

EURAD-2 Work Package 4: Waste Management for SMRs and Future Fuels (FORSAFF)

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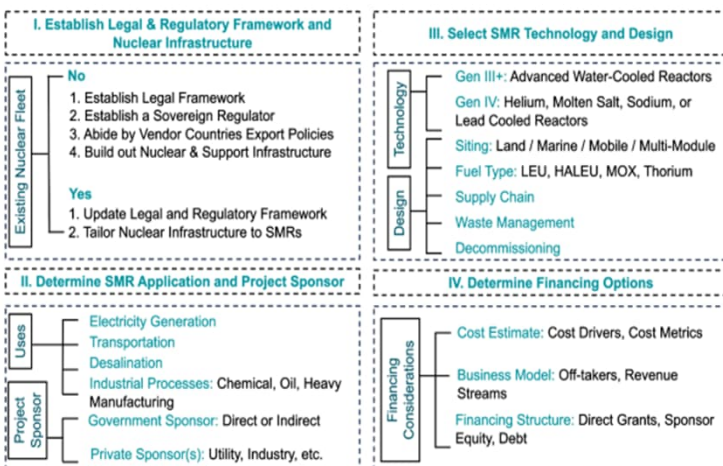
Introduction

There is growing enthusiasm worldwide for the deployment of Small Modular Reactors (SMRs). However, these reactors introduce unique considerations compared to larger, traditional reactors. Gaining a clear understanding of the challenges and opportunities associated with SMR deployment can help policymakers and stakeholders make informed decisions.

The "FORSAFF: Waste Management for SMRs and Future Fuels" work package, launched in October 2024, is a strategic study within the European Joint Programme on Radioactive Waste Management, 2024-2029 (EURAD-2). FORSAFF aims to identify knowledge gaps and provide recommendations for future research regarding SMR waste generation and waste management.

Objectives

- Evaluate SMR waste inventories, relative to different technology and fuel cycle options, and their main physico-chemical-radiological properties, and assess predisposal (treatment, conditioning, storage, transport) approaches and development needs in terms of anticipated waste generation across reactor designs and operating conditions.
- Review management routes for SMR wastes over a range of needs, considering both conventional as well as more recent concepts.
- Examine national policies and regulatory frameworks in the context of SMR fuel cycle and waste management as well as stakeholder perceptions and concerns.



Summarized decision-making framework for SMR deployment (Nuclear Small Modular Reactors: Key Considerations for Deployment, International Energy Forum, May 2024).

Methodology

FORSAFF TASK 3 - Waste Generation

- Investigate and define overall waste inventories arising from SMRs; develop a common methodology for waste stream identification based on key waste descriptors (volume, mass, activity, etc.)
- Identify the most significant properties impacting SMR waste management; discuss with SMR designers via formation of an End-user group
- Determine main characteristics of spent fuel and specific reprocessing waste generated from selected SMR designs; consider less conventional fuel types (thorium, HALEU, molten salts, TRISO)

FORSAFF TASK 4 - Waste Management

- Investigate predisposal and disposal management options for SMR wastes; identify pre-disposal / disposal route needs.
- Assess current reprocessing technologies with respect to SMR spent fuels; identify reprocessing needs.
- Evaluate waste characterisation methods and modelling tools for SMR wastes; identify characterisation needs (both experimental and modelling techniques).



Assessment of radioactive waste management and disposability technology readiness level (TRL) by reactor type (CoRWM, February 2024).

FORSAFF TASK 5 - Policy & Regulatory Framework

- Determine needs to adjust national policies and regulatory frameworks to support SMR fuel cycle and waste management.

FORSAFF TASK 6 – Stakeholder Engagement

- Identify stakeholder perceptions and concerns related to SMR waste management and develop recommendations for transparent information exchange and dialogue

Results

FORSAFF will deliver a Green Paper providing guidance on SMR implementation and deployment needs from the back end of the fuel cycle perspective and a White Paper identifying knowledge gaps for future R&D activities. FORSAFF (Task 2) also participates in the EURAD-2 KM programme to capture and share knowledge. By integrating technical, regulatory and stakeholder perspectives, FORSAFF intends to provide beneficial recommendations for the management of nuclear waste from SMRs.



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