



Commission canadienne  
de sûreté nucléaire

Canadian Nuclear  
Safety Commission

# *Ready to Regulate Small Reactors in Canada*



**Barclay D. Howden**

**Director-General**

**Directorate of Regulatory Improvement and Major Projects Management**

**Canadian Nuclear Safety Commission**

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# *Presentation Outline*



- **Overview of the Canadian Nuclear Safety Commission**
- **The Emerging Demand for More Reliable Sources of Energy in Remote Locations**
- **Canada's Long History with Small Reactors**
- **Reactors are Regulated in a Continuum of Requirements**
- **Overview of Licensing Process**
- **Codes and Standards**
- **How to Ensure Efficient Licensing Timelines**
- **Small Modular Reactors Currently Being Reviewed By the CNSC**
- **Conclusion**

# Canadian Nuclear Safety Commission



- Established in May 2000, under the *Nuclear Safety and Control Act*.
- **Mandate:**  
Regulate nuclear activities to protect the **health, safety** and **security** of Canadians and the **environment**, and to implement Canada's **international commitments** on the peaceful use of nuclear energy.



**Canada's Independent Nuclear Regulator –  
66 Years of Experience**

# *CNSC Regulates All Nuclear-Related Facilities and Activities*



- Uranium mines and mills
- Uranium fuel fabricators and processing
- Nuclear power plants
- Waste management facilities
- Nuclear substance processing
- Industrial and medical applications
- Nuclear research and educational uses
- Import/export control



**...From Cradle to Grave**

# Independent Commission



- Quasi-judicial administrative tribunal
- Commission members are independent
- Commission hearings are public and Webcast
- Supported by a Secretariat and independent legal services



**Transparent, science-based decision making**

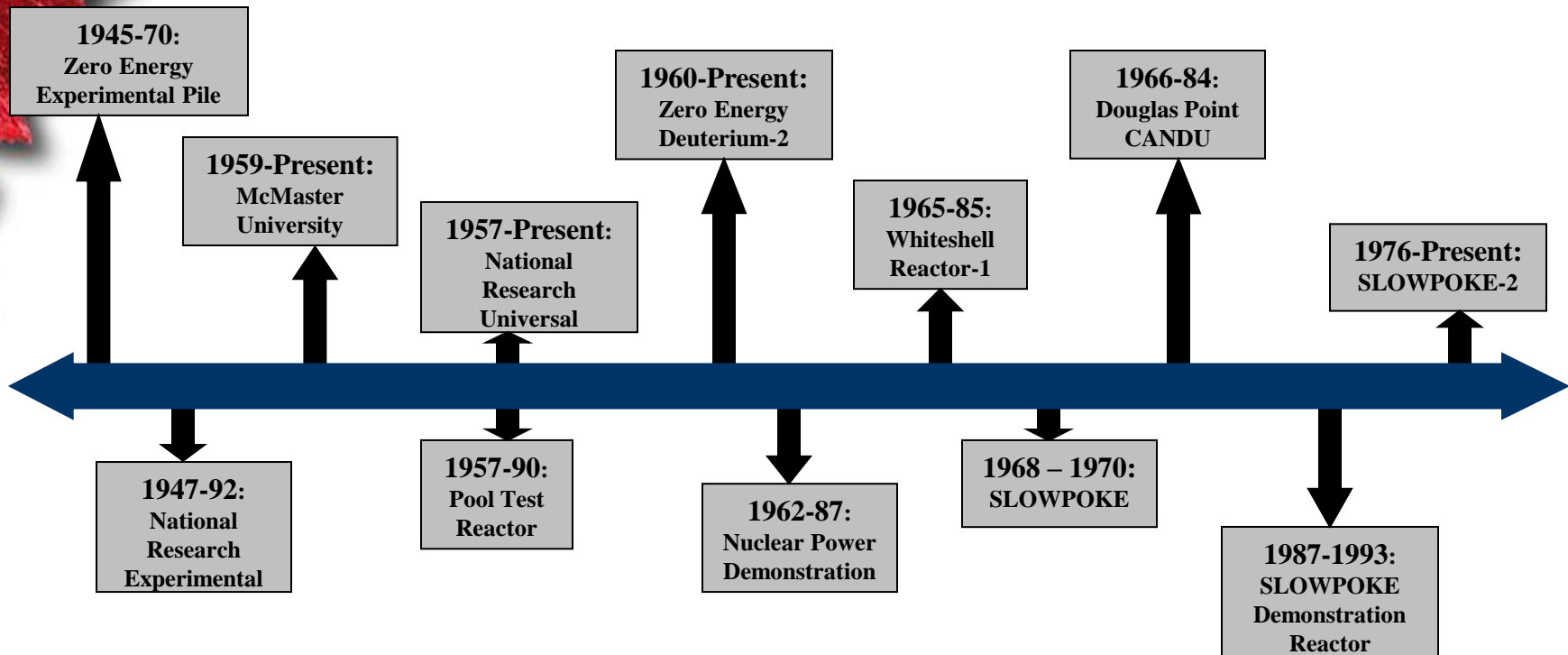
# Emerging Demand for More Reliable Sources of Energy in Remote Locations



