



The TANDEM Euratom project

Small Modular Reactor for a European safe and Decarbonised Energy Mix



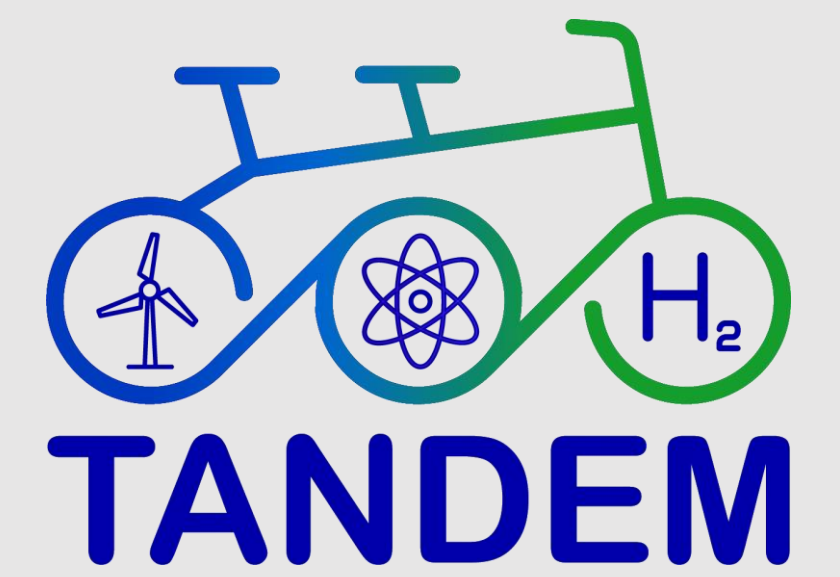
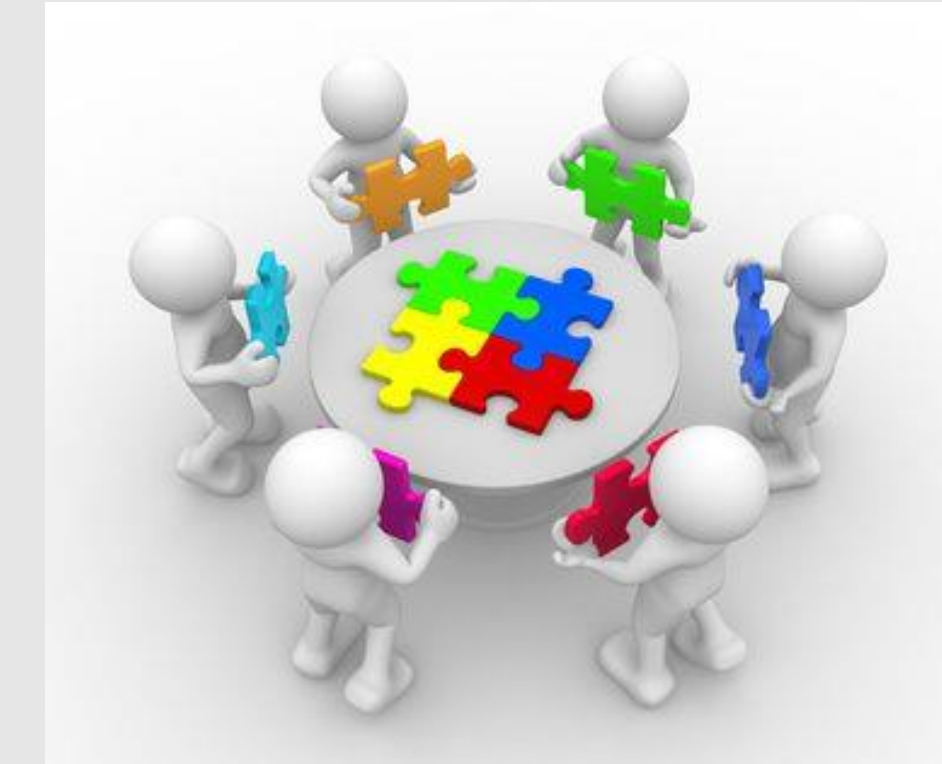
CONTEXT

Needs: achievement of energy security and affordability as soon as possible, and greenhouse gas (GHG) net-zero emission by 2050, considering that:

- ❑ **Electricity** supply will double by 2050.
- ❑ Decarbonisation of the electricity sector is not enough to successfully meet the EU energy transition targets: today, **heating and cooling** represent about half of the total final energy needs in EU. The **hydrogen** use is expected to increase rapidly.

