# Canadian Nuclear Safety Commission (CNSC): Small Modular Reactor Licensing in Canada

## Converging Energy Technologies (CET) Conference

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# Our Mandate

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

**OVER 70 YEARS OF REGULATORY EXPERIENCE**

# Our Approach to Licensing Small Modular Reactors (SMRs)

### Robust Licensing Process

Leveraging CNSC's robust performance-based, risk-informed regulatory framework sets us up for success when licensing novel technologies.

### Vendor Design Review

Maintaining awareness of upcoming regulatory challenges through pre-licensing processes (i.e. early discussions with proponents).

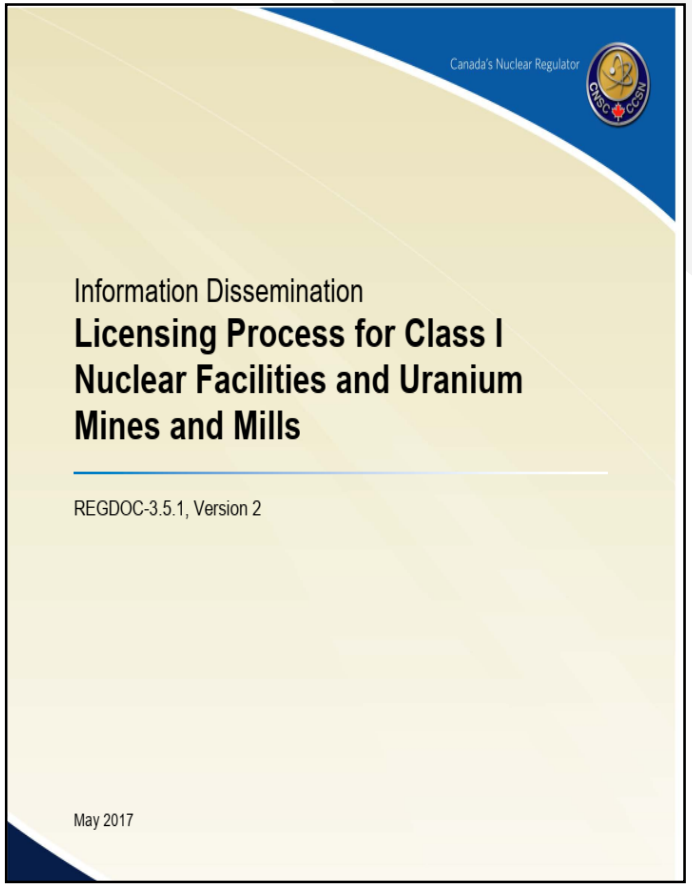
### SMR Readiness Project

Addressing identified regulatory challenges through a dedicated and integrated readiness project.

# Licensing Process Overview

# CNSC Licensing Approach

- Small Modular Reactors are licenced according to Class I Nuclear Facilities Regulations
- Licensing process requires a licence application that includes sufficient information to demonstrate a reactor can be safely constructed, operated and decommissioned
- CNSC staff provide recommendations on licensing to the Commission, who is the decision maker through a public hearing process
- CNSC follows a **performance-based approach** to licensing nuclear facilities.



# Pre-licensing Engagement and Licensing Process Overview

**Pre-licensing engagement (Optional)**
**No regulatory decision making**

## Potential applicant

**Vendor Design Review (VDR)**

Prepare application and submissions

Vendor leverages VDR results in discussions with potential applicant

*REGDOC-3.5.4, Pre-licensing Review of a Vendor's Reactor Design*

**Environmental Review**

## Licensing Process

**Transparent regulatory decision making**

| Site Preparation Licence | Construction Licence | Operation Licence | Decommissioning Licence |
|---|---|---|---|
| REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities* | REGDOC 1.1.2, *Licence Application Guide: Guide to Construct a Reactor Facility* | REGDOC-1.1.3, *Licence Application Guide: Licence to Operate a Nuclear Power Plant* | REGDOC-2.11.2, *Decommissioning* |

**REGDOC-1.1.5, *Supplemental Information for Small Modular Reactor Proponents***

# Vendor Design Review (VDR)

# Vendor Design Review (VDR)

- Vendors are encouraged to engage with the CNSC early
- A VDR is an optional process that:
  - provides feedback on vendor's efforts to address Canadian requirements and to identify fundamental barriers to licensing (if any), early in the process
  - provides an opportunity for CNSC staff to become familiar with the design and identify regulatory issues along with resolutions
- A VDR does not constitute an approval of a design
- Three phases
  - **Phase 1** determines if the vendor understands and intends to meet CNSC design requirements
  - **Phase 2** focuses on identifying potential fundamental barriers to licensing
  - **Phase 3** (if required) involves follow up on one or more focus areas chosen by the vendor

