

# ALFRED Project: Status and next activities

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# More energy... of a new type



**9.7 billion people by 2050**  
2/3 of the world's people living in urban areas



**25% global energy increase by 2040**  
2 times faster electricity demand increase



**1.7% increase of CO<sub>2</sub> in 2018**  
70% higher than average increase since 2010



**2.8% RES increase per year**  
RES will provide 31% of electricity generation by 2040

# Facts and forecasts at worldwide level



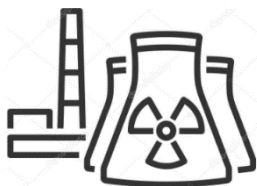
7713  
million people



25 602 TWh  
of electricity produced

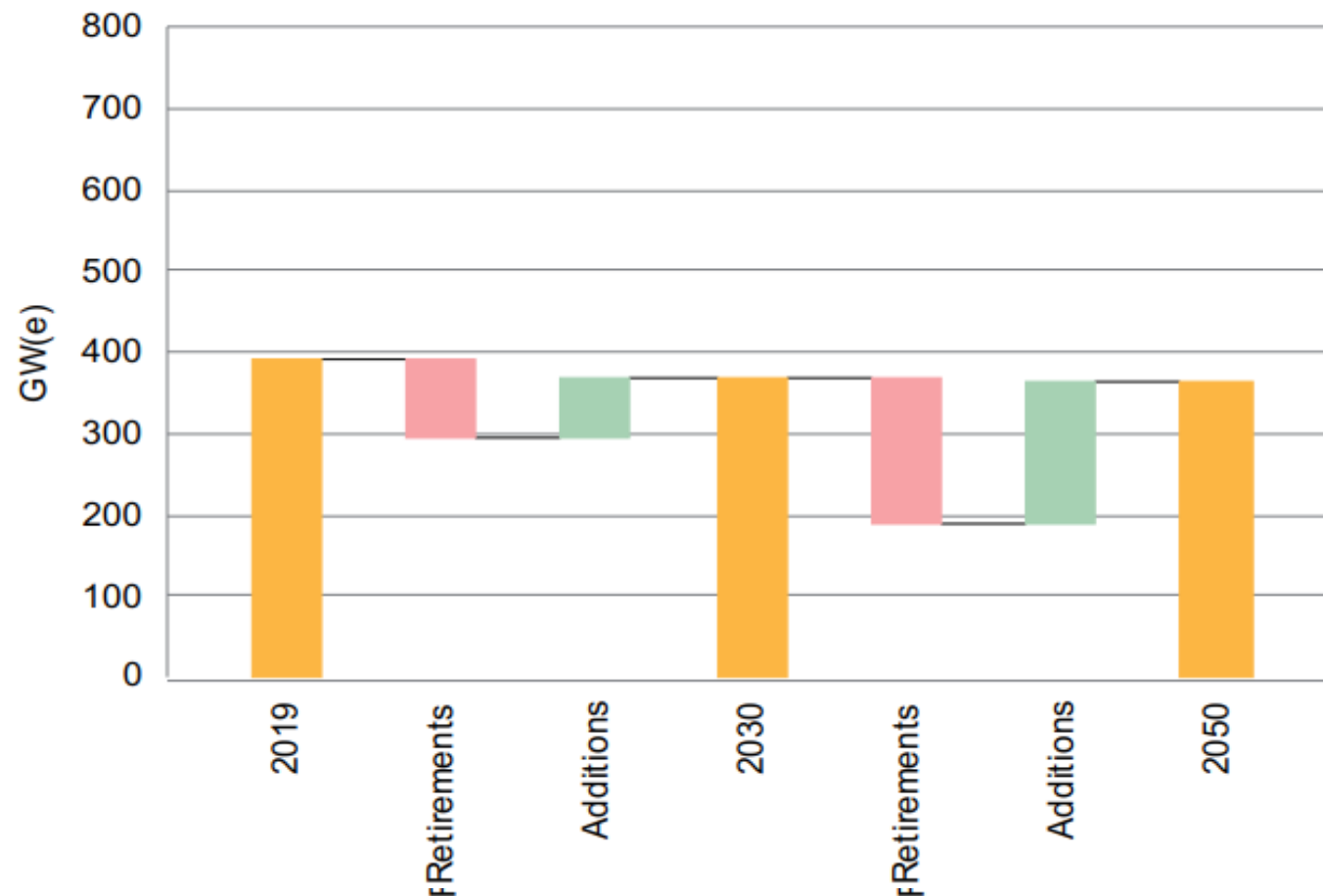


10.4%  
from nuclear



500-225 GWe  
of new installed capacity by 2050

## LOW CASE



# Facts and forecasts in Europe



## North/West/ Southern Europe

 **454**  
million people

