Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Canada

Regulation of SMRs in Canada

Converging Emerging Technologies (CET) Conference

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Melanie Rickard

Acting Director General

Directorate of Assessment and Analysis

Canadian Nuclear Safety Commission

CNSC Regulatory Approach

- Objective, independent decision making and oversight
- Safety focus at all times; licensees ultimately responsible for safety
- Modern, agile, and flexible regulator for innovative technologies
- Relationship and trust building are key to social acceptance
- Pre-licensing activities including Vendor Design Reviews can help ensure reactor designers understand CNSC requirements

The Commission Tribunal

MS. RUMINA VELSHI

DR. TIMOTHY BERUBE

DR. SANDOR DEMETER

MR. RANDALL KAHGEE

DR. MARCEL LACROIX

MS. INDRA MAHARAJ

DR. VICTORIA H REMENDA

TRANSPARENT, SCIENCE-BASED DECISION MAKING

- Quasi-judicial administrative tribunal
- Agent of the Crown (Duty to Consult)
- Reports to Parliament through Minister of Natural Resources
- Members are independent and part-time
- Commission hearings are public and webcast
- Staff presentations are public
- Decisions are reviewable by Federal Court

Safety and Control Areas (SCAs)

Management

- Management Systems
- Human Performance Management
- Operating Performance

Facility & Equipment

- Safety Analysis
- Physical Design
- Fitness for Service

Core Control Processes

- Radiation Protection
- Conventional Health and Safety
- Environmental Protection
- Emergency Management and Fire Protection
- Waste Management
- Security
- Safeguards
- Packaging and Transport

Environmental Reviews for SMRs

The type of environmental review(s) needed for an SMR depend(s) on the proposed location and heat capacity:

Impact assessment
under the *Impact Assessment Act (IAA)*

Environmental assessment:
under another jurisdiction's legislation

- For example: Provincial / Territorial / Land Claims agreements

Environmental protection review
under the *Nuclear Safety and Control Act*

- Conducted if no impact assessment is required
- May include a **federal lands review** under the IAA if SMR proposed on federal lands

CNSC Licensing Landscape

Darlington New Nuclear Project
Ontario Power Generation, (OPG)

- Technology: *GE Hitachi BWRX-300*
  - Boiling Water Reactor
- OPG currently holds a *Licence to Prepare Site* for new site in Clarington, Ontario
- OPG's intent is to apply for a Licence to Construct in the Fall of this year
- Opportunities to collaborate with the US NRC on license application reviews