Contribution brought by TANDEM to answer these needs:

- ❑ **Development of an integrated vision of the energy systems** based on the hybridization of nuclear and renewable energy sources with thermal/power storages and downstream applications (district heating, hydrogen production, etc)
- ❑ Analysis of the **role/benefits of multipurpose Small Modular Reactors (SMRs) integrated into hybrid energy systems** as reliable, resilient, and affordable clean energy options in Europe.

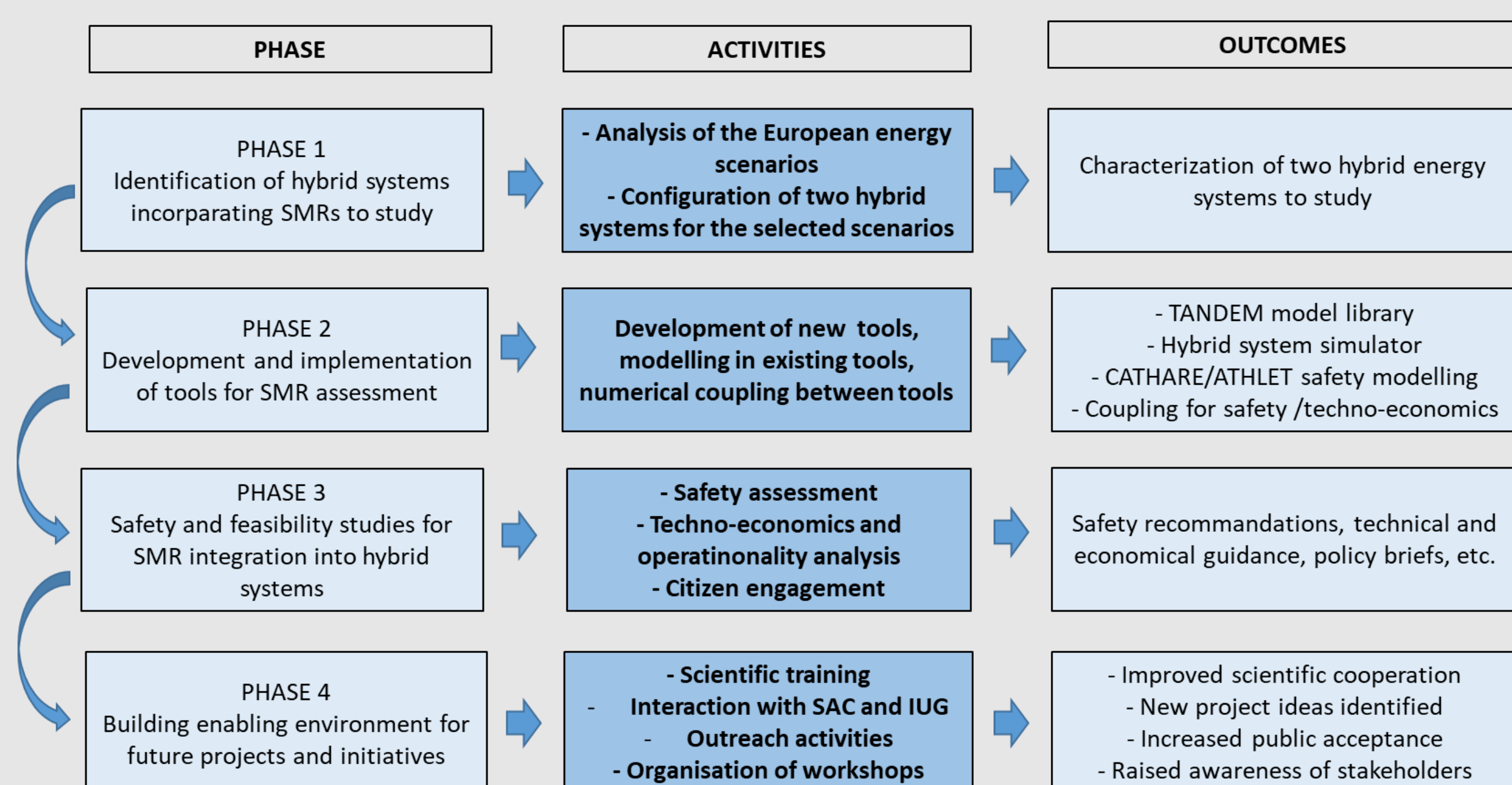


HIGH-LEVEL OBJECTIVES

- ✓ Assess the **safety compliance** of **SMRs to be integrated in the future European energy mix**: extend the current reactor safety approach to cover safety considerations coming from the coupling of a nuclear reactor with non-nuclear systems for energy production, storage and conversion.