 **2 989** TWh  
of electricity produced

 **24.2%**  
from nuclear

## Eastern Europe

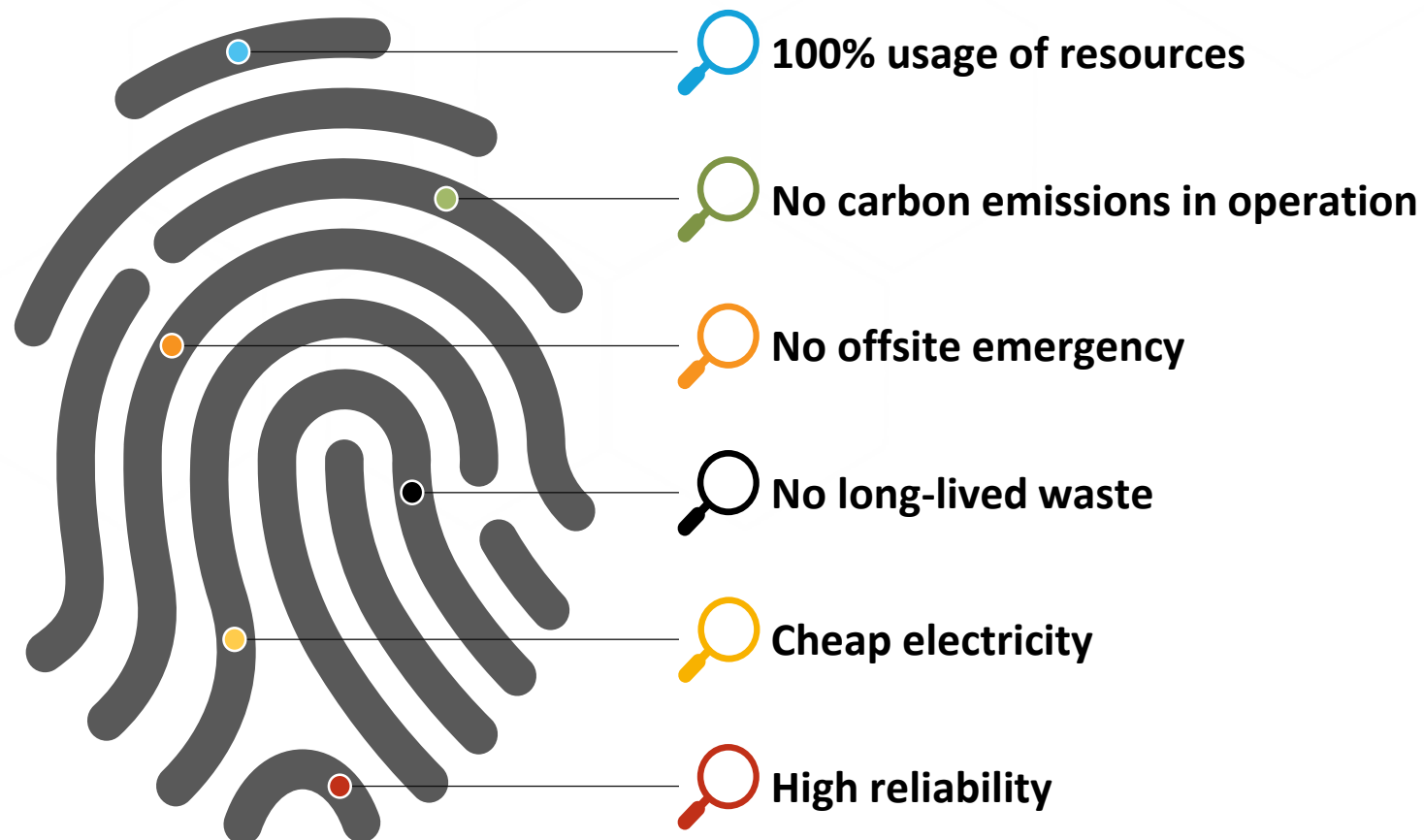
 **293**  
million people

 **1 622** TWh  
of electricity produced

 **22.1%**  
from nuclear

  
**130-75** GWe  
of new installed capacity by 2050

# The «ideal» Nuclear Power Plant



# ALFRED: the Advanced Lead-cooled Fast Reactor European Demonstrator



No other advanced reactor technology can feature the same unique aspects



One of the most promising technologies for deployment in the SMR segment

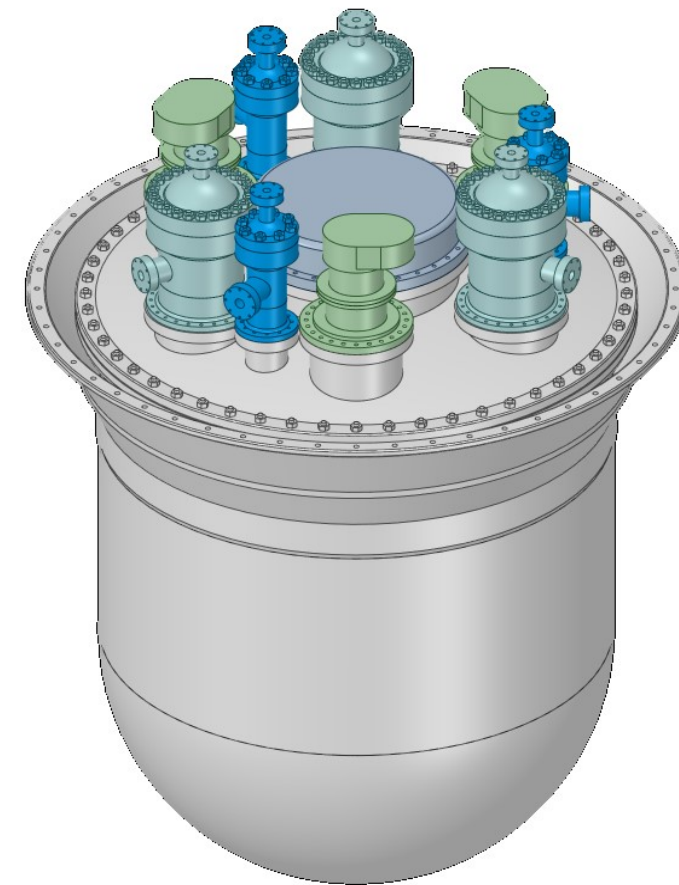


Steadily increasing attention by industry and utilities worldwide

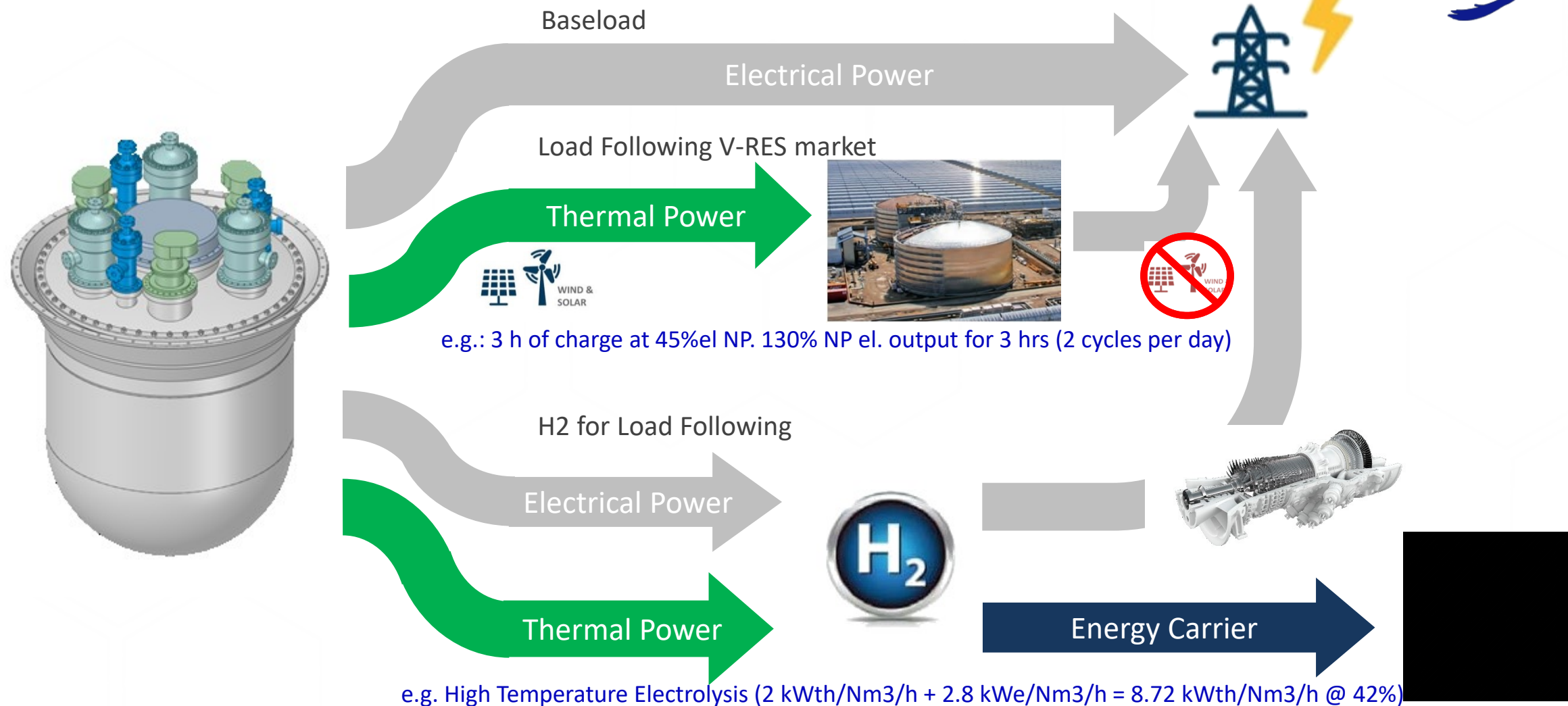


Recognized by inclusion in the research agendas at international level (GIF, ESNII)

ALFRED, a **demonstration reactor**, also **prototypic of a Lead-based SMR**, to bridge the final gap between conducted research and industrial application



# Enabling options: TES and H2 production





# A world-class Research Infrastructure



The largest pool facility in the world, for large-scale components testing in representative conditions



**ATHENA**

A broad-scope laboratory on the chemistry of HLMS and materials science

**ChemLab**



A hot facility to characterize radioisotopes behavior in Lead under accident conditions



**Meltin'Pot**



**ELF**



A pool facility for long-term experiments, to characterize the components and systems

A loop facility for full-scale testing and complete thermal-hydraulic characterization of fuel and absorber assemblies



