International Conference on
The Safety of Radioactive Waste Management, Decommissioning, Environmental Protection and Remediation

6–10 November 2023
Vienna, Austria
PREDIS: EXAMPLE OF HOW STAKEHOLDERS CAN IMPACT A R&D PROJECT AND MAXIMIZE THEIR BENEFITS – LEADING TO INCREASED SAFETY AND IMPROVED SUSTAINABILITY IN RADIOACTIVE WASTE MANAGEMENT

ELKE JACOPS – SCK CEN
ANTHONY BANFORD – NNL
ERIKA HOLT - VTT
Aim: Identify, develop and improve innovative technologies in pre-disposal radioactive waste management

Endorsement and close interaction with SNETP-Nugenia, IGD-TP, IAEA, NEA, EURAD

47 partners
17 countries
25 End User Group members

Total budget 23.7 M€
EC contribution of 14 M€

4 years
Started Sept 2020

Detailed info: https://predis-h2020.eu/
TECHNICAL SCOPES (WPs in green, Tasks in blue)

Low & Intermediate Level Waste Types
- Metallics
- Liquid Organics
- Solid Organics
- Cemented Waste

Innovative R&D Approaches
- Characterisation & classification of waste
- New treatments, conditioning & monitoring
- Modelling & Performance evaluation of new solutions
- Environmental & economic evaluations

Presentations of Erika Holt (ID_240; VTT) and Joel Kirk (Univ of Manchester)
End user and stakeholder engagement

**End users**

* Radioactive waste producers
* Waste owners
* Waste management companies

* Drafting Gap analysis
* Drafting and reviewing SRA
* Direct involvement in R&D (e.g. material donation)
* Interface between science and industry
* Participation in annual workshops and giving feedback on project progress

**Stakeholders**

* Research entities
* Supply industry
* Service providers
* TSO, regulators, CSO

* Invited to public events to “follow” the project
* Invited to contribute to the SRA
* Target audience for dissemination activities
PREDIS EUG

25 End users

17 Countries

Europe and USA

16 Partners
Stakeholder group

119 Registrations
29 Countries
4 Continents
Many different actors
Different aspects of end user and stakeholder engagement

- Gap analysis
- Drafting SRA
- Driving RD&D
- Examples of end user interaction
Gap analysis

Shaping the project

- During project preparation phase
- Evaluation of needs of industry and stakeholders for RD&D in predisposal waste management
- Active involvement of end users through IGD-TP and SNETP
- Focus: topics with highest added value for return in investment + needs of many MS

Refinement & prioritisation

- Further review, refine and prioritise project plans against identified needs and discern additional needs
- Tools: surveys, live polling, webinars, interviews with end users, literature review, ...
- Refine scope of technical WP’s
- Example of WP7: end user need for monitoring of internal waste package pressure
Drafting the SRA

- Baseline SRA (2021)
- Second version 2023:
  - Survey: needs & priorities vs. drivers
  - 7 topics selected
  - Panel discussion
- Guide RD&D in coming years → maximum benefit for EU and MS

<table>
<thead>
<tr>
<th>Technical Topics</th>
<th>Societal</th>
<th>Financial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Acceptance Criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Estimating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Hierarchy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characterisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditioning &amp; Packaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deployment Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality &amp; Management Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary Waste Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of R&amp;D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder Engagement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRIVERS</th>
<th>Socioeconomic</th>
<th>Innovation</th>
<th>Science &amp; Technology</th>
<th>Innovation</th>
<th>Revenue &amp; Turnover</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>economic growth &amp; sustainable development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>protection of citizens &amp; environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>public trust &amp; confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>innovations, products &amp; services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>improve performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>competence &amp; skills development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>networking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>science &amp; technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>revenue &amp; turnover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>investment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Driving RD&D

From the start
- Gap analysis during preparation phase
- Determined studied waste streams

Early in the project
- Second Gap analysis: input on needs, challenges and priorities
- Confirmation of initial focus + refinement of technical scope

During the project
- Interactions during technical meetings
- WP7: reference waste packages and mock-ups defined, based on end user needs
Driving RD&D: panel discussions

Speakers:

- Annukka Laitonen, TVO
  NPP, R&D Engineer and Waste expert. NPP/waste generator and LILW repository perspective

- Jari Tuunanen, Fortum NPP, nuclear waste Director. NPP/waste generator and LILW repository perspective

- Kai Hämäläinen, STUK, Manager waste issues. Regulatory perspective

- Gareth Law, University of Helsinki. Academic perspective

- Rebecca Robbins, IAEA Agency perspective
Driving RD&D: technical visits & training courses
How to ensure maximum impact of PREDIS? Role of end users and stakeholders

- Look at needs of industry and stakeholders (Gap analysis)
- Defined initial scope

- Maximum impact and utilization of the results
- Improve safety & enable sustainability
- SRA will guide future research (thus driven by EUG needs)

- Gap analysis → refinement of scope & work programme
- Better fit needs of EUG

- SRA (2nd edition): based on input EUG
- Direct interaction in technical WP’s
End user point of view: example

- Development sensor platform for remote monitoring of vessels in interim storage
- Team effort to create methods and experiments for validation of non-destructive sensor technology and a digital twin

Transfer industrial needs to R&D
“With respect to the industry expectations to PREDIS project outcomes, inputs from end users are needed so that the project is focused on delivering realistic solutions for relevant volumes of waste, beyond artificial laboratory tests. End users can help the project identify which techniques and solutions address existing gaps in waste conditioning and point out how various parties will benefit from such solutions developed in PREDIS.”
Irina Gaus, Head of Research & Development at Nagra (Switzerland)

“A reason of having good connections/collaborations with the research centers is that new techniques can first be applied in non-commercial decommissioning and waste treatment works, as for example on the BR3 at the SCK - where many applications have been tried and validated and could be the applied in commercial dismantling,”
Peter Berben, ENGIE corporate (Belgium)
Conclusion on stakeholder and end user interaction

Level

- General level of the project
- Inside technical WP’s and tasks

Time

- Preparation phase: defining scope of the project
- Early start (Gap analysis): refining scope of the project
- Continuously: during annual & technical meetings – orienting R&D

Topics

- SRA
- Gap analysis
- Knowledge management
- R&D topics

The interaction with SH and EUG will guide the project to ensure maximum impact and utilization of the results, which will improve safety of radioactive waste management and enable sustainability.
What’s coming up?

Another series of opportunities for SH & EUG!

• IAEA side event, tomorrow Nov 9 at 12:45
• SRA webinar on December 1\textsuperscript{st} 2023 → register!
• Training course on pre-disposal waste management operations (Orano)
• Case studies on end user impact
• Value assessment impact stories
• PREDIS final event – June 3 -7 2024 in Avignon (France)
This presentation benefited from the input of C. Bruggeman, T. Huys, A. Wareing, P. Carbol, I. Giboire, E. Niederleithinger, N. Maes, P. Berben and many other PREDIS colleagues and end users.

This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 945098.
Ensuring Safety and Enabling Sustainability