



Accordo di Programma MSE-ENEA

  
MINISTERO DELLO SVILUPPO ECONOMICO

**RICERCA DI SISTEMA ELETTRICO**



## **REATTORI DI IV GENERAZIONE E SICUREZZA NUCLEARE**

# ***COLLABORAZIONE INTERNAZIONALE PER IL NUCLEARE DI IV GENERAZIONE***

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## SNETP

- maintaining the safety and competitiveness of today's technologies (NUGENIA)
- developing a new generation of more sustainable reactor technologies (ESNII)
- developing new applications for nuclear power (NC2I)

## ESNII

- addressing the need for demonstration of Generation IV Fast Neutron Reactor technologies, together with supporting research infrastructures, fuel facilities and R&D

## SRIA

- provides decision-makers and the scientific community at large with research, development and demonstration roadmaps to achieve the short (2015), medium (2020) and long-term (2040-2050) goals of the SET Plan

SNETP – Sustainable Nuclear Energy Technology Platform

ESNII – European Sustainable Nuclear Industrial Initiative

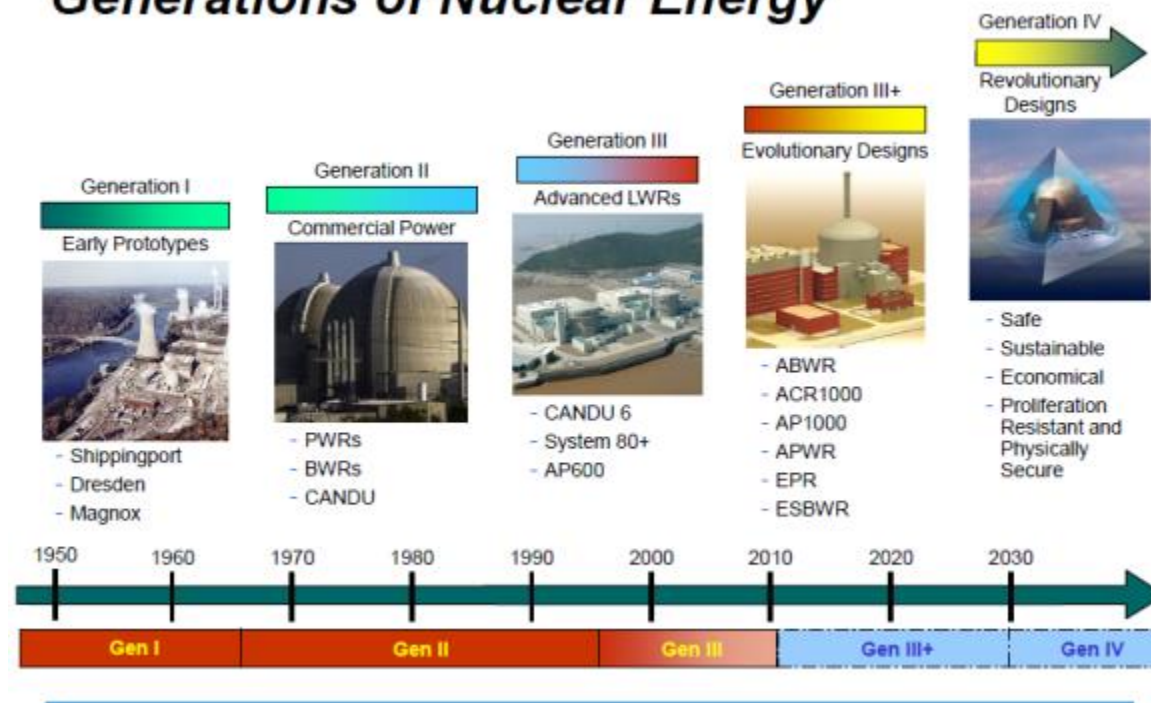
SRIA – Strategic Research Initiative Agenda

## “STRATEGIC RESEARCH INITIATIVE AGENDA” (SRIA)



“With respect to the 2010 technologies evaluation....The **Lead Fast Reactor technology has significantly extended its technological base and can be considered as the shorter-term alternative** technology, whereas the **Gas Fast reactor technology has to be considered as a longer-term alternative option.**”

### Generations of Nuclear Energy



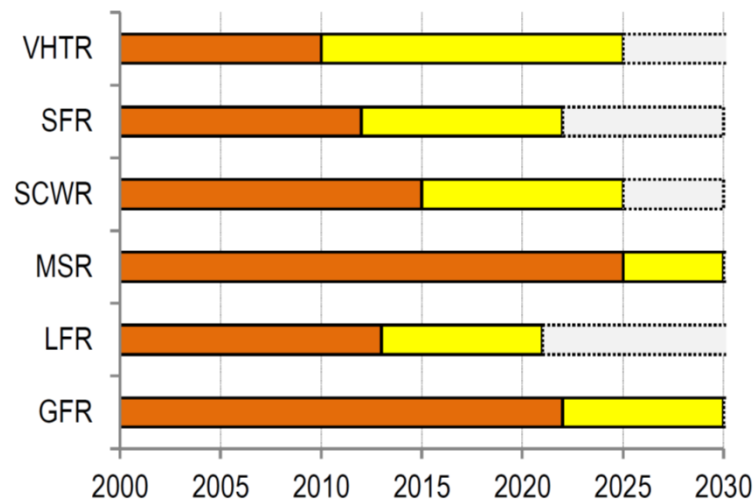
# Contesto Internazionale



- Safety and Reliability
- Sustainability
- Economics
- Proliferation resistance



GIF roadmap 2013



## Viability

Basic concepts, technologies and processes are tested under relevant conditions, with all potential technical show-stoppers identified and resolved

## Performance

Engineering-scale processes, phenomena and materials capabilities are verified and optimised under prototypical conditions

## Demonstration

This phase involves the licensing, construction and operation of a prototype or demonstration system in partnership with industry and perhaps other countries. The detailed design will be completed and licensing of the system will be performed during this phase