**HELENA-2**

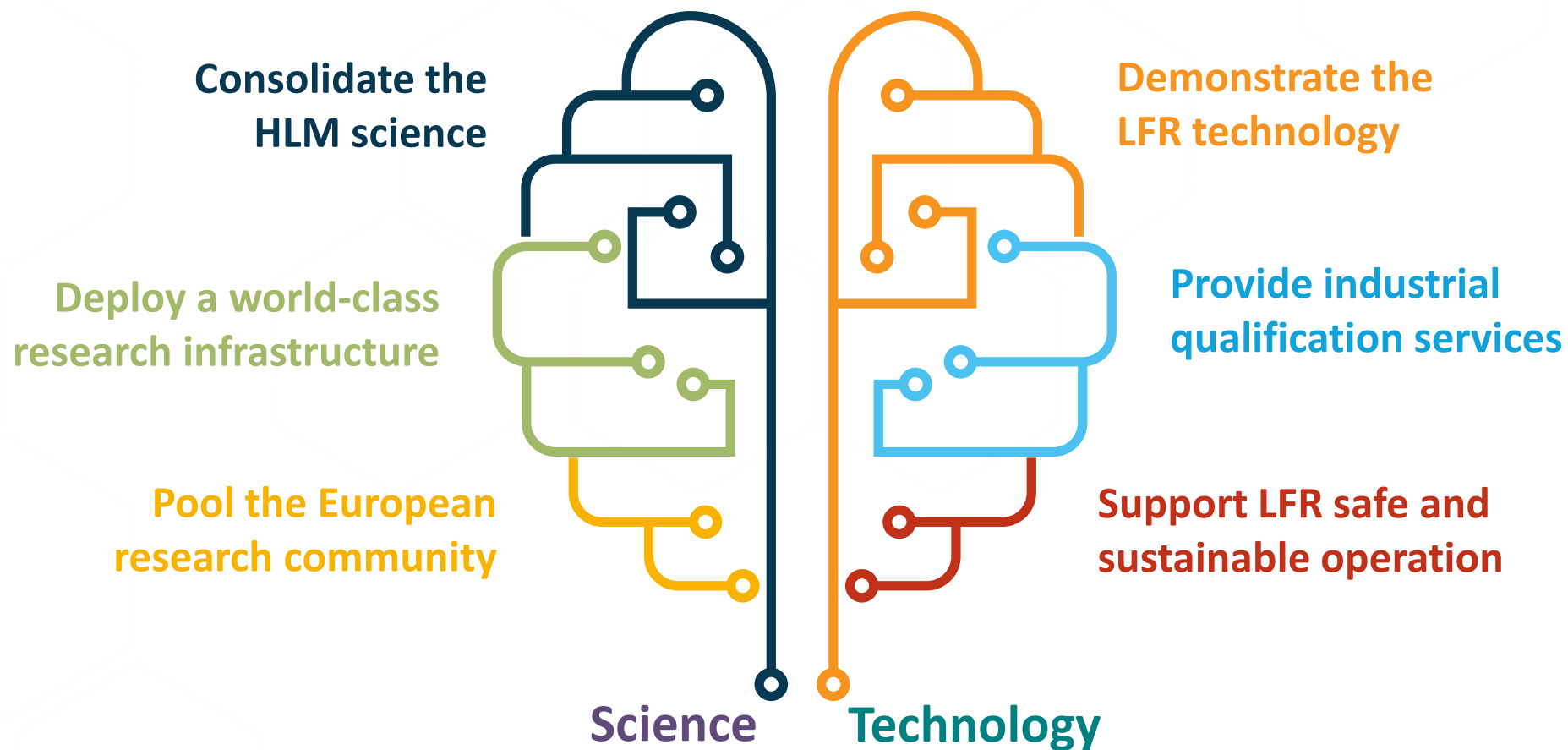
**Hands-ON**



A facility devoted to the testing and qualification of systems and procedures for the handling of core elements



