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How Support for Machine-Based Sources of Radiation Contributes to Sustainable Development

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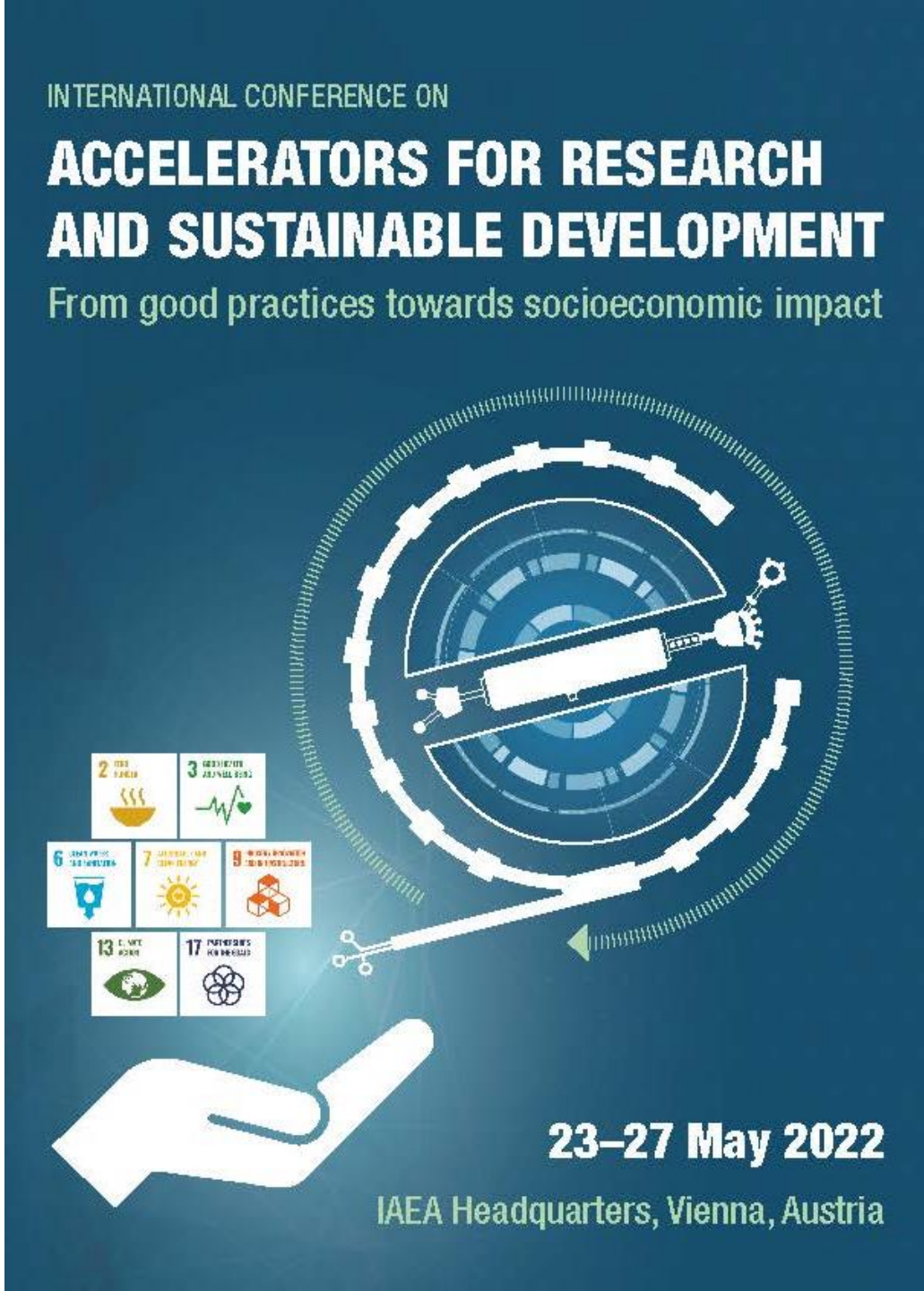


The risk of malicious use of radioactive material requires action

ORS works with partners to enhance global security by preventing high-activity radioactive materials from being used in acts of terrorism.