## FALCON CONSORTIUM\*

1  
PHASE

- 18 months
- Unincorporated consortium
- In-kind contributions
- Optimize the cooperation
- Areas: strategic, management, governance, financial and technical

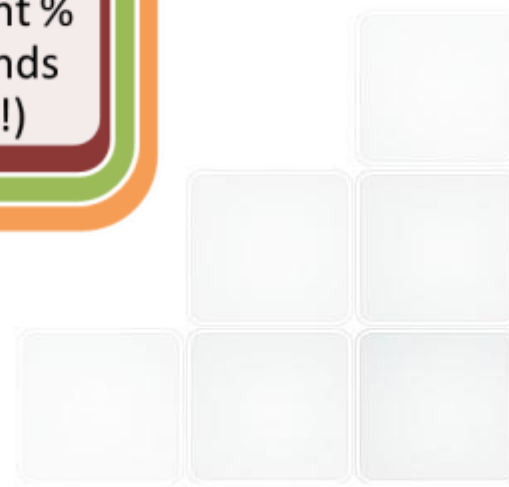
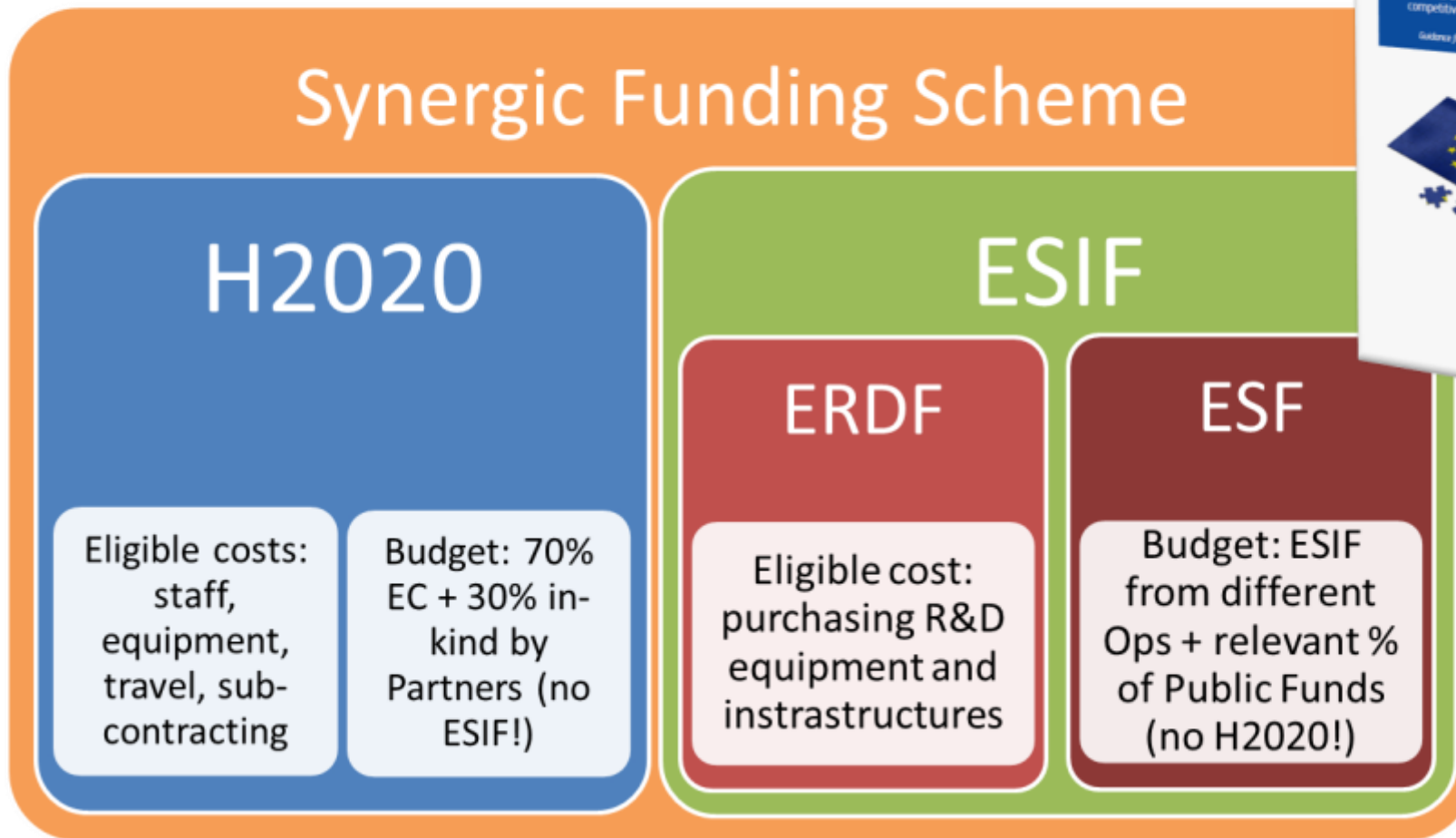


2  
PHASE

- Detailed agreement
- Manage the R&D needs
- Engineering design
- Licensing, and
- Commit the construction