- ✓ Provide **guidance in a deployment perspective** for the future integration of Generation-III SMRs and Generation-IV AMRs into well-balanced hybrid energy systems: techno-economics and operationality of hybrid energy systems, flexibility of energy production, citizen engagement.
- ✓ **Create an enabling environment** for the development of hybrid energy systems based on SMRs and AMRs: education and training to develop technical young engineers' skills and extend experienced engineers' ones, stakeholder engagement (nuclear and high GHG emitter industrials, policy makers, nuclear regulatory, R&D teams, NGOs, ...)

Ambition: **become a pioneer initiative** in gathering efforts and expertise around the development of SMR integration into hybrid energy systems in Europe.

METHODOLOGY

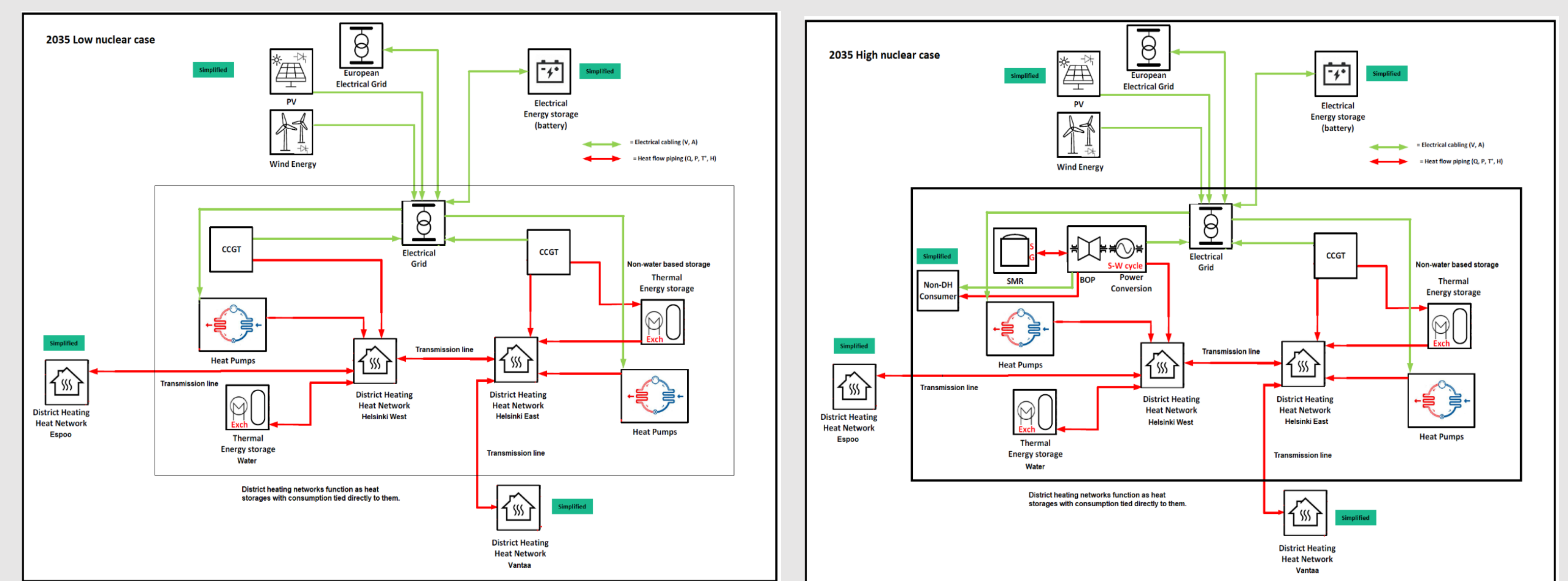


SMR use-case in TANDEM: the light-water **E-SMR academic concept** developed in the framework of the ELSMOR Euratom project

