Communicating SMR Momentum in Canada

SMR Roadmap NRCan)

Issued by GoC in October
You can read the details at www.smrroadmap.ca

11 SMR Applicants to CNSC Vendor Design Process
- SMR Public Workshop (Nov. 24, 2017) - results report available online

8 Site applicants in Canada
- 6 at CNL (USNC/GF advanced to Stage 3 negotiations with government)
- 2 in New Brunswick (ARC, Moltex)
PERSPECTIVES ON CANADA'S SMR OPPORTUNITY
Summary Report: Request for Expressions of Interest—
CNL’s Small Modular Reactor Strategy

UNRESTRICTED / ILLIMITÉ
CNL began the conversation in Canada...

Launched RFEOI in 2017 - to get in a better understanding from all perspectives.
Path to Demonstration

Market Survey (2017):
• 80 responses
• 19 potential demonstrations
• Gathered input from vendors, end users and industry

Invitation to Site a Demonstration SMR (2019):
• 6 applications received, more anticipated
• Technology and project developers serious and progressed to site the first demonstration unit

Parallel Activities
• Public Engagement
• Building R&D Capabilities
• Environmental Assessment/Impact Assessment
• Licence Applications
• Developing partnerships
• Assess waste management approaches and nuclear liabilities
Canadian Responses
Proposed SMR Demonstration Reactors

![Bar chart showing the number of reactors for different cooling and fuel types.]

- Water-cooled: 3
- High-Temperature Gas: 4
- Sodium-cooled Fast: 3
- Lead-cooled Fast: 3
- Gas-cooled Fast: 1
- Molten Salt: 3
- Fusion: 1

UNRESTRICTED / ILLIMITÉ
Requirements for SMR Deployment
Generic Siting Activities at CNL

- Technology neutral undertaking, CRL and WL

- Generic SMR siting study using broad vendor feedback
- Sites for at least 10 SMR demonstrations have been identified
  - Some will be more suitable than others
  - Some will be more suitable than others for different technologies
  - Some of these areas could handle more than one SMR

The number of SMRs at CNL will not be limited by the number of sites...

... and CNL manages more than one site.
SMR Siting at CNL

- **Process**

1. **Stage 1:** Pre-qualification
2. **Stage 2:** Due Diligence
3. **Stage 3:** Negotiation of Land Arrangement and Other Contracts
4. **Project Execution**

CNL recommends to AECL
If successful, letter of support for licensing purposes

6 Applicants (3 vSMRs – “Micro-Reactors”)
One Stage 2 Applicant Approved to Stage 3
Two Stage 1 Applicants Approved to Stage 2
One new Stage 1 Applicant
Clean Energy Research Initiative:

1. Launch / Guidelines – as early as July
2. Applications – as early as August
3. Awards – as early October
4. Size of work – TBD by applicants
5. Scope – collaborative clean energy R&D (e.g., economics, fuel, renewable system integration, materials, chemistry, thermalhydraulics, modeling & simulation, etc.)
Clean Energy Research Park (CERP)

- Advancing the readiness of low-carbon hybrid energy systems with SMRs

Renewables

Smart Grid

SMR

Storage

Resource Management

Remote Communities

Transportation

Demonstration platform

Enable low-carbon systems

Prototype diverse applications
## SMR Work at CNL

- **Work Across the Company**

<table>
<thead>
<tr>
<th>RESEARCH</th>
<th>BUILDING CAPABILITY</th>
<th>COMMERCIAL</th>
<th>SITING</th>
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</table>
| • Construction  
• Remote inspection and monitoring  
• Human Performance  
• Modelling & Simulation  
• Computational tools  
• Waste management  
• Hybrid energy systems  
• Passive safety systems  
• Severe accidents  
• Fission Product Release | Continue to invest into the facilities and capabilities needed to support SMR development, including molten salts and fuel fabrication of HA LEU fuels. | • 18 NDA  
• 7 MOUs  
• 8 MTA  
• 12 contracts  
35 additional in discussion. | Generic siting studies completed.  
Vendor-specific siting studies underway.  
6 site applications received |

Continue to invest into the facilities and capabilities needed to support SMR development, including molten salts and fuel fabrication of HA LEU fuels.
Canada has >200 Remote Mining Sites (Alaska has 31)
Mining in Canada

- 60% of global mining revenue is traded on TXE
- PDAC (Prospectors) conference attracts >30,000
  - Large nuclear timeline is 60 years
  - Mining timeline is 5-15 years
- Mining Business Case
  - Demonstration within 5-10 years to take advantage of current “up-swing” (cyclical)
Advantages to vSMR Deployment in Canada

- Government Climate Policy (applies to mining)
- Robust market for mining and remote communities
  - >125 remote communities >500 inhabitants
- Progressive, Risk-Informed Regulator (CNSC)
- 11 applicants to Vendor Design Review (VDR)
- Mature Supply Chain ($26 Billion refurbishments)
- Canadian National Laboratories
  - Siting, R&D support, fuel fabrication/HALEU
- Federal Government SMR Roadmap (no funding, yet)
Canadian Momentum

6 SMR Roundtables w/ 38 Different Vendor Designs
- 1\textsuperscript{st} - Winnipeg, October 2017 (12 Vendors)
- 2\textsuperscript{nd} - Atlanta, March 2018 (18 Vendors)
  - Launch: CNL Siting Application Process
- 3\textsuperscript{rd} – San Francisco, PBNC - October 2018 (26 vendors, 6 countries) Launch: CERP
- 4\textsuperscript{th} – Ottawa, G4SR, 6 November 2018 (23 Vendors – 500 attendees – SOLD OUT)
  - Launch: Canada’s SMR Roadmap
- 5\textsuperscript{th} – Atlanta, April 2019 (19 Vendors)
- 6\textsuperscript{th} – Vancouver, May 2019 (18 Vendors)
  - Launch: CERI

7\textsuperscript{th} SMR Roundtable – Washington, DC
- ANS Winter Meeting, November 20, 2019
- Focus: North America Collaboration
- Regulatory Harmonization, HALEU, Joint R&D

8\textsuperscript{th} SMR Roundtable – Toronto – G4SR 2020 (TBD)
The place is Canada.
The time is now.
Your partner is CNL.

Mark Lesinski,
CNL President & CEO

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https://www.youtube.com/watch?v=wsfrYpfmpWI