## EXPLOITING POTENTIAL SYNERGIES IN FUNDS

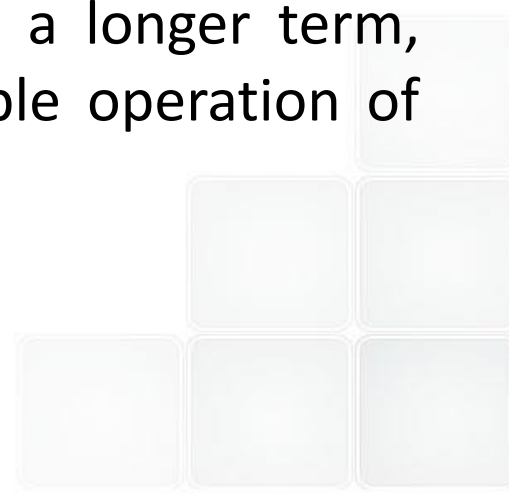


## iCRADLE

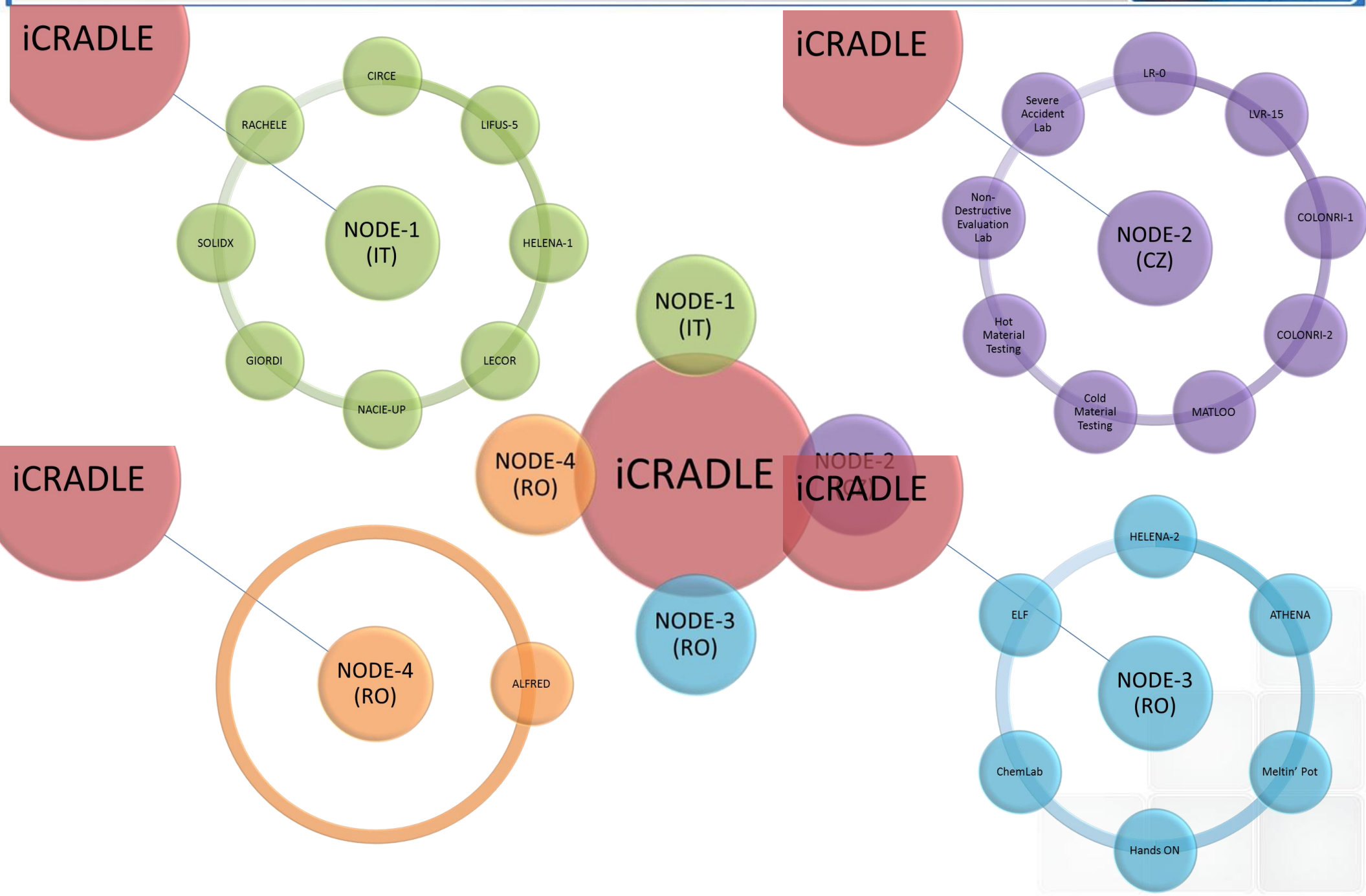
Infrastructure for Cooperative Research to Advance up to Demonstration the Lead technology in Europe



The iCRADLE proposal is meant to provide Europe with a **Distributed Research Infrastructure (D-RI)** for research, development and qualification (R&D&Q) of the Heavy Liquid Metal (HLM) technology for innovative nuclear reactors demonstration and, in a longer term, the safe and sustainable operation of future power plants



