

DEM'N'MELT

IN CAN vitrification for conditioning

HLW/ILW-LL waste from decommissioning operations

Project supported by Andra under the "Investments for the Future Programme" ("Investissements d'Avenir") - Selected under the Andra Call for Projects "Optimization of post-dismantling radioactive waste management", organized in cooperation with the French National Research Agency (ANR).

Duration: 48 months

Project launch:
07/2016

Total project cost:
€7.26 million

**Sum covered under the
Investments for the Future
Programme:** €3.6 million

Type of financial support:
Subsidy with ROI guarantees
for the State

Locations:
Bagnols-sur-Cèze (30),
Grenoble (38),
La Défense (92)

Coordinator: CEA

Partners:

- CEA
- ECM Technologies
- Orano

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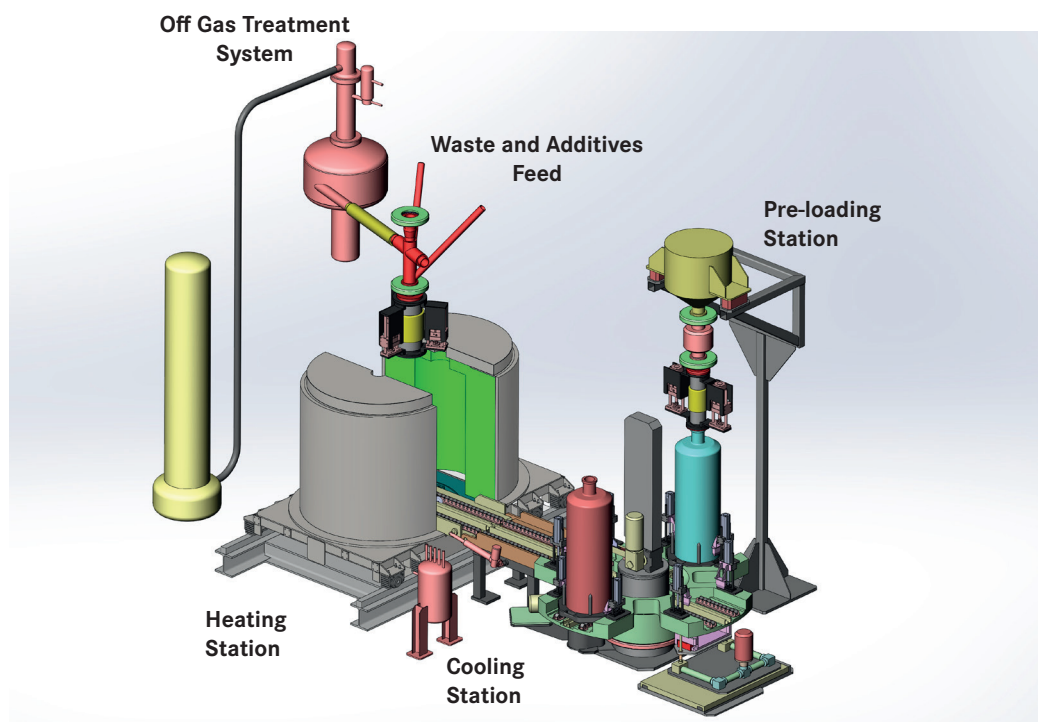
BACKGROUND

Some waste from decommissioning operations presents a problem for handling, transport, a suitable encapsulation matrix or disposal solution. This is true for the very high-level waste found in equipment from facilities which have processed high-level materials, for example, during spent fuel recycling operations (fission product disposal tanks, vitrification facility feed tanks, evaporators, etc.). The many constraints associated with radioactive waste management require direct (*in situ*) on-site processing solutions to be studied in order to produce a waste package suitable for existing disposal solutions.