# Research Infrastructure: Science and Technology development

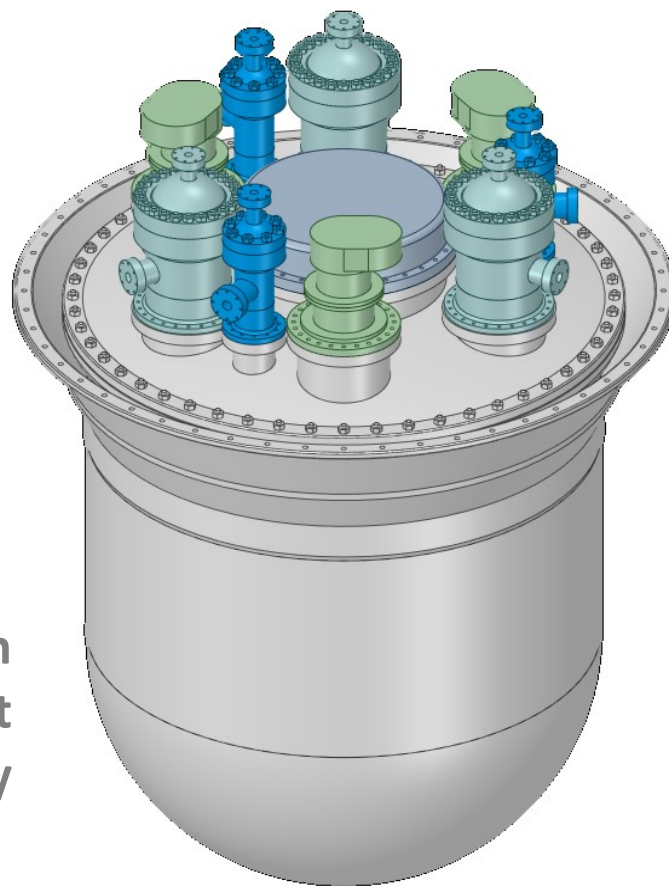


# Role of the Research Infrastructure



**To support the final design and licensing of the ALFRED reactor**

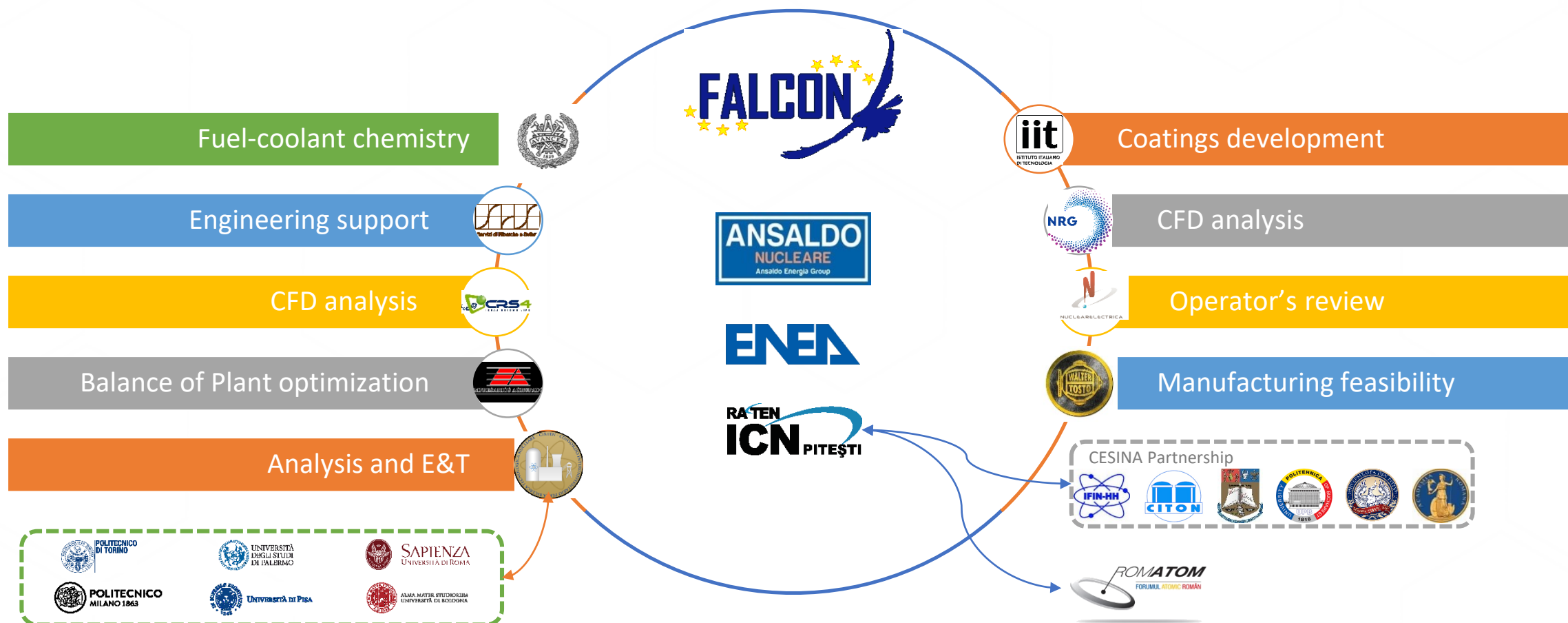
**To support a staged approach for the further advancement of the LFR technology**