# Contesto Internazionale

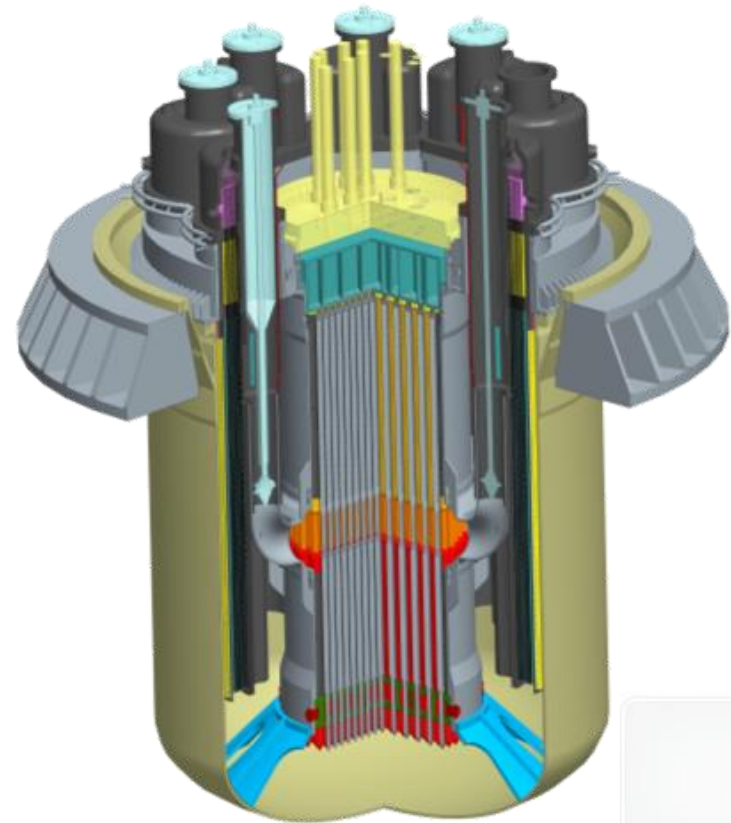


## Advanced Lead Fast Reactor European Demonstrator

**ALFRED** is a Research Reactor, as part of an **pan-European Distributed Research Infrastructure**.

**ALFRED** is a **demonstrator**, and not a prototype, dedicated to the **development** of the LFR technology.

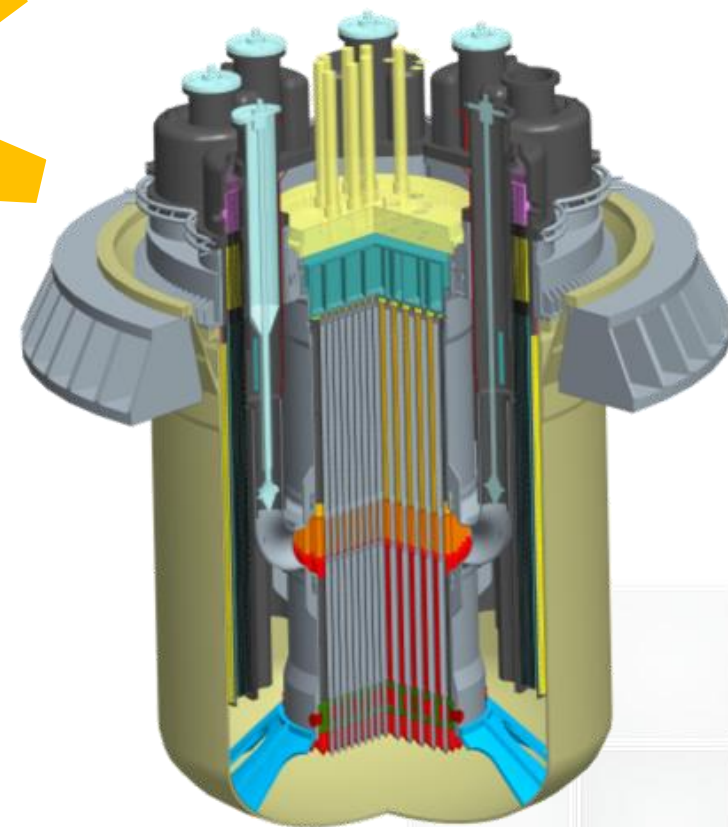
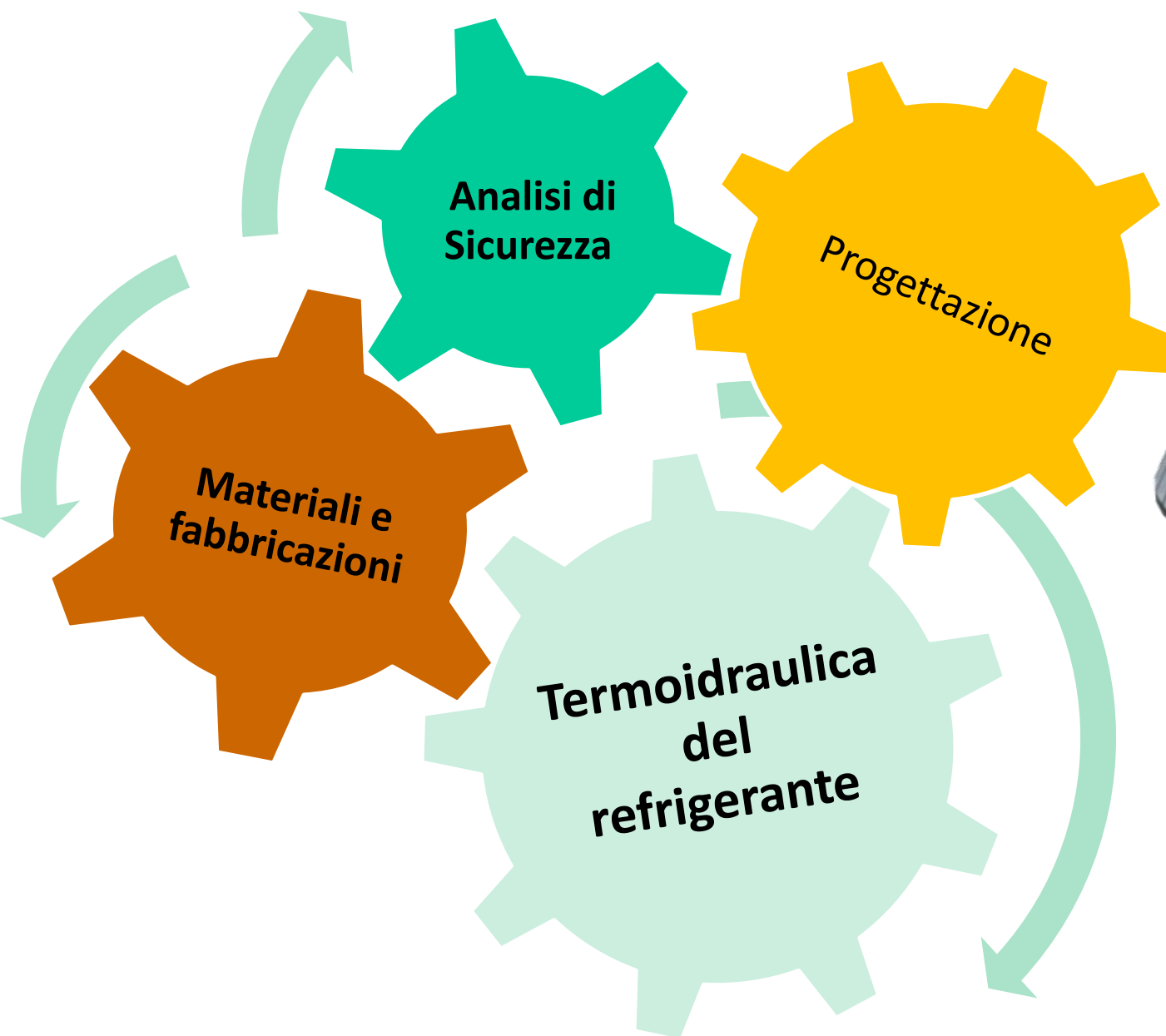
**ALFRED** is a 300 MWth **reactor** addressing the concerns on **safety**, **economics** and **sustainability** of nuclear energy.

