

# Implementation of LFR Experimental Infrastructures in Romania

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Romania through RATEN ICN is deeply involved in the development and implementation of ALFRED Demonstrator being the reference site for ALFRED construction. One of its roles is to demonstrate the effectiveness of the nuclear option as a reliable component of any sustainable energy scenario of the future.

The ALFRED Project aims to the development, up to the full demonstration, of the LFR technology, one of the most promising Gen-IV concepts being significantly safe, sustainable, economically competitive, and not-proliferant.

The project will gather the existing centre of excellence on lead technology located in Italy with a new one, to be realized in Romania, where the infrastructures presently missing in the European landscape, but required for supporting the design of an LFR, are planned to be constructed.

Six new research infrastructures will be built or are under construction on RATEN ICN site: ATHENA (full-scale testing of the components, assessment of systems behavior in a pool configuration, etc.), ChemLab (coolant and cover gas chemistry, auxiliary systems development), HELENA2 (multipurpose - pump, valves, sub/assemblies and erosion/corrosion investigations in lead), ELF (long-running system tests (endurance)), MELTIN'Pot (fuel-(clad)-coolant interaction) and HANDS-ON (core simulator for S/As manipulation and handling tests).

The purpose of the LFR experimental infrastructures is:

- o to support ALFRED licensing process (demonstration of the complete control of the phenomena, qualification of the materials, component, equipment, validation and verification, etc.);
- o to use the infrastructure to find the solution for the open issues;
- o to create the skills and competences for lead technology;
- o to explore beyond the frontiers of the field, synergies with other fields.

The ALFRED infrastructure is suitable to investigate the key points related to the heavy liquid metals and to support the technological development of the LFRs, while the demonstrator itself will support the qualification of materials subject to fast spectrum neutron irradiation in a representative environment.

FALCON Consortium (created in 2011 by RATEN-ICN (Romania) together with ENEA and ANSALDO NUCLEARE (Italy) holds the skills to carry out safety studies, licensing as well as planning and execution of experimental campaigns in support of LFR technology development.

ALFRED infrastructure is fully integrated in an experimental roadmap expected to integrate the ALFRED reactor and to support the development of the LFR technology, beyond the construction of the demonstrator itself, towards the deployment of a commercial fleet.

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