- Resource Projects
  - Many new projects are far from natural gas pipelines or regional electrical grids.
- Supply of reliable diesel and propane (good quality at decent price) is slowly drying up.
- Northern delivery routes becoming unreliable.
- Department of National Defence
  - Northern missions are vulnerable to fuel supply failures.
- In the North, “green” technologies are too small and unreliable.

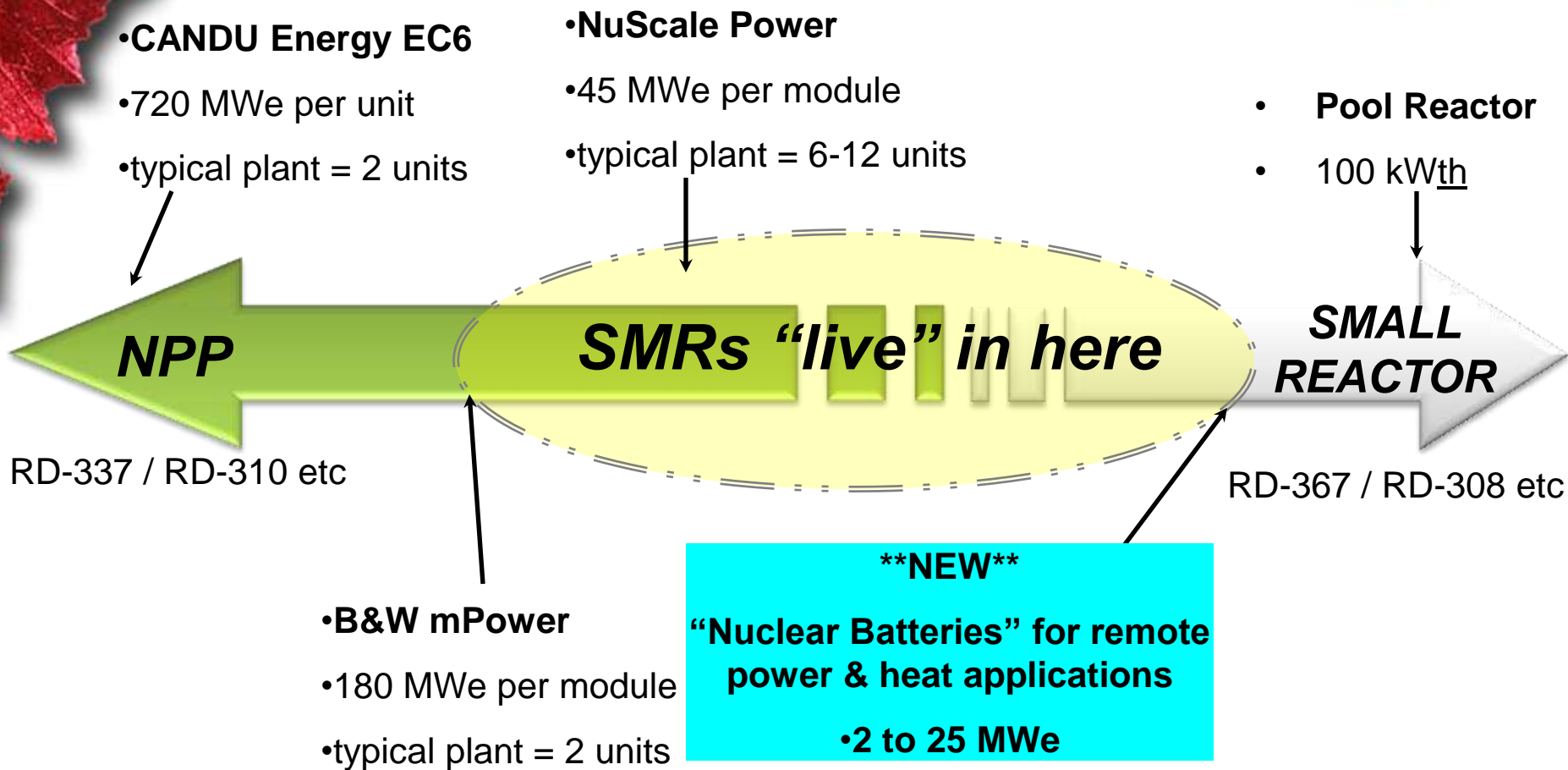
**Existing energy supplies have worked well so far but are becoming unreliable**