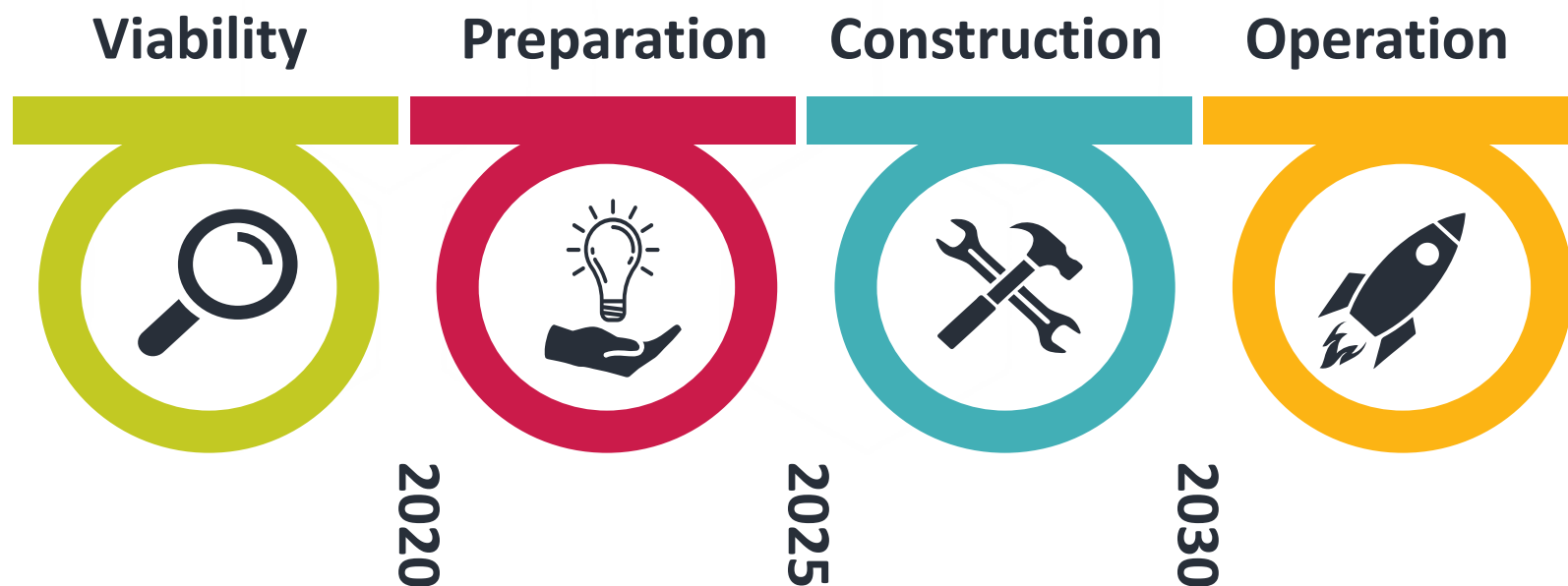
**To provide a comprehensive platform to master the LFR technology**

**To continuously enhance the safety and