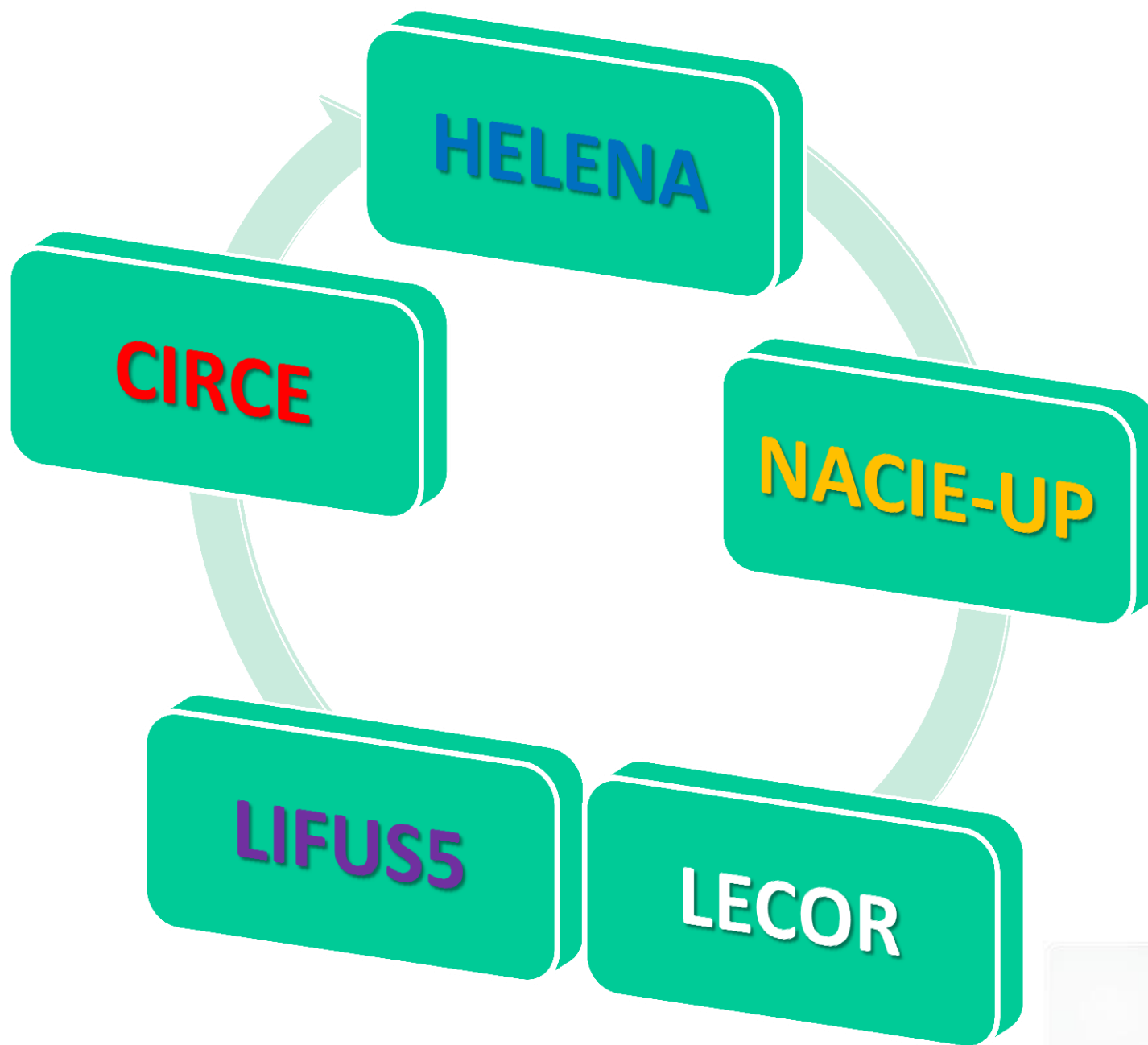


Demonstration of a safer and more sustainable secure energy

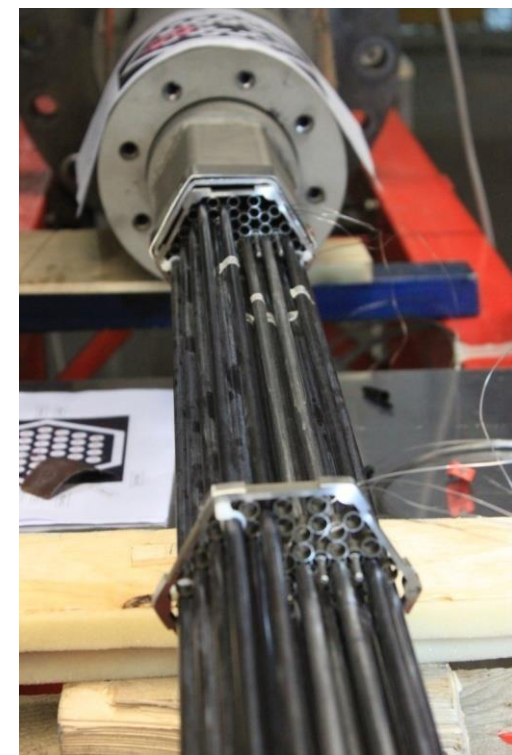
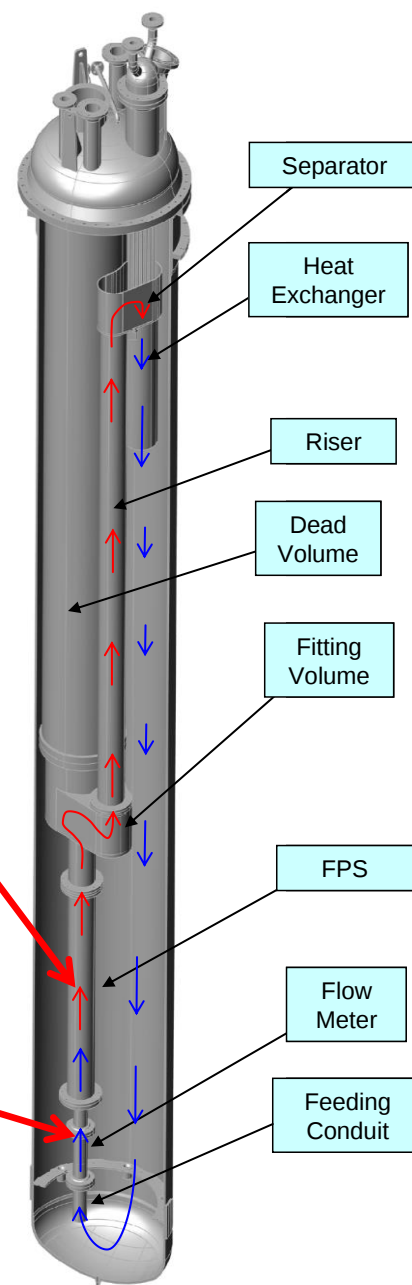
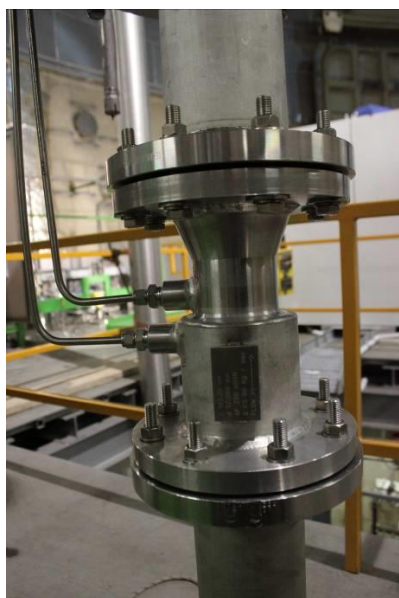
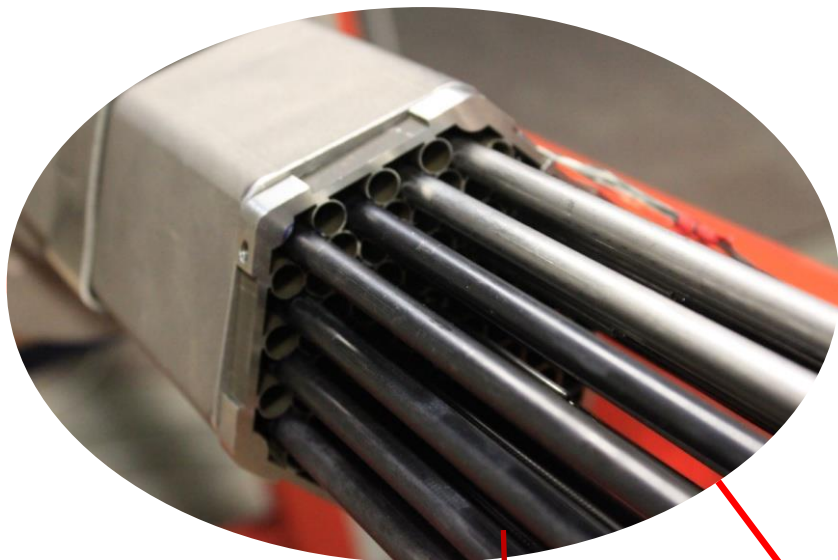
- ☑ **LEADER** – Lead cooled European Advanced Demonstrator Reactor
- ☑ **THINS** – Thermal Hydraulic of Innovative Nuclear Systems
- ☑ **FREYA** - Fast Reactor Experiments for hYbrid Applications
- ☑ **GETMAT** – Gen IV and Transmutation Materials
- ☑ **MATTER** – Materials Testing and Rules
- ☑ **SEARCH** – Safe Exploitation Related Chemistry for HLM reactors
- ☑ **MAXSIMA** – Methodology, Analysis and Experiments for the "Safety In MYRRHA Assessment"
- ☑ **ESNII+** - Preparing ESNII for HORIZON 2020
- ☑ **MARISA** - Myrrha Research Infrastructure Support Action
- ☑ **MATISSE** - Materials' Innovations for a Safe and Sustainable nuclear in Europe
- ☑ **MYRTE** - MYRRHA Research and Transmutation Endeavour
- ☑ **SESAME** - thermal hydraulics Simulations and Experiments for the Safety Assessment of MEtal cooled reactors

