACTING A LOT OF ATTENTION



KEY DATES PUBLIC UPDATES AND OUTREACH

Project description
submitted by CNL
Apr 1, 2016

Two 60-day comment periods
held on draft EIS (French version
provided June 2017)
Mar. – Aug. 2017

CNSC transmits to CNL
all comments and info
requests on draft EIS
Sep. 14, 2017

CNL updates project
description (NSDF will contain
low-level waste only)
Oct. 27, 2017

CNL continues to work on
providing responses to
comments on the draft EIS
Nov. 2017 – present



NSDF

Project description
submitted by CNL
Apr 1, 2016

90-day comment period
held on draft EIS
Nov. 2017 – Feb. 2018

CNSC transmits to CNL
all comments and info
requests on draft EIS
Mar. 15, 2018

CNL continues to work on
providing responses to
comments on the draft EIS
Apr. 2018 – present



NPD

Project description
submitted by CNL
Jun 2, 2016

75-day comment period
held on draft EIS
Oct. – Dec. 2017

CNSC transmits to CNL all
comments and info
requests on draft EIS
Jan. 5, 2018

CNL continues to work on
providing responses to
comments on the draft EIS
Apr. 2018 – present



WHITESHELL

TIMELINES DEPENDENT ON QUALITY AND COMPLETENESS OF INFORMATION



WASTE MANAGEMENT



Aerial View Western Waste Management Facility



Aerial view of Port Hope and Granby
Government of Canada committed \$1.3b.



Concrete silos at the Point Lepreau
Generating Station

ONTARIO POWER GENERATION (OPG) WASTE FACILITIES

Western

Licence valid until May 31, 2027

Pickering

Licence valid until August 31, 2027

Darlington

Licence valid until April 30, 2023

PORT HOPE AREA INITIATIVE

Port Hope and Port Granby Implementation phase

Port Hope waste nuclear substance licence
– Valid until December 31, 2022

Port Granby waste nuclear substance
licence – Valid until December 31, 2021

Government of Canada committed \$1.27B

OTHER WASTE MANAGEMENT FACILITIES

Gentilly-1 (QC)

Point Lepreau (NB)

Douglas Point (ON)

STORED SAFELY AND SECURELY



FEDERAL POLICY AND LEGISLATION ON WASTE



The ***Nuclear Safety and Control Act (NSCA)*** includes safe spent fuel and radioactive waste management

Radioactive Waste Policy Framework (1996)

The federal government has the responsibility of developing policy, regulating and providing oversight on waste

Waste owners are responsible for the funding, organization and operation of the facilities required to manage their waste

Licensees must plan for the complete life of the facility, including financial guarantees

Nuclear Energy Act

Nuclear Fuel Waste Act

Nuclear Liability and Compensation Act

THE FEDERAL GOVERNMENT ENSURES THE SAFE MANAGEMENT OF RADIOACTIVE WASTE IN CANADA



OPG DEEP GEOLOGIC REPOSITORY (DGR)



Joint review panel environmental assessment report – May 2015

15-year process; 33 days of hearings; 246 participants; over 20,000 pages of information reviewed

In November 2015, Minister of Environment and Climate Change requested additional information and further studies on environmental assessment

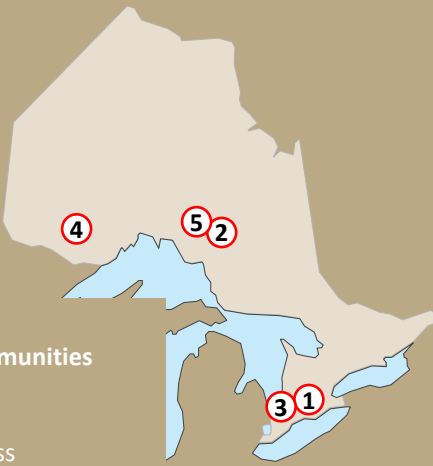
On August 21, 2017, the Minister requested additional information from OPG on the potential cumulative effects of the DGR project on physical and cultural heritage of the Saugeen Ojibway Nation (SON)

Cost: \$2.4B

STILL AWAITING DECISION



NUCLEAR WASTE MANAGEMENT ORGANIZATION (NWMO)



- NWMO**
Learn more communities
1. South Bruce
 2. Hornepayne
 3. Huron-Kinloss
 4. Ignace
 5. Manitouwadge

FINDING A SITE FOR HIGH-LEVEL RADIOACTIVE WASTE

There are 5 communities remaining in the NWMO's Learn More process (out of 22 original communities – 19 in Ontario, 3 in Saskatchewan)

2023 – A single preferred site is identified
2028 – Licence applications submitted
2040 to 2045 – Operations begin

Projected cost: \$23B for APM



REGULATORY EXCELLENCE

THE REGULATOR MUST

- Have a questioning attitude
- Seek continuous safety improvement
- Increase regulatory knowledge
- Have adequate numbers of competent staff
- Make independent regulatory decisions
- Encourage, promote and enforce compliance



DISRUPTIVE TECHNOLOGIES



GOOGLE (SAFETY) GLASSES

- Workplans projection
- Step-by-step guidance of work tasks
- Employees focus on tasks at hand
- Mimicking EPD (electronic personal dosimeter) performance



3D PRINTING

- Rapid prototyping
- Verify mechanical measurements
- In-house design verification
- Quick turnaround
- Pre-implementation modeling

ARE REGULATORS READY?