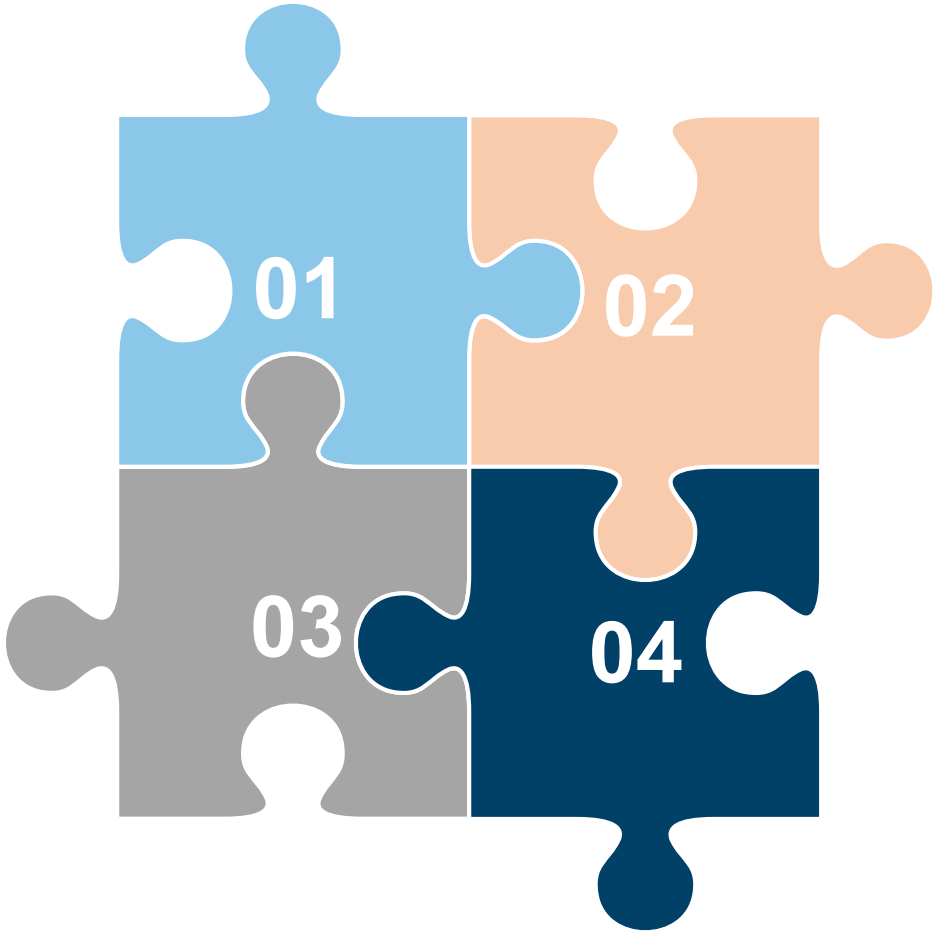
CNSC Licensing Landscape

Global First Power, (GFP)

- 15MW(t) High Temperature Gas Reactor for up to 5 MW of electrical generation
- Licence to Prepare Site application received in March 2019 for Chalk River Laboratories, ON
- CNSC-led environmental assessment underway
- Demonstrate commercial operation

Other Provinces with no previous NPP experience (Saskatchewan, Alberta) are exploring SMR technologies

SMR Readiness
A Regulators Perspective



Readiness: Vendor Design Reviews (1)

VDRs are pre-licensing activities and are carried out in 3 phases:

- **Phase 1:** Evaluates if the vendor understands and intends to comply with the Canadian regulatory requirements
- **Phase 2:** Determines if fundamental barriers to licensing exist
- **Phase 3:** Provides the vendor the opportunity to follow-up with specific focus areas and/or additional area not covered in previous phases

Provides information that can be leveraged to inform licensing for a specific project – it is neither a design certification nor a licence

No regulatory decisions are made

Readiness: Current SMR Vendor Design Reviews (2)

Company	Reactor type (output per unit)	VDR Status
Terrestrial Energy	Molten salt integral (200 MWe)	PHASE 1 complete **PHASE 2 underway**
UltraSafe Nuclear/Global First Power	High-temperature gas prismatic block (5 MWe)	PHASE 1 Complete **PHASE 2 underway**
X-Energy	Pebble bed HTGR (80 MWe)	**COMBINED PHASE 1 & 2 underway**
Advanced Reactor Concepts	Sodium pool fast spectrum (100 MWe)	PHASE 1 complete **PHASE 2 underway**
Westinghouse	Microreactor /heat pipe (up to 25MWe)	**COMBINED PHASE 1 & 2 underway**
NuScale Power	Integral Pressurized Water (50 MWe)	**COMBINED PHASE 1 & 2 underway**
General Electric Hitachi	Boiling Water Reactor (300 MWe)	**COMBINED PHASE 1 & 2 underway**

Readiness: Safeguards

IAEA

The CNSC supports the concept of "Safeguards-by-Design" (SBD): the integration of safeguards considerations at the early design phase of a nuclear facility and throughout its life cycle

The CNSC is participating in an IAEA Member State Support Programme task on "Safeguards by Design for Small Modular Reactors"

Aims to identify the key technical challenges for safeguards implementation and the steps that can be taken to support incorporating SBD principles into the designs.

Readiness: Waste Management

- Spent fuel intended for storage will need to be placed in interim storage, as is CANDU generated waste, until a long-term storage option is available
- *The Nuclear Fuel Waste Act* is flexible and accommodates new entrants
- The Nuclear Waste Management Organization is engaged with SMR vendors, early in the process
- Canada is Modernizing its *Nuclear Waste Policy on Radioactive Waste Management and Decommissioning*

Readiness: International Co-operation with the USNRC

- CNSC Collaboration with the U.S Regulatory Commission
- Memorandum cooperation specific to SMRs
- Success in cooperation on regulatory/technical issues, including 4 completed projects
- Strategic Workplan to gain Regulatory efficiencies
- Industry Harmonization - towards standard designs

CNSC's SMR Focus:

- On-going SMR readiness activities
- Preparation for, and review of, Licence applications
- Meaningful public and indigenous engagement
- Continued international collaboration and sharing lessons learned
- Support of the IAEA's Nuclear Harmonization & Standardization Initiative

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