CONFIGURATION OF HYBRID ENERGY SYSTEMS

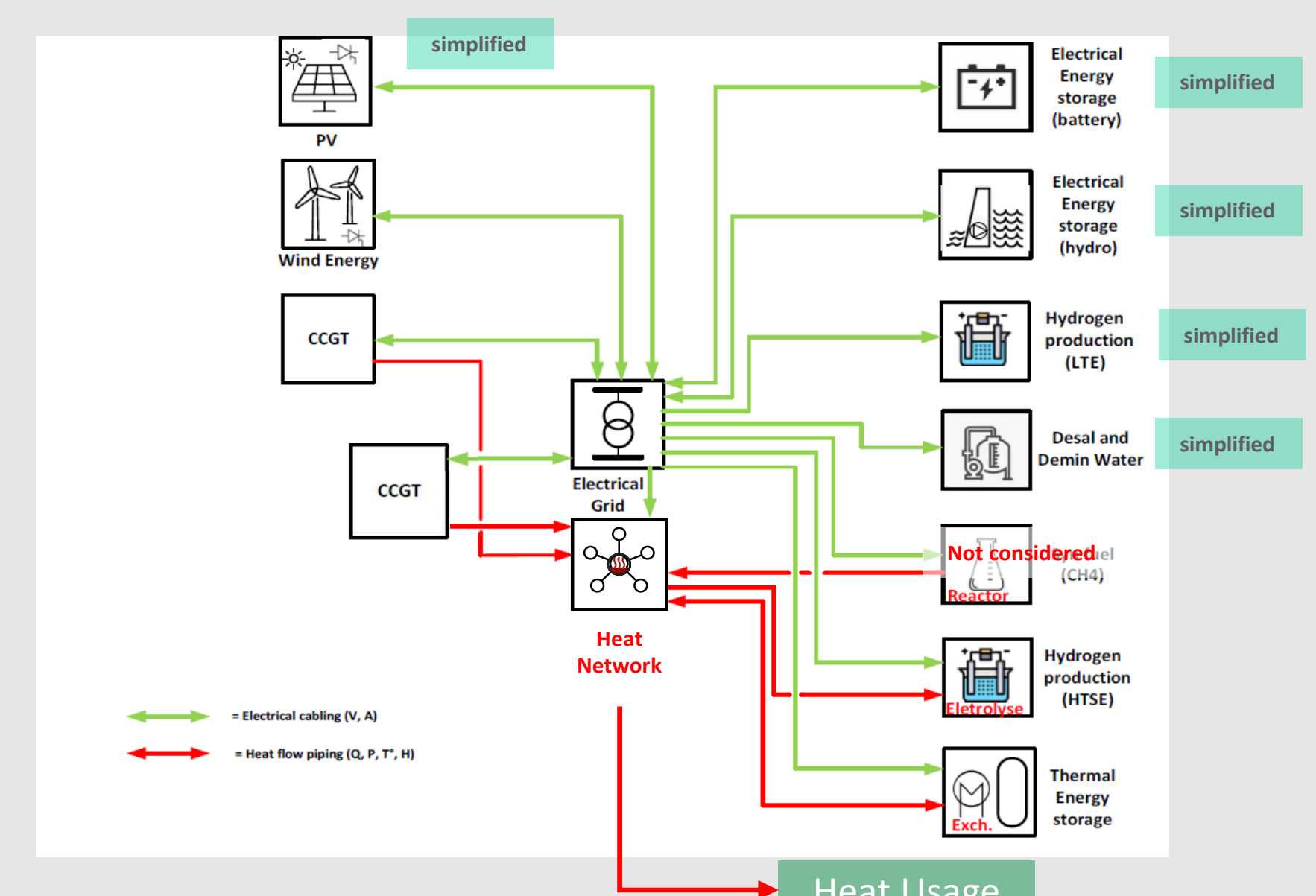
1/ Hybrid energy system for district heating and electricity supply