# Struttura Generale

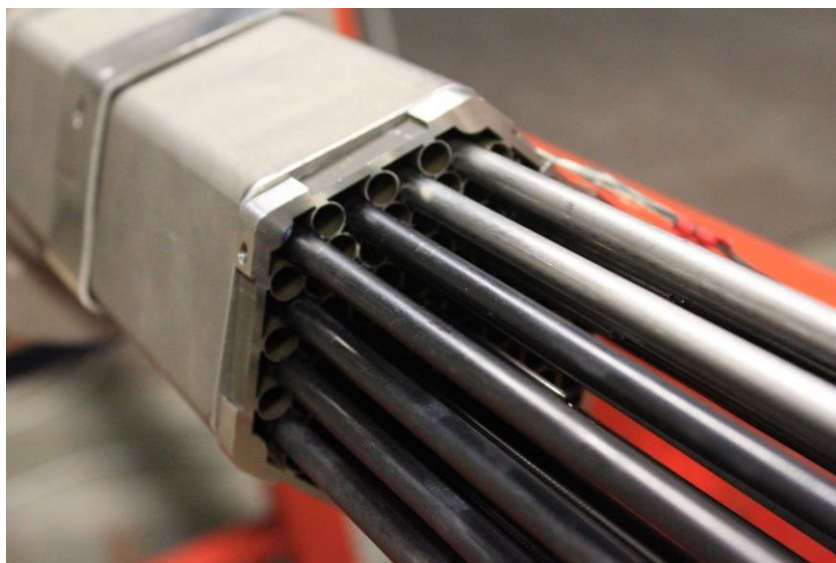
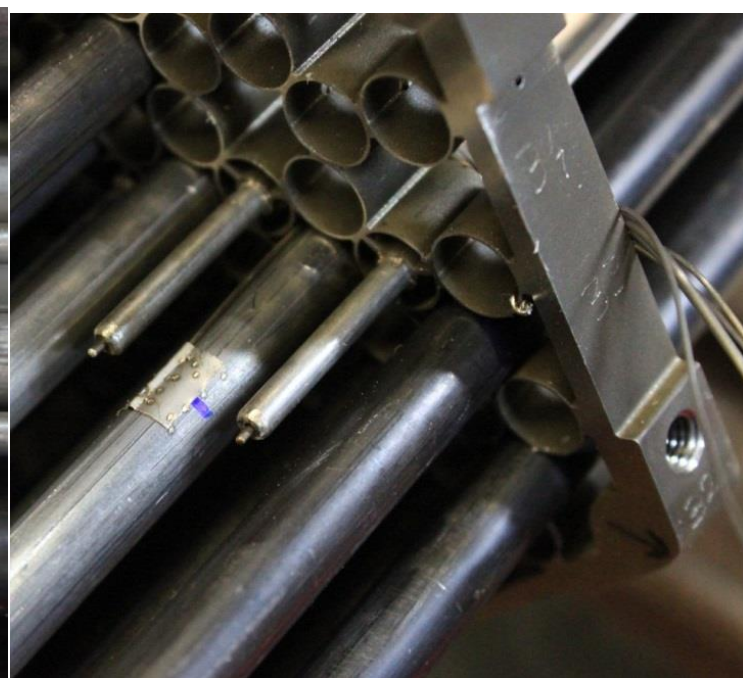
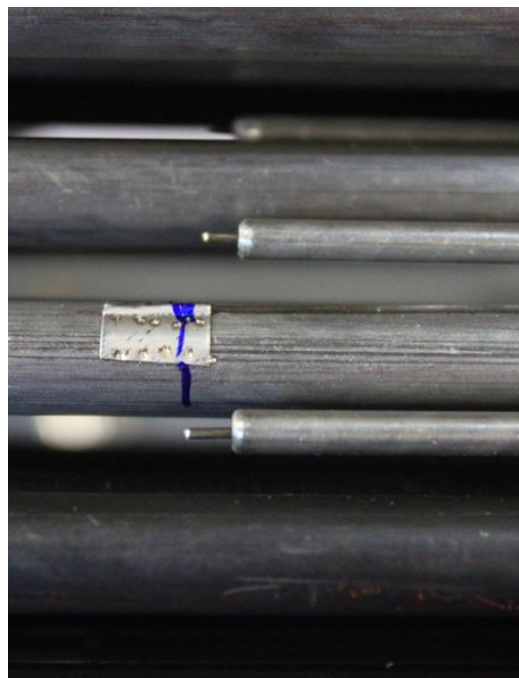
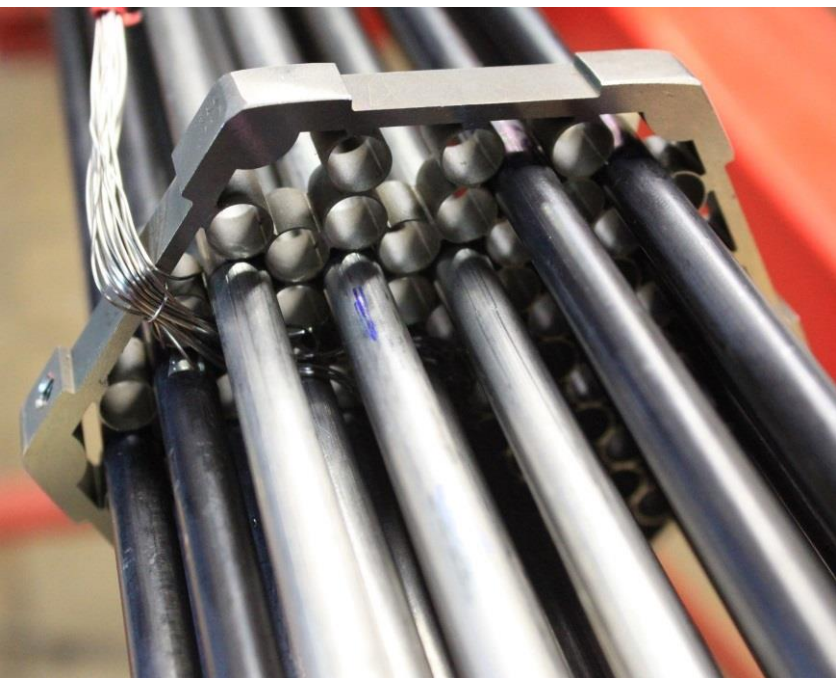