OBJECTIVES

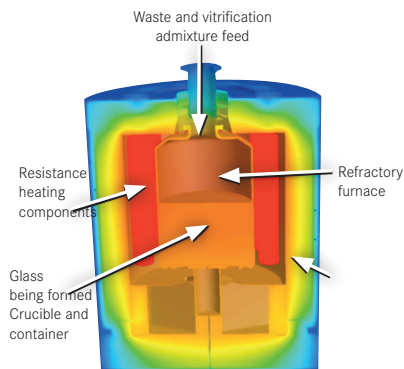
The DEM'N'MELT project seeks to develop and implement an innovative tool for high-level waste (HLW) and intermediate-level long-lived waste (ILW-LL), which:

- is sufficiently flexible to adapt to the uncertainty of the composition of waste needing processing, but which nevertheless produces waste packages whose composition, structure and radiation containment performance are properly managed for disposal;
- is based on a vitrification procedure, whereby radioactive waste is contained within glass, a material already known and used for containing high-level waste;

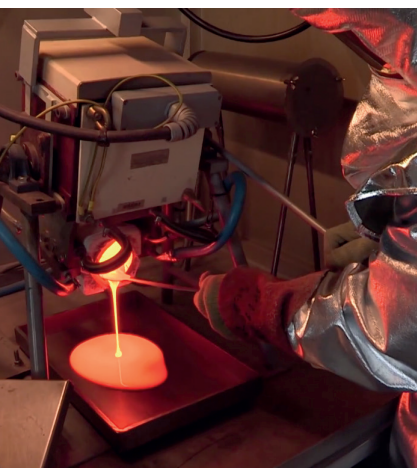


► 3D view of process.

DEM'N'MELT: IN CAN vitrification for conditioning HLW/ILW-LL waste from decommissioning operations



► Diagram of the IN CAN MELTER* core process.



► Development of test glasses in the laboratory.

- is small enough to be installed and operate in an existing facility or building;
- is designed for short usage periods, like a decommissioning tool, and can be easily dismantled straight after the processing operation;
- produces a small quantity of secondary waste;
- has a low investment and operating cost.

PROJECT SEQUENCE

In order to achieve the objective of producing a process prototype along with all data required to launch an industrial application, the DEM'N'MELT project is based on a previously developed process called IN CAN MELTER*. The project has a total duration of 48 months and is organised in two periods:

- a first 18-month phase to study process feasibility. Initial tests will be conducted using existing equipment to propose a first draft of the process and sizing information;
- a second 30-month phase during which an actual size process prototype will be built for tests. This step will help specify the composition and durability of the glass matrix, taking into account the variability of the waste to process.

EXPECTED RESULTS

Innovation

The process developed is unique as it is considered as a decommissioning "tool" rather than a "facility". This reasonably-priced tool is also designed to be dismantled after processing the relevant waste from a site being decommissioned.

Economic impact

At the end of the project, the partners will be able to offer and market a high-level and intermediate-level waste processing / conditioning solution to decommissioning site operators. A number of potential sites have been identified in France and abroad.

Impact on radioactive waste management

DEM'N'MELT will provide a solution for HLW/ILW-LL waste conditioning, while limiting the volume of waste for disposal. Radioactive waste, initially in the form of effluents or powdery materials, will be contained in a non-dispersible solid form within a glass matrix. The project will help optimise the capacity and safety of radioactive waste repositories.

APPLICATION AND COMMERCIALISATION

The main target market is the processing and conditioning of waste generated by the decommissioning of nuclear facilities where high-level materials have been handled, such as fuel processing plants, research laboratories or specific nuclear sites where large quantities of high-level waste need to be processed. Various sites have already been identified in France and abroad: UP1 plant in Marcoule (France), pilot reprocessing plant in Karlsruhe (Germany), SCK-CEN research unit in Mol (Belgium) and the Fukushima site (Japan). Since April 2018, CEA, Orano and ANADEC have been evaluating the potential of the DEM'N'MELT process to treat waste from water treatment operations at Fukushima Daiichi.



Watch a video of the DEM'N'MELT project at: [youtube.com/watch?v=haKdwrCug1U](https://www.youtube.com/watch?v=haKdwrCug1U)

* The IN CAN MELTER is a simple, small-capacity vitrification process developed for conditioning military effluents. It operates using a crucible where the glass is developed, which also serves as the container and is changed each time it is filled to avoid glass casts. Glass is fused using a conventional resistance furnace.