# Canada's Long History with Small Reactors



**Lessons learned from all past small reactor projects have informed our regulatory requirements and will continue to do so!**

# Reactors are Regulated in a Continuum of Requirements





# Threshold between Small Reactor and Nuclear Power Plant?



Small Reactors (approximately < 200 MW thermal)	Nuclear Power Plant (approximately > 200 MW thermal)
RD – 308: <i>Deterministic Safety Analysis for Small Reactors</i>	RD – 310: <i>Safety Analysis for Nuclear Power Plants</i>
RD – 367: <i>Design of Small Reactors</i>	RD – 337: <i>Design of New Nuclear Power Plants</i>

- Why?

- Not a hard threshold.
- Below approx. 200 MW thermal, the core inventory may present lower risks to the public, allowing for more flexibility in how safety can be demonstrated.
  - Example: Above 200 MW thermal use of containment as opposed to confinement will be necessary to demonstrate safety.

**Very Important Point:**

**Flexibility in approach ≠ “relaxing” safety requirements!**

# Rigorous Licensing Process

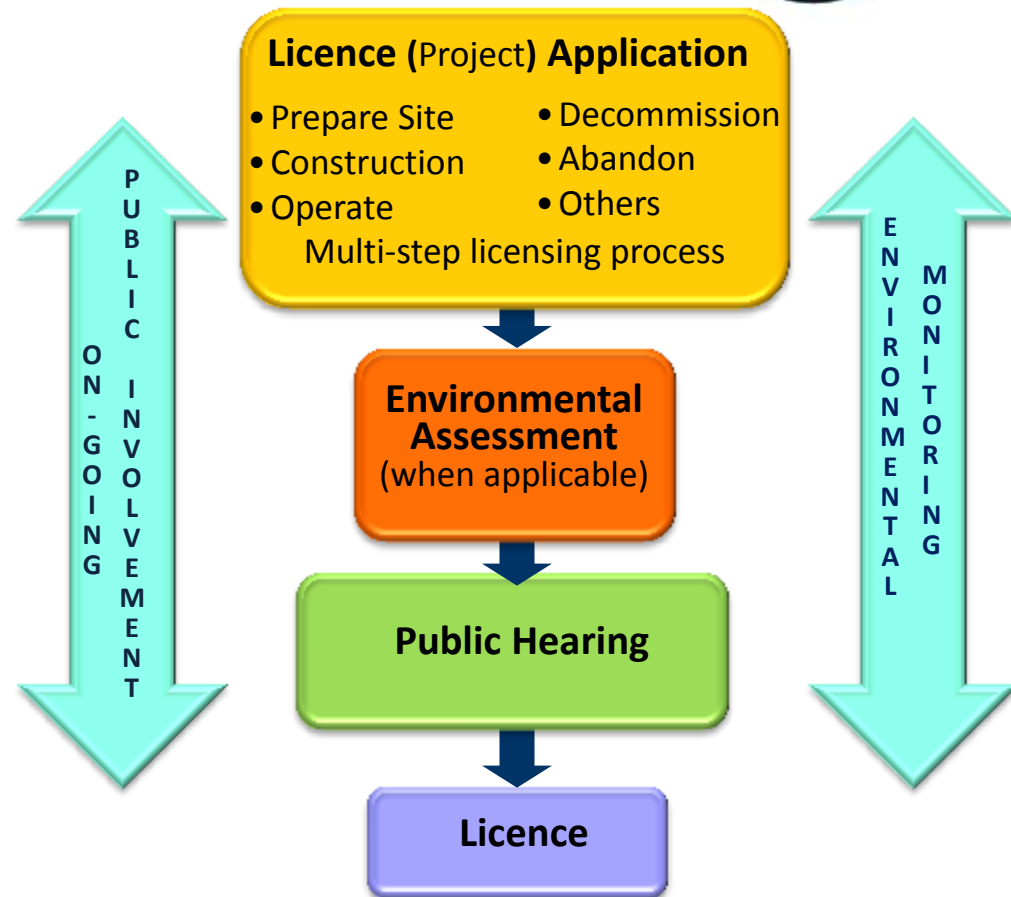


- **CNSC Oversight**

- Licence Conditions
- Compliance Assurance:
- Inspections, Enforcement, Safety Culture