Studies in two EU local contexts: urban areas in Finland and Czech Republic



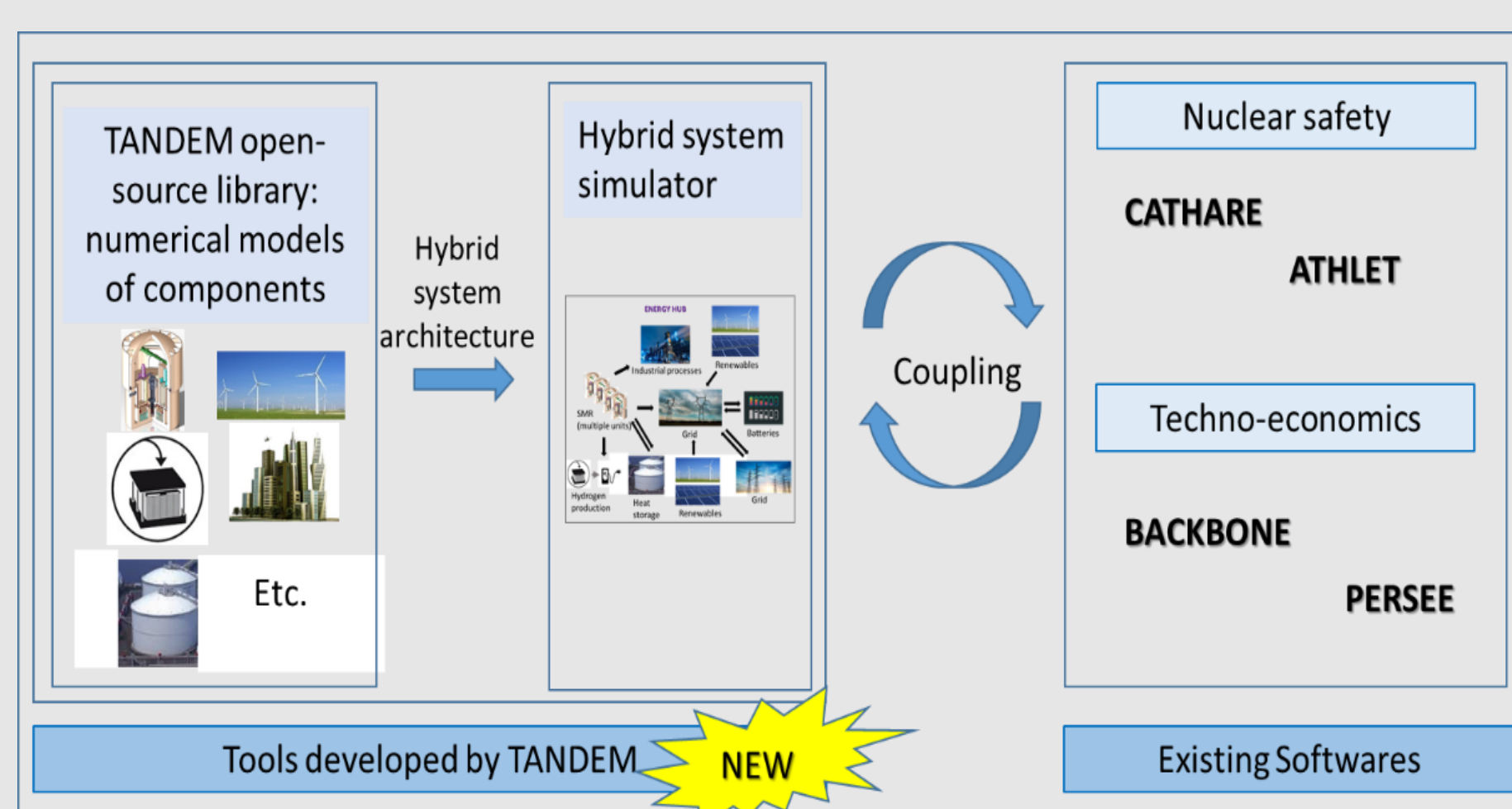
2/ Hybrid energy system for energy hub

Study in a EU local context: definition of a virtual harbor-like infrastructure in Southern Europe, inspired from the Dunkirk harbor (data coming from the "Toile énergétique®")



Two timeframes: **2035** (considering two energy scenarios: no SMR deployment or start of the deployment) and **2050** (all fossil-fired energy plants replaced by carbon-free energy plants)

SIMULATION TOOLS



Website: tandemproject.eu
LinkedIn: @TANDEMproject
Coordinator contact: claire.vaglio-gaudard@cea.fr

Duration: 3 years (2022-2025) | Budget: 3.8M€ (including EC grant: 3.4M€) | Consortium: 18 partners from 8 European countries



ansaldo | nucleare



Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Atomic Energy Community ('EC-Euratom'). Neither the European Union nor the granting authority can be held responsible for them.