

**Canada**  
**Agenda Item 13 – Space Nuclear Power Systems**  
**Delivered by: Rinat Rashapov, Canadian Space Agency**

Committee on the Peaceful Uses of Outer Space  
Scientific and Technical Subcommittee  
Sixty-second session, Vienna, February 3rd-14th, 2025

Chair, Distinguished Delegates,

A key challenge for exploration of the Solar System is access to an abundant, clean, reliable, resilient, and high-performance source of electrical and thermal power. In its Global Exploration Roadmap, the International Space Exploration Coordination Group (ISECG) considers enabling nuclear power generation as a critical technology to provide a reliable source of surface power for extended exploration missions and to enable a sustained human presence on the Moon and Mars surfaces. Fission surface power reactors are nuclear reactors that can provide electrical and thermal power for an extended period of time. Radioisotope power systems (RPSs) – which include radioisotope thermoelectric generators and radioisotope heater units – supply long-term heat in the cold temperatures of space, without any maintenance.

Chair,

Canada is a long-standing global leader in nuclear research and technology, exporting reactor systems as well as a high proportion of the world supply of radioisotopes used in medical diagnosis and cancer therapy. Canada has a full nuclear fuel cycle (“from cradle to grave”), including uranium mining fuel processing and refining nuclear power plant operations, and nuclear waste management. Canada has created significant economic, geopolitical, social and environmental benefits due to investments in nuclear power. The Canadian Government has committed to achieving net-zero emissions by 2050 with the development and deployment of sustainable and clean energy sources.

Nuclear energy plays an integral role in addressing climate change on Earth. Small modular reactors (SMRs) and microreactors are considered a source of safe, clean, reliable, and affordable energy, opening opportunities for a resilient, low-carbon future. Since many communities in Northern Canada, in addition to remote mining sites, continue to be powered by fossil fuels, SMRs are considered

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as candidates to replace fossil fuel generators while providing highly qualified jobs in these regions. Due to existing parallels between operating a reactor at a lunar base and operating it in Northern Canada, the Canadian Space Agency (CSA) will explore how to leverage the synergies to ensure that space investments in this technology area maximize benefits for Canadians.

In order to stimulate the nexus of space and nuclear, Canada is undertaking activities related to space nuclear power systems such as exploring nuclear power system concepts including small nuclear reactors, and the feasibility of producing radioisotope fuel for radioisotope power systems using CANDU reactors.

Chair,

In advancing Canadian space nuclear power technologies, Canada could leverage the alignment between our national objectives to establish a long-term sustainable human presence on the Moon, to achieve net-zero emissions by 2050, to enhance Canada's innovation performance, and to support socioeconomic growth. To advance Canada's expertise on the topic of nuclear power systems for space exploration activities, the CSA has been engaging in preparatory activities with federal government partners, Canadian industry, R&D organizations, academia, and international partners.

In conclusion, Canada is a leader in terrestrial nuclear power, and we are exploring the possibility of making a major contribution to the space community by potentially providing a nuclear reactor. Canada could leverage its existing CANDU nuclear fleet to potentially produce radioisotopes for use in radioisotope power systems. We look forward to continuing discussions within the Nuclear Power Sources Working Group of this subcommittee.

Thank you.