DISRUPTIVE TECHNOLOGIES



DRONES

OPG first used unmanned aerial vehicles to inspect Darlington's vacuum building



WIRELESS SENSORS

Comanche Peak Nuclear Power Plant is the site of a pilot program using a wireless, automated, remote diagnostic system

DISRUPTIVE TECHNOLOGIES



AUTONOMOUS VEHICLES

Rio Tinto has at least 54 autonomous trucks currently operating that handle various transportation-related tasks.



NEW ENERGY SYSTEMS

“Next-generation nuclear has the potential to disrupt the global energy mix”

“Fusion power has massive disruptive potential”



SMALL MODULAR REACTORS (SMRS)



Example of an SMR technology: Facility cross-section
Terrestrial Energy Integral Molten Salt Reactor (IMSR-4000)
(Courtesy of Terrestrial Energy)

Global interest for SMR technologies (ie. UK, US, China, Russia, NEA, IAEA)

NB Power – \$10M, ARC, Moltex

CNL call for proposals – great interest

CNSC is participating in the Canadian SMR Roadmap

REGDOC-1.1.5, *Licence Application Guide: Small Modular Reactor Facilities* – out for comments July 31, 2018

10 Vendor Design Reviews (VDR) are currently underway

INTEREST IN SMR IS GROWING! FUTURE FOR NUCLEAR?



SMR VENDOR REVIEWS

| VDR Number | Country of Origin | Company | Reactor type/output per unit |
|------------|-------------------|---|---|
| 1 | Canada/U.S. | Terrestrial Energy | Molten salt integral / 200MWe |
| 2 | U.S./Korea/China | UltraSafe Nuclear/Global First Power | High-temperature gas prismatic block / 5 MWe |
| 3 | Sweden/Canada | LeadCold | Molten lead pool fast spectrum / 3 – 10 MWe |
| 4 | U.S. | Advanced Reactor Concepts | Sodium pool fast spectrum / 100 MWe |
| 5 | U.K. | U-Battery | High Temperature gas prismatic block / 4 MWe |
| 6 | U.K. | Moltex Energy | Molten salt fast spectrum / ~ 300 MWe |
| 7 | Canada/U.S. | StarCore Nuclear | High temperature gas prismatic block / 10 MWe |
| 8 | U.S. | SMR, LLC. (A Holtec International Company) | Pressurized Water / 160 MWe |
| 9 | U.S. | NuScale | Integral Pressurized Water / 50 MWe |
| 10 | U.S. | Westinghouse Electric Co. | eVinci Micro Reactor / < 25 MWe |



MODERNIZING THE REGULATORY FRAMEWORK

Regulatory modernization - Regulatory documents

Discussion paper DIS-16-04, *Small Modular Reactors* – What We Heard Report published September 2017

Discussion paper DIS-16-03, *Radioactive Waste Management and Decommissioning* – What We Heard Report published December 2017

Discussion paper DIS-17-01, *Framework for Recovery in the Event of a Nuclear or Radiological Emergency* – Public comment period closed in January 2018

REGDOC-2.2.4, *Fitness for Duty, Volume II: Managing Drug and Alcohol Use* – Published December 2017

REGDOC-2.1.2, *Safety Culture* – Published April 2018

REGDOC-1.1.5, *Licence Application Guide: Small Modular Reactor Facilities* – Released July 30, 2018, open for consultation

Nuclear Liability and Compensation Act

**CNSC's
Regulatory Framework
Modernized, On-line
And Transparent**

**Participate in
consultation – submit
your comments!**

CLARITY OF REQUIREMENTS IS IMPORTANT



NUCLEAR LIABILITY AND COMPENSATION ACT

NLCA came into force on January 1, 2017, replacing the *Nuclear Liability Act (NLA)*

Raised the liability limit from NLA's \$75M to \$650M, rising in annual steps of \$750M and \$850M to reach \$1B on January 1, 2020

NRCan consults with the CNSC on which facilities will be "designated" as nuclear facilities, and on relative risk levels to determine the applicable liability limit

NLCA allowed Canada to join the *Convention on Supplementary Compensation for Nuclear Damage (CSC)*

Member countries provide the same liability protection to suppliers and contractors as in Canada

The CSC provides a second tier of compensation of approximately \$500M from an international pool, available if claims exceed the NLCA coverage