# VDR Focus Areas – Design and Safety Analysis Centric

| | | | |
|---|---|---|---|
| **1** | General plant description, defence in depth, safety goals and objectives, dose acceptance criteria | **11** | Pressure boundary design |
| **2** | Classification of structures systems, and components | **12** | Fire Protection |
| **3** | Reactor core nuclear design | **13** | Radiation Protection |
| **4** | Fuel design and qualification | **14** | Out-of-Core Criticality |
| **5** | Control system and facilities | **15** | Robustness, safeguards and security |
| **6** | Means of reactor shutdown | **16** | Vendor research and development program |
| **7** | Emergency core cooling and emergency heat removal systems | **17** | Management system of design process and quality assurance in design and safety analysis |
| **8** | Containment /confinement and safety-important civil structures | **18** | Human factors |
| **9** | Mitigation of Design Extension Conditions | **19** | Incorporation of decommissioning in design considerations |
| **10** | Safety analysis (PSA, DSA, hazards) | | |

# Canadian Nuclear Landscape

# CANADIAN NUCLEAR LANDSCAPE

LICENSING ACTIVITIES FOR NEW BUILDS IN CANADA

**NEW BRUNSWICK POWER**
Site preparation application for 1 ARC-100 SMR

**ONTARIO POWER GENERATION**
Construction application for 1 GEH BWRX-300

**Bruce Power**
Planning Phase of Impact Assessment for up to 4,800 Mwe (large nuclear)

# CANADIAN NUCLEAR LANDSCAPE

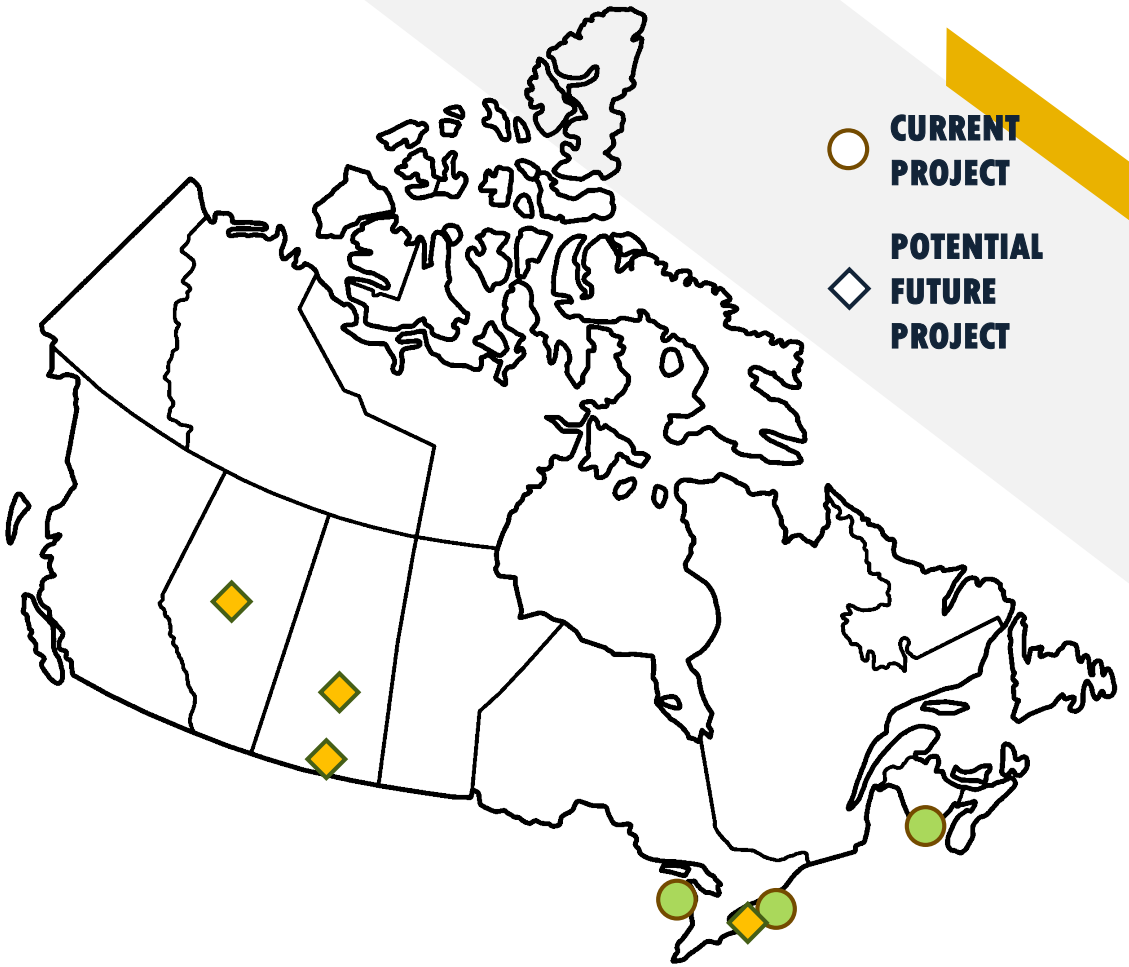
POTENTIAL FUTURE NEW BUILD APPLICATIONS

**ONTARIO POWER GENERATION (OPG)**
**Up to 3 additional BWRX-300 UNITS**

**SASKPOWER**
**BWRX-300**

**SASKACHEWAN RESEACH COUNCIL NUCLEAR**
**eVinci™ Microreactor**

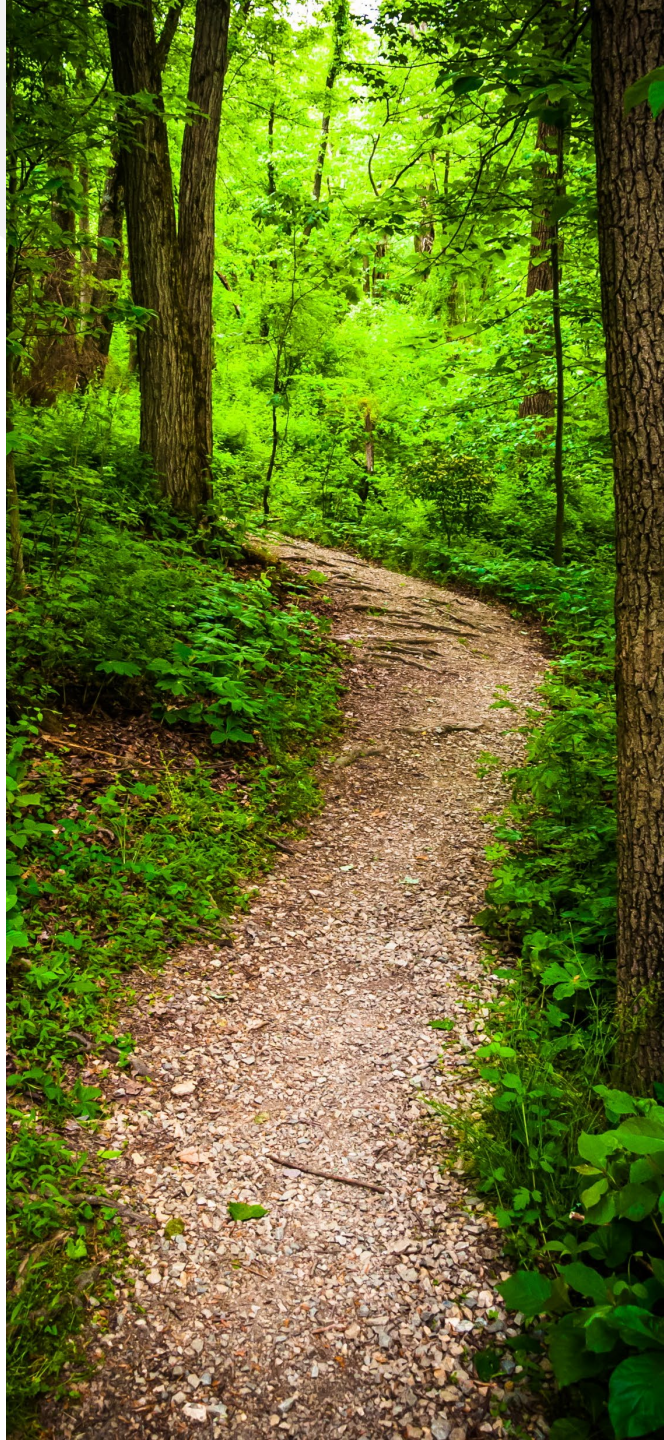
**OPG and CAPITAL POWER**
**Exploring SMRs in Alberta**



# Looking Ahead

The CNSC is prepared for nuclear innovation and expansion in Canada without compromising the safety and security of the environment and the public by:

- Leveraging the existing robust licensing processes
- Having early conversations with vendors through the Vendor Design Review Process
- Ensuring readiness for regulating advanced reactor technologies.



# Thank you