GREEN-ENERGY

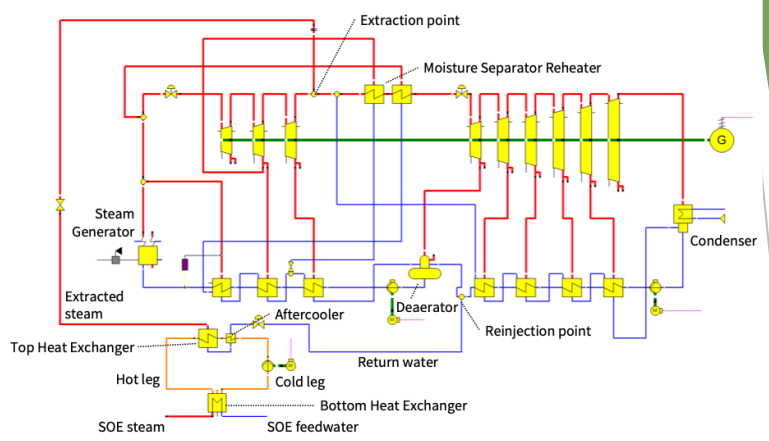
HydroGen pRoduction from nuclEar ENergy
for European Net zEro emissions stRateGY

Project start:
February 2025
Duration:
24 months
Coordinator:
Politecnico di Milano
Partners:
Politecnico di Torino
UniRoma La Sapienza
Università di Palermo

First year activities

PoliMI

Definition of the plant layout and modeling the integrated system architecture, with particular attention to the nuclear steam cycle and its thermal integration with the hydrogen production system. Different steam extraction and return configurations analyzed, to assess their impact on power conversion efficiency and identify the most effective solution. Future work: development of a dynamic simulator of the integrated system to evaluate its response under a range of operating scenarios.

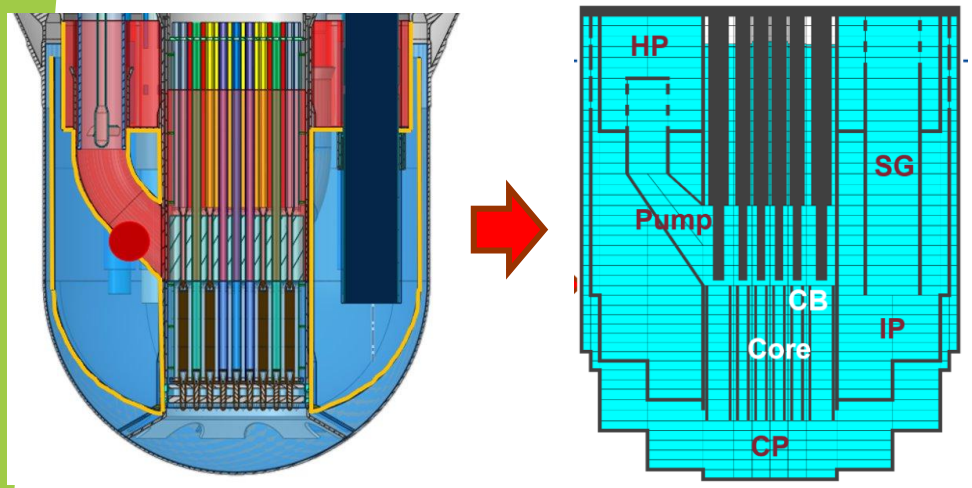


UniPA

Construction of the NEEDDS (NuclEar-hydrogEn Safety Driven-DeSign) DataBase package, enabling structured data organization and proper management of relationships among the different tables. Implementation of the table related to the Functional Failure Mode and Criticality Analysis (FFMECA) completed, with the modules required to define and manage the FFMECA structure within the NEEDS platform developed and integrated. Future work: implementation of the FFMECA table developed by PoliTO in NEEDS and application of MLD approach.

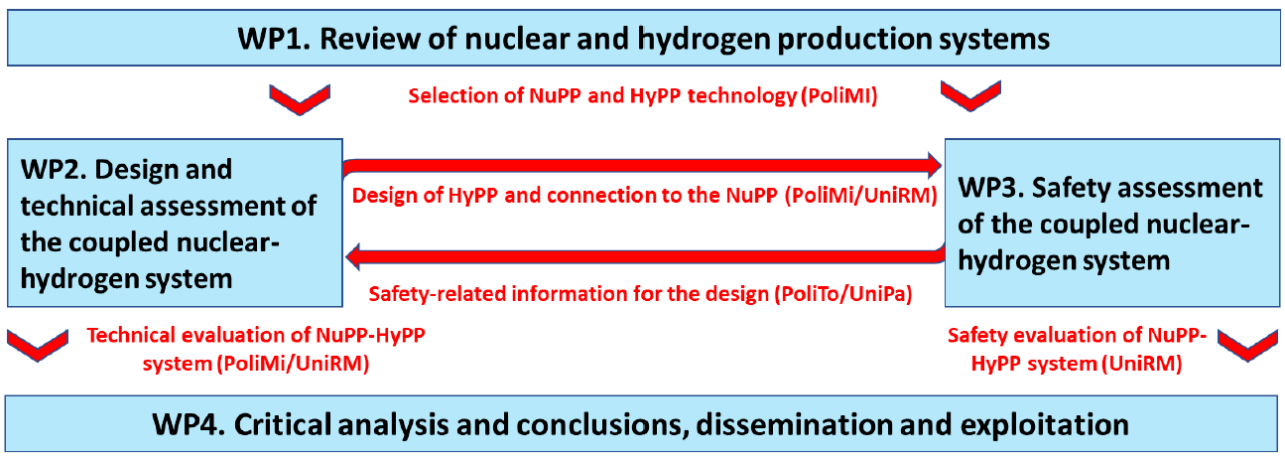
PoliTO

Safety analysis focused on the thermal and electrical energy transfer functions forming the coupling interfaces. Identification of the reference configuration, addressing design gaps and integrating minimum safety devices. Development of the Hierarchical Plant and Functional Breakdown Structures, to describe the physical architecture and the process and safety functions involved in energy transmission from the nuclear–Rankine interface to the final hydrogen plant. Future work: FFMECA to derive the relevant postulated initiating events associated with the coupling.



UniRM1

Development of a complete numerical model of the Advanced Lead-cooled Fast Reactor European Demonstrator (ALFRED) reactor, based on a Thermal-Hydraulic (TH) model with lumped parameters coupled to point kinetics, including the main feedbacks. Development of a more detailed reactor model, to be used to refine the assessment of the safety margins related to the ALFRED reactor during accidental conditions.



Ministero dell'Università e della Ricerca

PRIN
Progetti di Ricerca di Rilevante Interesse Nazionale

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