sustainability performances of following commercial units**

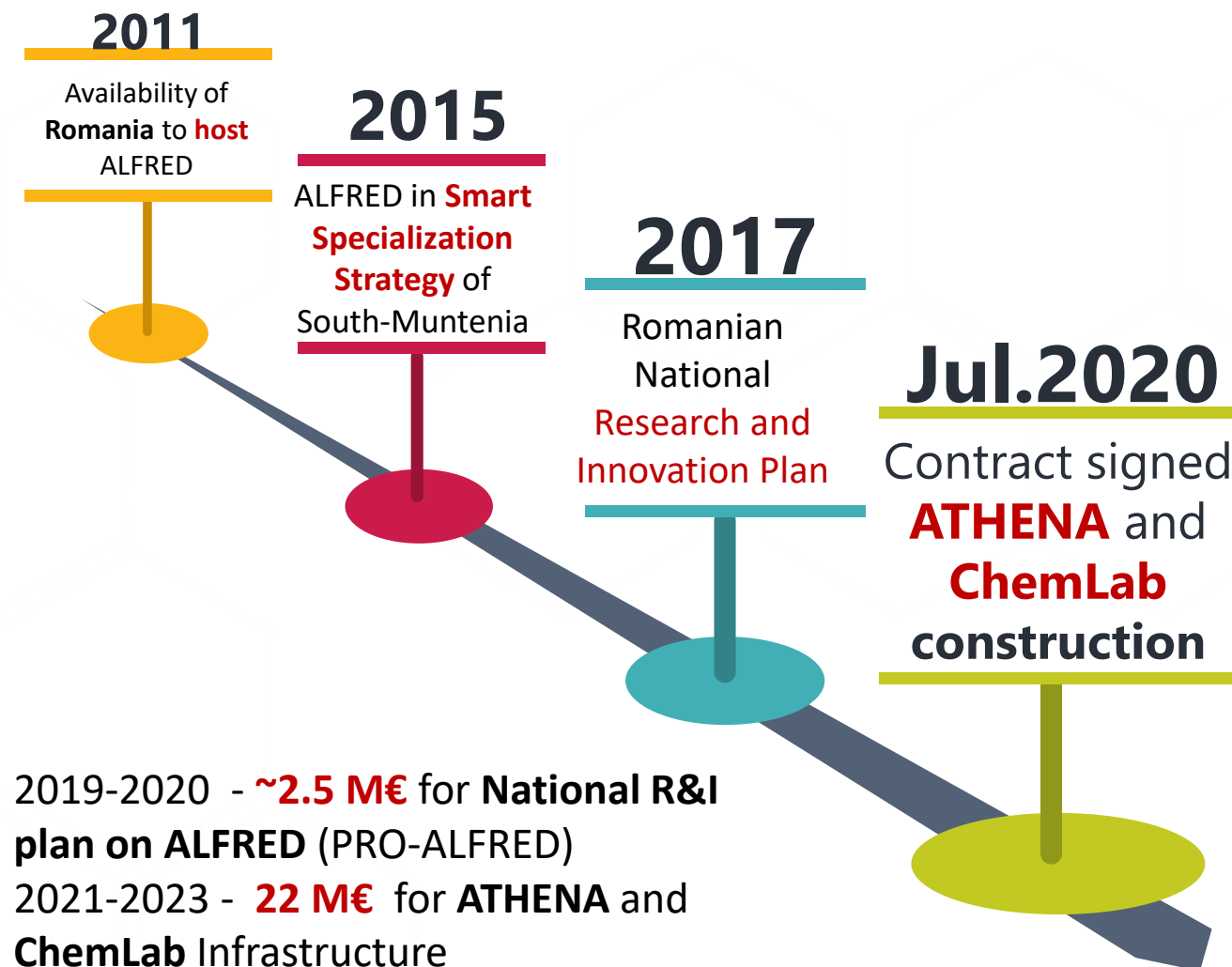
# FALCON: A long-lasting collaboration endeavor



