Canadian Nuclear Safety Commission

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
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.

TRANSITION TO NEW LEADERSHIP

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
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
ACTIVE URANIUM MINING OPERATIONS (SASKATCHEWAN)

Cigar Lake Mine (Cameco)

McCLean 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

#### 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)

#### Nuclear Plants

<table>
<thead>
<tr>
<th>Bruce A and B</th>
<th>Darlington</th>
<th>Pickering</th>
<th>Gentilly-2 Point Lepreau</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>In service 1977/2012</td>
<td>In service 1992</td>
<td>In service 1971/2005</td>
</tr>
<tr>
<td>A2</td>
<td>In service 1977/2012</td>
<td>Being refurbished 2016</td>
<td>In service 1971</td>
</tr>
<tr>
<td>A3</td>
<td>In service 1978/2003</td>
<td>935 MWe</td>
<td>In service 1972</td>
</tr>
<tr>
<td>A4</td>
<td>In service 1979/2003</td>
<td>935 MWe</td>
<td>In service 1971/2003</td>
</tr>
<tr>
<td>B5</td>
<td>In service 1985</td>
<td>In service 1993</td>
<td>In service 1983</td>
</tr>
<tr>
<td>B6</td>
<td>In service 1984</td>
<td>In service 1993</td>
<td>In service 1984</td>
</tr>
<tr>
<td>B7</td>
<td>In service 1986</td>
<td>In service 1993</td>
<td>In service 1985</td>
</tr>
<tr>
<td>B8</td>
<td>In service 1987</td>
<td>In service 1993</td>
<td>In service 1986</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bruce A and B</th>
<th>Darlington</th>
<th>Pickering</th>
<th>Gentilly-2 Point Lepreau</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>In service 1977/2012</td>
<td>In service 1971/2005</td>
<td>In service 1983</td>
</tr>
<tr>
<td>A3</td>
<td>In service 1978/2003</td>
<td>Safe storage state</td>
<td>Safe storage state</td>
</tr>
<tr>
<td>A4</td>
<td>In service 1979/2003</td>
<td>Safe storage state</td>
<td>Safe storage state</td>
</tr>
<tr>
<td>B5</td>
<td>In service 1984</td>
<td>935 MWe</td>
<td>In service 1983/2012</td>
</tr>
<tr>
<td>B6</td>
<td>In service 1986</td>
<td>935 MWe</td>
<td>705 MWe</td>
</tr>
<tr>
<td>B7</td>
<td>In service 1987</td>
<td>935 MWe</td>
<td>705 MWe</td>
</tr>
<tr>
<td>B8</td>
<td>In service 1992</td>
<td>935 MWe</td>
<td>705 MWe</td>
</tr>
</tbody>
</table>
BRUCE NUCLEAR GENERATING STATION (ONTARIO)


$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
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
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
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

EA PROCESS DELAYED
Translation of Documents
Indigenous Consultation
Characterization of waste
KEY DATES PUBLIC UPDATES AND OUTREACH

**NSDF**
- 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

**NPD**
- 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

**WHITESHELL**
- 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

TIMELINES DEPENDENT ON QUALITY AND COMPLETENESS OF INFORMATION

Canadian Nuclear Safety Commission nuclearsafety.gc.ca
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)

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

STORED SAFELY AND SECURELY
The Nuclear Safety and Control Act (NSCA) includes safe spent fuel and radioactive waste management.

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
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

GLOBAL SAFETY IS THE RESPONSIBILITY OF ALL STAKEHOLDERS, GOVERNMENT, INDEPENDENT REGULATORS AND INDUSTRY
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
AUTHOMOUS 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”
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

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

CNSC’s Regulatory Framework Modernized, On-line And Transparent

Participate in consultation – submit your comments!

CLARITY OF REQUIREMENTS IS IMPORTANT

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

**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
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
Connect With Us
Join the conversation

nuclearsafety.gc.ca