Current members are Argentina, Canada, Ghana, India, Japan, Montenegro, Morocco, Romania, the United Arab Emirates and the United States

NLCA CHANNELS ALL RESPONSIBILITY FOR A NUCLEAR ACCIDENT TO THE OPERATOR, NOT SUPPLIERS OR CONTRACTORS



GOVERNMENT LEGISLATIVE REFORMS

Restoring trust and confidence in Environmental Assessments

Recall CEEA 2012 placed accountability on three responsible authorities for conducting federal EAs: CNSC, NEB and CEEA

Bill C-69: To enact the *Impact Assessment Act and the Canadian Energy Regulator Act*, to amend the *Navigation Protection Act* – First Reading in Senate June 2018

Now Minister of Environment and new Impact Assessment Canada will be accountable for EAs; Integrated reviews with lifecycle regulators

Important consultations yet to come: Project list, Timelines,
Developing A Strategic Assessment of Climate Change

Bill C-68: To amend the *Fisheries Act* – First Reading in Senate June 2018

GOVERNMENT CONSULTATIONS ARE IMPORTANT



INDIGENOUS RECONCILIATION

REGDOC 3.2.2 – Aboriginal Engagement published by the CNSC in 2016

Cabinet Committee on Diversity and Inclusion looks at initiatives to strengthen relationships with Indigenous Canadians

Working group of six ministers to ensure that Canada’s laws, policies and programs protect Aboriginal and treaty rights

United Nations Declaration on the Rights of Indigenous Peoples

Free, prior and informed consent Prime Minister’s speech on February 14, 2018 and commitment to support Bill C-262 (First Reading in Senate, May 2018)

CNSC’s Indigenous Forums – more formal, and structured approach will continue to strengthen relationships with Indigenous peoples in Canada

THE CNSC WILL CONTINUE TO STRENGTHEN ITS CONSULTATION AND ENGAGEMENT PROCESS



INTERNATIONAL LANDSCAPE

A nuclear accident anywhere, is a nuclear accident everywhere

Global Accountability in Non-proliferation

Binding treaty-based system for safeguards and security under
United Nations International Atomic Energy Agency (IAEA)

Need for Global Accountability for Safety

Treaties and processes are based on peer reviews:

Convention on Nuclear Safety (Nuclear Power Plants)

Joint Convention on Spent Fuel and Radioactive Waste Management

UN IAEA Peer Review Missions – (IRRS, IPPAS, EPREV)

CNSC BELIEVES IN GLOBAL ACCOUNTABILITY FOR NUCLEAR SAFETY



SOME COUNTRIES OF INTEREST

United Kingdom

Active issues: Atkins acquisition; new build; plutonium disposition; waste management; Brexit

CNSC: Government putting into place agreements for Brexit; CNSC strong relationship with UK Office of Nuclear Regulation; working on sharing information related to the regulation of SMRs

United States

Active issues: Supply chain; new build; decommissioning; CFSI coordination

CNSC: CNSC has strong relationship with US Nuclear Regulatory Commission (NRC); sharing information on the regulation of SMRs

Argentina

Active Issues: Life extension at Embalse NPP; status of new build CANDU at Atchua; Argentina constructing SMR (CAREM-25)

CNSC: Strong relationship with Autoridad Regulatoria Nuclear; Argentina to host an IRRS Mission in 2019.



SOME COUNTRIES OF INTEREST

Romania

Active Issues: Only CANDU in Western Europe; status of new build Cernavoda 3 & 4?

CNSC: Strong relationship with National Commission for Nuclear Activities Control of Romania (CNCAN) and with Western European Nuclear Regulators (WENRA)

China

Active Issues: New build; Advanced Fuel CANDU Reactor (AFCR); Recycled fuel; SMRs

CNSC: Strong relationship with China nuclear regulatory authorities

South Korea

Active Issues: Wolsong nuclear power plant

CNSC: Strong relationship with Nuclear Safety and Security Commission

India

Active Issues: Indigenous pressurized heavy water reactors

CNSC: Managing new era since resumption of nuclear trade in 2016

**THE CNSC HAS INTERNATIONAL AGREEMENTS IN PLACE WITH
OVER 42 COUNTRIES AND INTERNATIONAL ORGANIZATIONS**



COMMUNICATIONS AND OUTREACH

Outreach: Indigenous and targeted audiences

Digital presence: YouTube, Twitter, Facebook, LinkedIn, CNSC website

Emergency communications

Public and media inquiries

Participant Funding Program (PFP)

Regulatory oversight of licensee public communications

Indigenous Forums Communicate
with Public Duty to Consult

Disseminate

Information Emergency

Communications Social Media

Indigenous Consultation

Participant Funding
Program

Meet the Regulator

**OUR VISION: TO BE THE TRUSTED SOURCE
OF INFORMATION ON NUCLEAR SAFETY IN CANADA**



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Canada

Connect With Us

Join the conversation



nuclearsafety.gc.ca