Office of Radiological Security

VISION: A world free from the threat of radiological terrorism

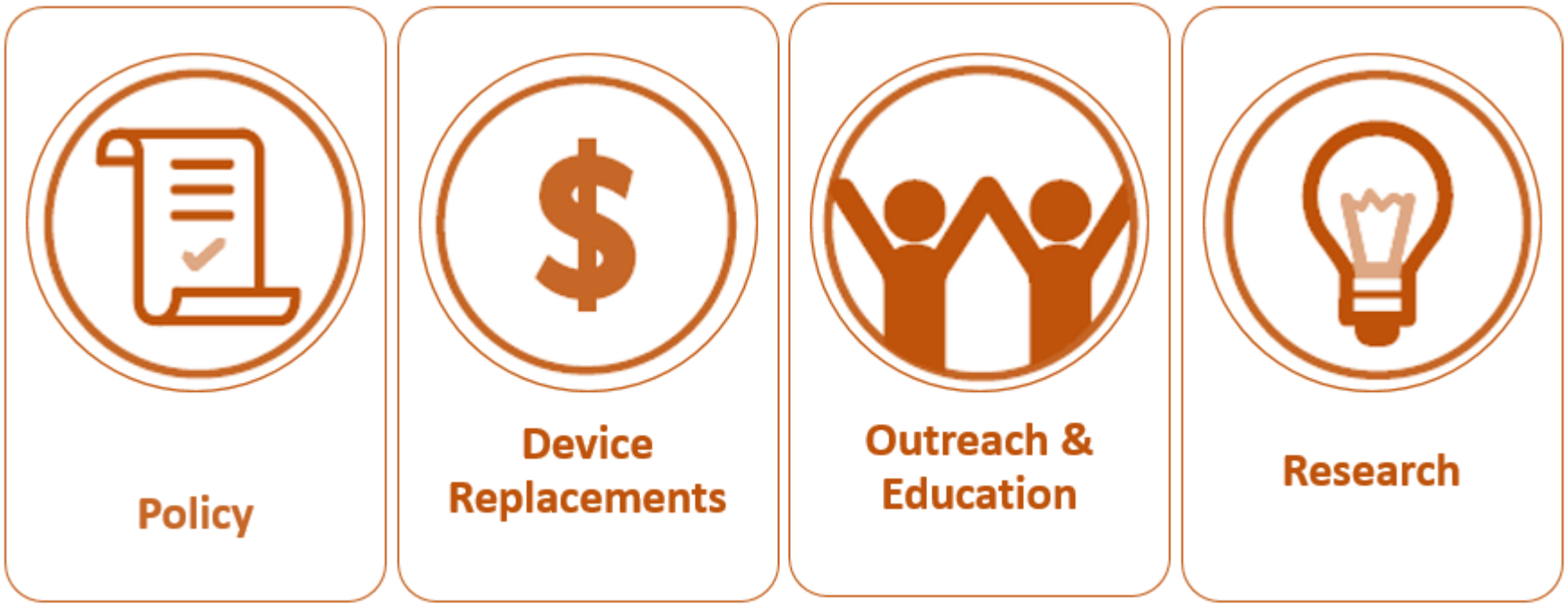
MISSION: To enhance U.S. and global security by preventing high-activity radioactive materials from being used in acts of terrorism.

Machine-Based Radiation Generating Devices and Applications within ORS Scope

Machine-Based Radiation Generating Devices	Application Examples
• Self-shielded X-ray Irradiators	• Research Irradiation • Blood Irradiation • Sterile Insect Technique (SIT) • Seed irradiation • Plant Mutation Breeding
• Medical Linear Accelerators (LINACs)	• Radiotherapy
• Industrial Electron Beam and X-ray	• Medical Device Sterilization • Phytosanitary Treatment & Food Irradiation • Plastics and Material Modification • Wastewater Treatment
• Mobile X-ray	• Non-Destructive Testing

Strategic Approaches to Encouraging the Use of Machine-Based Radiation Generating Devices

Support the adoption and development of non-radioisotopic devices to achieve permanent risk reduction by reducing the footprint of risk-significant radiological materials



Link between Applications within ORS Scope and Sustainable Development

UN Sustainable Development Goal (SDG)	SDG Description	Applications of Interest
Zero hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	• Phytosanitary treatment & food irradiation • Sterile Insect Technique (SIT) • Plant mutation breeding • Seed irradiation
Good health and well-being	Ensure healthy lives and promote well-being for all at all ages	• Radiotherapy • Blood irradiation • Medical research • Medical product sterilization
Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all	• Wastewater treatment
Industry, innovation, & infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation	• Non-Destructive Testing
Life below water	Conserve and sustainably use the oceans, sea and marine resources for sustainable development	• Plastics/polymer reuse and recycling
Partnerships for the goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development	• ORS contributes to IAEA Technical Cooperation and PUI

Supporting Use of Medical Linear Accelerators (LINACs) for Radiotherapy

ORS Efforts

- **Removal of unwanted Co-60 devices** being replaced with medical LINACs to safe and secure long-term storage/disposition
- **Infrastructure modifications** (including bunker modifications and UPS installation)
- **Support for research and development** for innovative, economical, and resilient LINAC designs
- Contribution to establishing **medical LINAC at IAEA Dosimetry Laboratory** in Seibersdorf
- Contributions to **IAEA medical LINAC procurement through** - $4.5M to 4 LINACs in 2021

Medical LINAC Benefits

- **Advanced** treatment options and **improved** treatment accuracy
- **Less treatment time** per patient
- No radioactive waste management or security system for radioactive material