- **Licensee Obligations**

- Health and Safety
- Environmental Protection
- Security
- Monitoring
- Reporting
- Financial Guarantee
- Proactive Disclosures



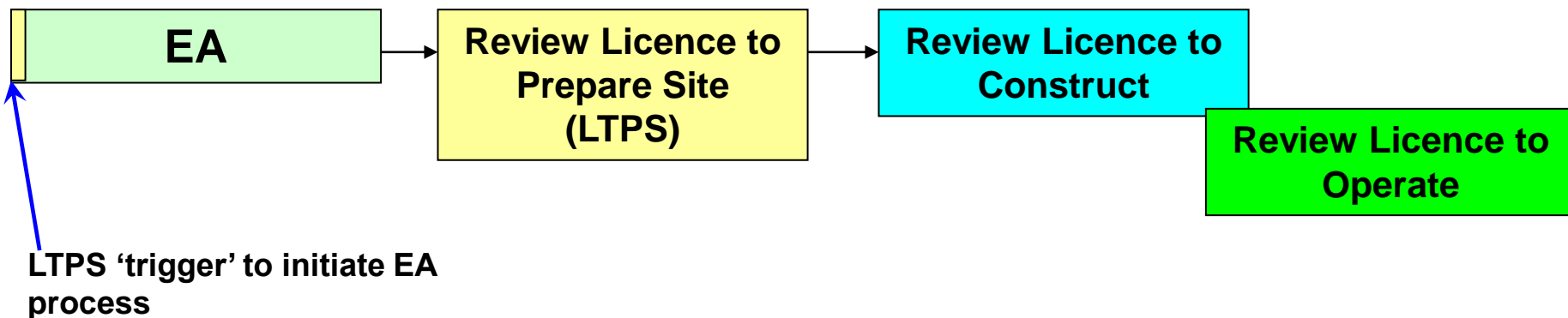
**... One process regardless of reactor size**

# Canadian Licensing Process Provides Flexibility



- Licence applications can be reviewed in series or in parallel depending on the needs and readiness of the licensee.
- Examples:

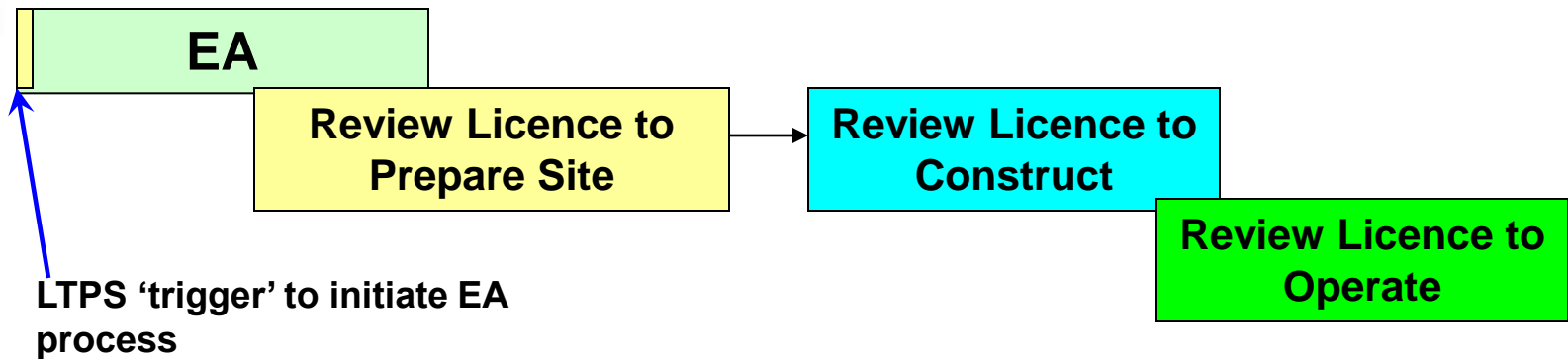
1. Simple Series process with deferred decision on Licence to Prepare Site (EA used as planning tool only).



