

Accelerating SMRs for Net Zero

NEA International Workshop on the Economics of SMRs

Laurier Room - Fairmont Château Laurier

Ottawa, Canada

Tuesday, 27 February 2024

9:00 – 17:45



Overview

The Nuclear Energy Agency (NEA) will host an international workshop on the economics of small modular reactors (SMR) in Ottawa, Canada, on Tuesday, 27 February 2024. This international workshop aims to assess recent progress in SMR deployment and discuss how different policy frameworks, deployment strategies, and delivery models will influence the overall economics of SMRs. Additionally, the event will draw insights from comparable industries that have achieved cost reductions through serial construction, identifying potential approaches for SMR projects.

Global momentum behind the adoption of SMRs as a competitive, low-carbon energy source in the pursuit of net zero goals continues to grow. NEA analysis indicates that SMRs can play a crucial role in fulfilling the commitment made by 25 countries at COP28 to [triple installed nuclear capacity by 2050](#) in support of net zero targets. This role encompasses addressing challenges in hard-to-abate sectors, such as replacing coal power plants with on-grid power, substituting diesel generators with off-grid heat and power for remote mining operations, providing high-temperature heat to replace fossil fuel co-generation in heavy industries, and serving as marine propulsion to replace heavy-fuel oil in merchant shipping.

To meet this diverse and growing demand, SMRs bring a number of unique design features that support both their safety case and economics. This includes integral designs that contribute to a robust inherent safety case, low core inventories to reduce the need for emergency planning zones, improved modularisation and manufacturability that would transform nuclear new builds delivery models, and enhanced flexibility for nuclear energy to further support variable renewables integration in the electricity mix.

While developers of SMRs continue to make significant strides on the first demonstration projects, crucial questions remain regarding deployment pathways for a widespread global rollout, delivery models, and the realisation of cost competitiveness through “economies of multiples.” Simultaneously, achieving these goals necessitates fostering government-to-government, public-private, and business-to-business cooperation to expedite the large-scale deployment of SMRs.

The outcomes of this workshop will contribute valuable insights to the first NEA Accelerating SMRs for Net Zero Summit scheduled for September 2024 in Paris. This summit, as the capstone of the NEA's new initiative on [Accelerating SMRs for Net Zero](#) launched at COP28, will bring together senior government officials and industry leaders to discuss key policy priorities and international co-operation aimed at expediting the deployment of SMRs.

Programme

Arrival and check-in – 8:30 – 9:00

Welcome and introduction

- 9:00
(30 min)
- Jeff Labonté, Associate Deputy Minister of Natural Resources Canada, NRCan
 - Rachna Clavero, President and CEO, CANDU Owners Group
 - Diane Cameron, Head of Nuclear Technology Development and Economics Division, NEA

Session 1: Role of SMRs in pathways to net zero

9:30
(60 min)

The wave of innovation in SMRs is expected to offer practical solutions to decarbonise hard-to-abate parts of the economy, providing power and heat for both on-grid and off-grid applications. Beyond on-grid baseload power to replace coal-fired generation, near-term market demand for SMRs in hard-to-abate sectors continues to grow. Promising applications include off-grid heat and power to replace diesel generators in remote regions for mining operations; fossil-fuel replacement for district heating and high-temperature heat to replace fossil fuel co-generation in heavy industries; hydrogen production for synthetic fuels and clean steel production; as well as marine propulsion to replace heavy-fuel oil for merchant shipping. This session will highlight the promise of SMRs to support safe, secure and affordable pathways for net zero and discuss how near-term demonstration projects can set the stage for a rapid roll out over the next two decades.

Session Chair: Michelle Leslie, Senior Manager, Infrastructure & Capital Projects, Deloitte Canada

Speakers:

- Bill Lacivita, Partner, McKinsey &Co
- Carlos Leipner, Director, Global Nuclear Energy Strategy, Clean Air Task Force
- Nicolas Stauff, Group Manager, Nuclear Applications & Economics, Argonne National Laboratory
- Environment and Climate Change Canada (*invited*)

10:30
(30 min)

Coffee break

Session 2: Policy frameworks and energy markets to accelerate SMRs for net zero

11:00
(60 min)

At a time of rapid transformations across the energy sector, policy frameworks and energy markets will play a pivotal role to ensure that SMRs reach their full potential for net zero, alongside and in complementarity with other clean energy technologies. Policymakers possess a range of levers in their policy toolkit to support these efforts and foster a level playing field for clean energy technologies domestically and internationally, including through direct financial support measures, fiscal policy, as well as energy market regulations. This session will discuss the role and interplay between these different policy measures to support both first-of-a-kind (FOAK) SMR projects and future serial deployment at the speed and scale required for reaching net zero by 2050.

