Orano nuclear fuel reprocessing plant in La Hague, France (credit: Orano – Eric Larrayadieu)

MIMOSA

MultI-recycling strategies of LWR SNF* focusing on MOlten SAlt technology

**Light-water reactor spent nuclear fuel*

www.mimosa-euratom.eu

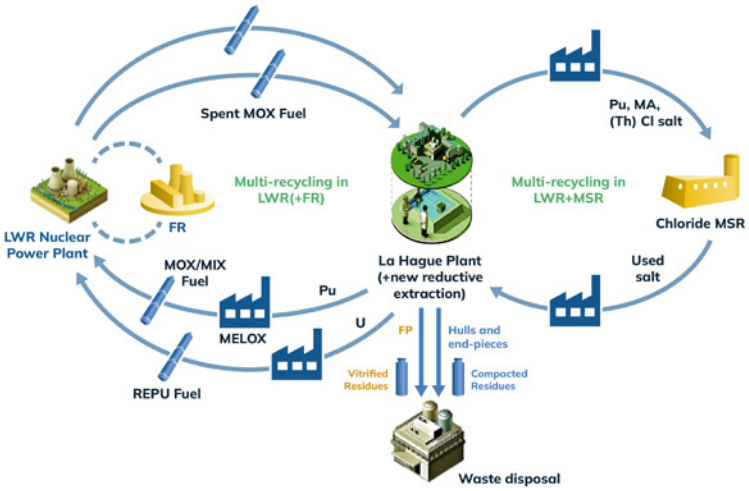
MSR : a promising technology
to achieve closure of the fuel cycle

While the EU has the highest share of spent nuclear fuel reprocessing worldwide, **most of the spent uranium oxide fuels are declared waste**. Multi-recycling in light-water reactors (LWRs) is a tangible solution, but it presents some limitations related to the degradation of the plutonium (Pu) isotopic composition and the generation of minor actinides (MAs).

Significant improvement in converting Pu isotopes and MA into fission products with shorter half-lives can be achieved with the introduction of advanced fast reactor systems, among which **the molten salt reactor using Chloride salt (Cl MSRs) is a particularly promising option**. In this type of reactor, the fuel is dissolved in the salt circulating through the core, with such liquid form of fuel eliminating the major technological bottleneck of refabrication of solid fuels with high content of transuranics.

Risk-cost optimised
multi-recycling strategy integrating the Cl MSR

The MIMOSA project will devise and demonstrate an **integrated multi-recycling strategy of plutonium and uranium** combining multi-recycling options in LWRs with recycling Pu and other transuranics today considered as waste in Cl MSRs using existing European infrastructures such as the Orano reprocessing plant in La Hague (France).



Advancing Cl MSRs
beyond the current state-of-the-art

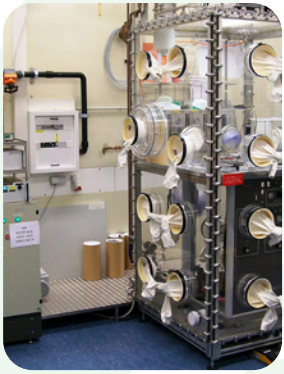
Today, the maturity of Cl MSRs is low. For this reason, MIMOSA will also seek to demonstrate several **key aspects of technical feasibility and performance:**

- Development of synthesis routes of the chloride fuel salt for use at the industrial scale
- Selection and qualification of optimised fuel salt composition with respect to thermo-physical properties
- Qualification of innovative materials, new corrosion monitoring and mitigation methods, control of accidental situation
- Pyro-chemical processes to recycle Pu and MAs
- New methods for fission product management: removal, disposal, extraction and purification when valuable
- Qualification of codes coupling neutronics and thermo-hydraulics.

MIMOSA will raise the TRL of several Cl MSR-related technologies, processes and materials from 1 or 2 to 3 or 4. This will pave the way for **Cl MSR deployment in Europe,** which could be a game changer in nuclear energy through closure of the fuel cycle and a significant reduction in the high-level waste storage footprint.

Furthermore, the project will contribute to the development of materials and technologies that can be useful to other **high temperature, high corrosion applications** such as the chemical industry or energy storage.

Chlorination reactor
(credit: JRC)



Calorimetry Glove Box
(credit: JRC)

LR-0 reactor core
(credit: CVR)

A partnership
with complementary and state-of-the-art expertise

The MIMOSA consortium, led by nuclear fuel cycle service provider Orano, brings together twelve partners from four European countries.

MIMOSA is a EURATOM Research and Innovation Action that will run from June 2022 to May 2026 with a budget of 5.75M EUR. The project has been labelled by the Sustainable Nuclear Energy Technology Platform (SNETP).

orano eDF TU Delft CVŘ Research Centre Řež

Industrial multirecycling of Pu

DIFFER schunk* NRG Nuclear. For life. cnrs

Provision of innovative technologies

MSR research & innovation

NUCLEAR 21 PERSPECTIVE FOR YOUR DECISIONS

Technical-economic assessment, scenario analysis, safety and security, non-proliferation

European Commission

Pu and minor actinide fuels

THORIZON

Development & exploitation of MSRs

ARTTIC a PNO international management services company

Collaborative research management

*Associated partner

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SNETP Sustainable Nuclear Energy Technology Platform