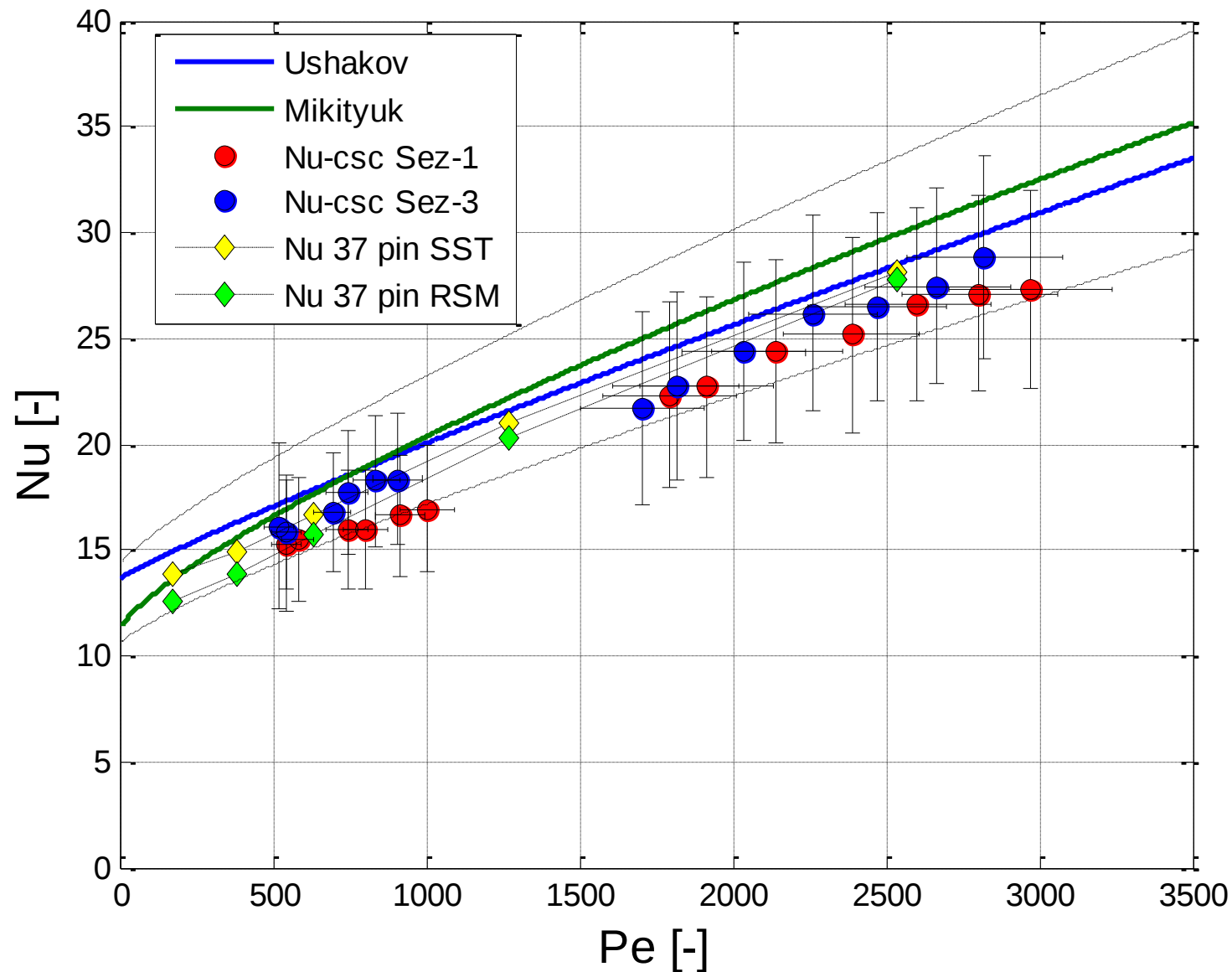
# CIRCE



# CIRCE - Fuel Pin Simulator



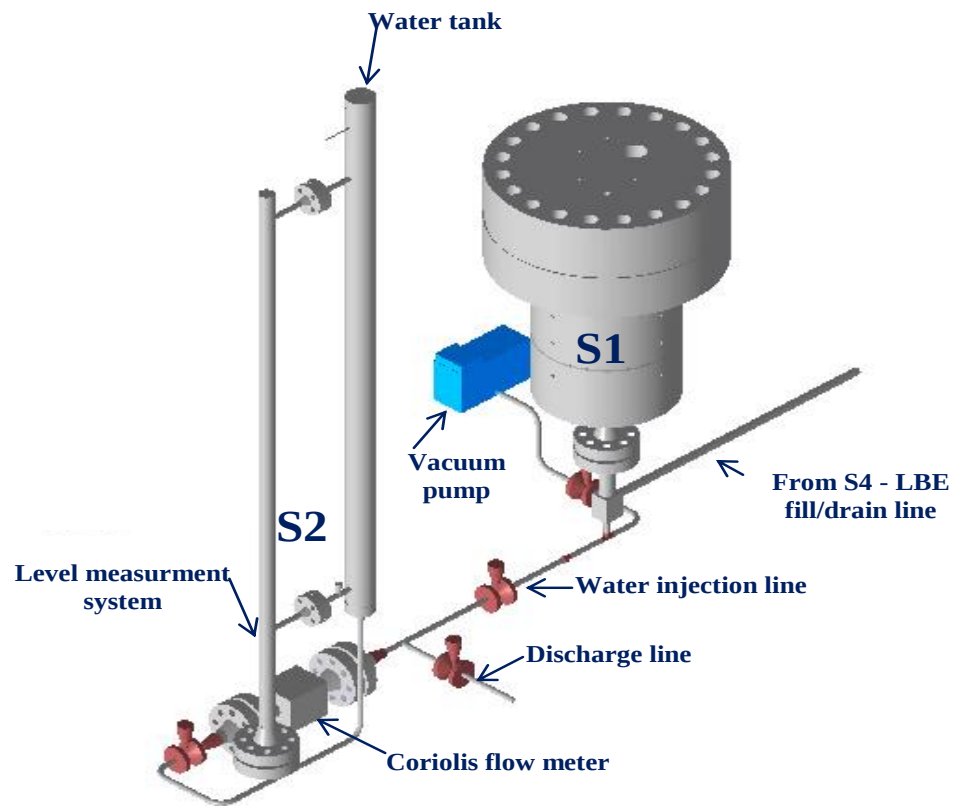
# CIRCE - Experimental Results



# NACIE-UP



# LIFUS5



# HELENA



# LECOR





***Grazie !***