Session Chair: Colin Hault, Senior Director, Nuclear Energy, NRCAN, Canada

Speakers:

- Stephen Comello, Senior Vice President, Strategic Initiatives, EFI Foundation
- Guy Lonechild, CEO, First Nations Power Authority
- Jigar Shah, Director, Loans Programs Office, US Department of Energy (*invited*)
- Vanessa Whiten, Executive Director, Clean Technology, Alberta Innovates (*invited*)
- Department of Energy Security and Net Zero, United Kingdom (*invited*)

Session 3: Understanding SMRs key construction cost drivers

12:00
(60 min)

SMRs represent a promising advancement in nuclear technology, offering scalable and cost-effective solutions for both power and non-power applications, but also presenting new economic models and value proposition. At the plant level, achieving the economies of multiple will require to leverage on several costs drivers, including modularisation, factory construction, design simplification, standardisation as well as potential some international harmonisation of licensing approaches. This session will showcase recent perspectives on SMR construction costs drivers and their potential role in shaping the overall economics of SMRs.

Session Chair: Milt Caplan, President, MZConsulting

- Michel Berthélemy, Nuclear Strategic Policy Advisor, NEA
- Chad Boyer, Principle Technical Leader, EPRI
- Ben Lindley, Assistant Professor, University of Wisconsin- Madison
- Aaron Johnson, Senior Vice President – Nuclear, Aecon

13:00
(60 min)

Networking lunch

Session 4: Achieving the economies of multiples

14:00
(90 min)

Serial construction has underpinned significant cost reductions in a number of industries, including aviation, shipbuilding, data centers, as well as energy sectors such as wind and oil & gas. This “economies of multiples” is expected to play a significant role for SMRs in order to compensate for the “economies of scale” that otherwise traditionally benefits gigawatt-scale reactors. At the same time, it is also expected to contribute to accelerating time to market, with broader implications for SMRs value proposition. This session will review best practices from these other industries in terms of their approach to serial construction and discuss key lessons learnt, as well as their applicability for large-scale deployment of SMRs.

Session Chair: Jenifer Shafer, Associate Director, ARPA-E, US Department of Energy

Speakers:

- Eric Ingersoll, Founder and Managing Director, TerraPraxis
- Gary Fischer, Executive Director, Project Production Institute
- Marcus Nichol, Executive Director, New Nuclear, NEI
- Celestin Piette, Chief Vision Officer, Tractebel
- Mark Tipping, Global Power to X Director, Lloyd’s Register

15:30
(30 min)

Coffee break

Session 5: SMRs business models and delivery strategies for serial deployment

16:00
(90 min)

In a number of cases SMRs target new markets where nuclear energy is currently not part of the energy options. In parallel, structural changes across the energy sectors are impacting the way clean energy assets are built, owned and operated, and how projects risk can be allocated and mitigated among project proponents. On the supply side, these factors are shaping future business models and delivery strategies of SMR developers and their supply chains. On the demand side, they are also expected to drive how different prospective customers and end-users are approaching SMR projects in order to build the order book required for the competitiveness of SMRs. This session will review and discuss the most promising business models and delivery strategies that have the potential to accelerate the deployment of SMRs.

Session Chair: Paul Murphy, Managing Director, Murphy Energy & Infrastructure Consulting

Speakers:

- Jon Ball, President, eVinci Microreactor, Westinghouse (*invited*)
- Sandra Dykxhoorn, Vice President, New Nuclear Growth, OPG
- Lisa McBride, Vice President, Country Leader SMRs Canada, GE Hitachi Nuclear (*invited*)
- Yongsoo Kim, Vice President of SMR Business Office, KHNP
- Aurora Young, Advanced Nuclear Systems Specialist, Cenovus
- Kreshka Young, North America Business Director, Energy & Climate, Dow Chemical

Conclusion

17:30
(15 min)

- Diane Cameron, Head of Nuclear Technology Development and Economics Division, NEA