Supporting Use of X-rays for Blood and Research Irradiation

ORS Efforts

- **Removal of unwanted Cs-137 devices** being replaced with X-ray to a safe and secure location for long-term storage/disposition
- **Procurement of X-ray devices** to replace Cs-137 and Co-60 devices
  - Over 30 Cs-137 irradiators replaced with X-ray internationally since 2016
- **Support for research and development** for innovative and economical X-ray development

X-Ray Benefits

- No source decay, so **consistent irradiation times**
- **Increased throughput** for blood products (i.e., Red Blood Cells, Plasma and Platelets)
- X-rays come in **different energies**, permitting a broader range of research.
- No radioactive waste management or security system for radioactive material

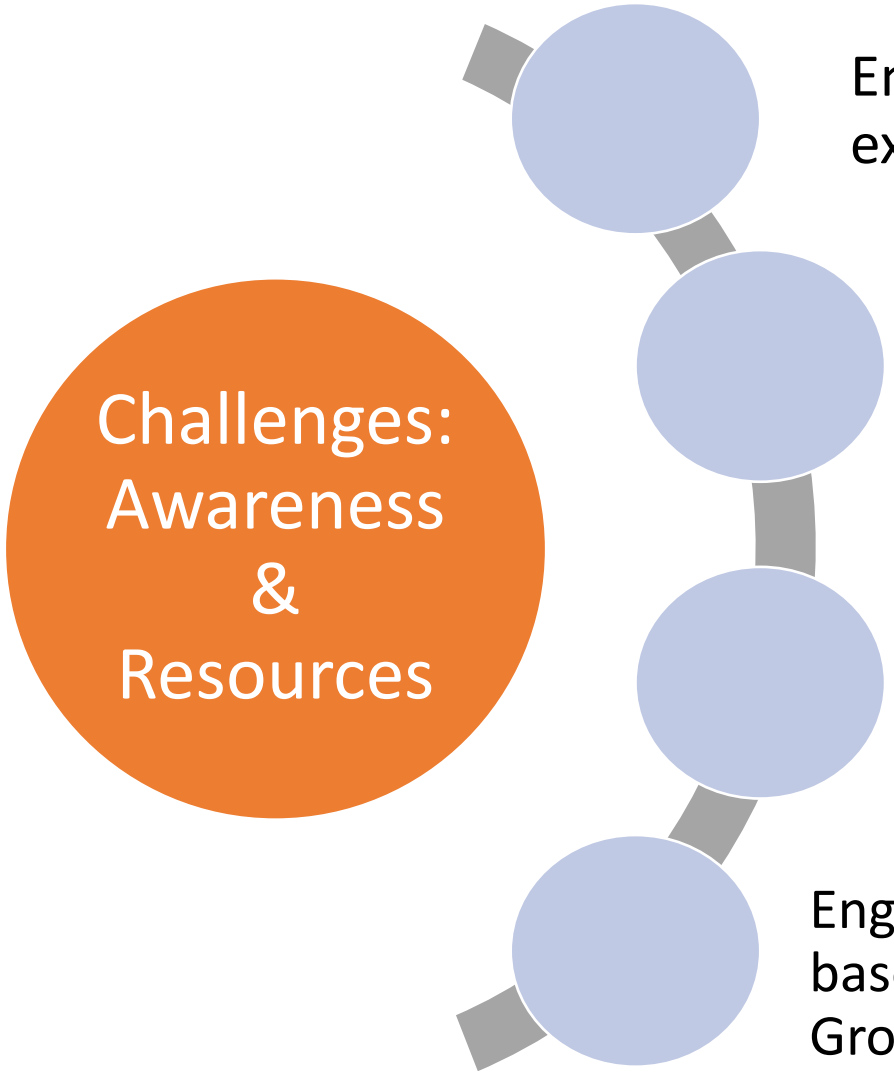
Supporting Use of Electron Beam (e-Beam) and X-ray Technologies for Sterilization and Resource Reuse

ORS Efforts

- **Support for U.S. research centers** by providing e-Beam and X-ray technologies for testing in medical, food, and environmental applications
- Support for **Medical Product Materials Sterilization Study** which provides electron beam and X-ray irradiation and material property measurements for industry
- **Contributions to IAEA projects**, to include NUTEC and e-Beam technologies for plastics remediation
- Conducting of **e-Beam comparison, feasibility, and cost/benefit studies**

E-Beam & X-Ray Benefits

- Capability for **higher dose rates**
- Capability for **higher throughputs,** which can lead to **improved economics**
- Independence from radioisotope supply challenges
- No radioactive waste management or security system for radioactive material



Engage with development and field-specific experts to address resource gaps

Support development of robust technologies that can handle a variety of power environments and training levels for sustainable operation

Partner with and incentivize industry to develop local service capabilities and provide efficient spare parts delivery

Engage in forums to share experiences operating machine-based radiation technologies, including the Ad Hoc Working Group on Alternatives to High-Activity Radioactive Sources

Thank you

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