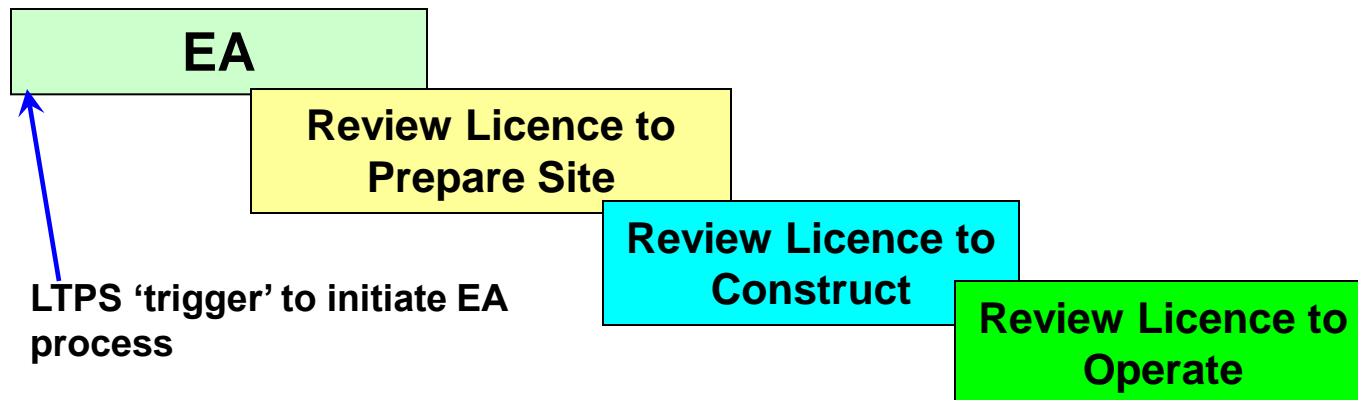
# Canadian Licensing Process Provides Flexibility



## 2. Parallel EA and Licence to Prepare Site with deferred construction licence.



## 3. Parallel EA and LTPS- First of a Kind.



# Codes and Standards



- Canadian Standards Association (CSA) and American Society of Mechanical Engineers (ASME):
  - Example: The CSA N285 series regulates the pressure retaining components design
- Applications should include references to applicable codes and standards.
- Products from outside Canada - the vendor is required to identify gaps between their adopted standard and those used in Canada.



**The licensing process is independent of reactor size and can be adapted to any licensing scenario.**

# Ensuring Efficient Licensing Timelines



- We suggest vendors use the Pre-licensing Vendor Design Review Process:
  - Optional service
  - Provides early identification of resolution of potential regulatory or technical issues in the design process.
- A vendor design review evaluates if:
  - the vendor understands Canadian regulatory requirements and CNSC expectations;
  - the design complies with CNSC regulatory documents RD-337, *Design of New Nuclear Power Plants* or RD-367, *Design of Small Reactors* and related regulatory documents and standards; and
  - a resolution path exists for any design issues identified in the review.

# Ensuring Efficient Licensing Timelines



- Enter the licensing process with high quality, complete and timely submittals.
- The applicant is strongly encouraged to engage the public and aboriginal groups early and transparently.
- Understand the regulatory landscape.



# Small Modular Reactors Currently Being Reviewed by the CNSC



- **B&W mPower Reactor**

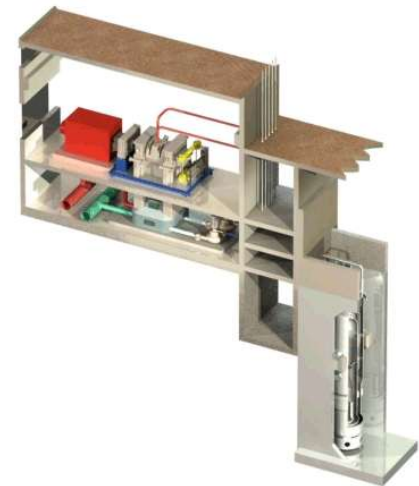
- *180 MW (electric) per unit in a 1-2 module station*

- **NuScale Power System Reactor**

- *45 MW (electric) per unit in a 6-12 module station*



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Single-unit side view of the NuScale system design



# Conclusion



- Many vendors have already been in contact with the CNSC.
- There is an emerging demand for reliable sources of energy in remote locations.
- A strong understanding in safety requirements for small modular reactors.
- Flexible licensing process.
- Capable of ensuring efficient licensing timelines.



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**We Will Never  
Compromise Safety**

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# Questions?