# A challenging roadmap...



# ...on a solid basis



Jul. 2020 - Contract signed for **Athena** and **Chemlab construction**

Apr. 2020 - **Integrated National Energy and Climate Change Plan (NECP)** for 2021-2030 Romania

2018 - **ESNII** Exec Board promoted **ALFRED** in the **Fast Track**

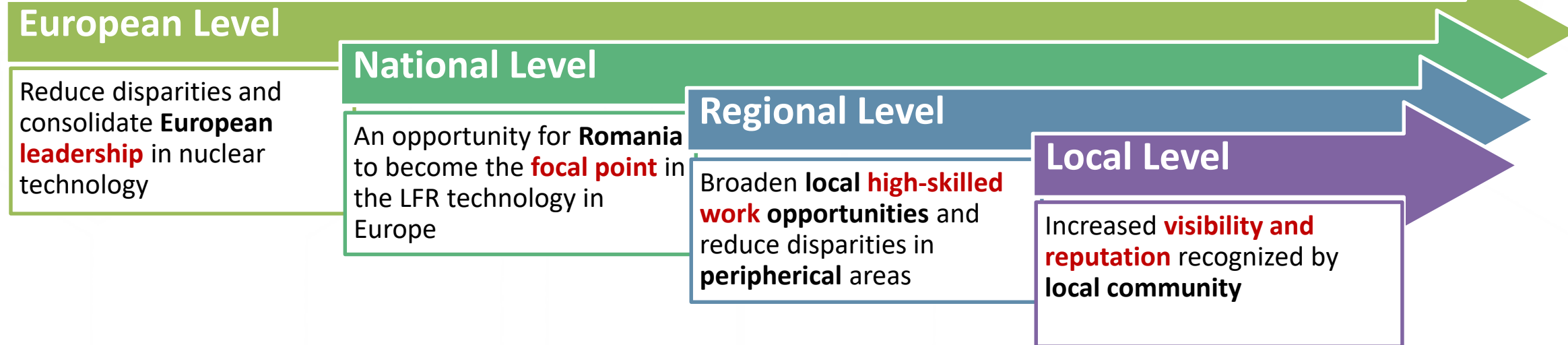
2017 - **National Strategy for RDI** (2015-2020)

2017 - **Roadmap** for **Research Infrastructures** in Romania for 2017-2025, Ministry of Research and Innovation

2017 - **CESINA** (academia), **ROMATOM** (nuclear industry) **partnerships** and **NUCLEARELECTRICA agreement**

2017 - **ALFRED** included in the **Romania National Research and Innovation Plan 2015-2020**

# Opportunities and benefits



- **Economic competitiveness** of the industrial reactors is one of the main **drivers** of the Project.
- Competitiveness **cannot** be the case for the **research infrastructure** (including ALFRED).
- **Economic worthwhileness** can be demonstrated if **socio-economic impacts** are factored in.
- Short- and long-term **scientific relevance** and **social benefits** are key factors.
- A **combination** of **public** and **private** funds is the means for project success.

sustainable  
pan-European  
**ALFRED**  
technology  
unique  
future  
excellent  
open  
secure  
safe  
science  
acceptable  
innovative

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