

## INTEGRATION OF SMRS INTO LOW-CARBON HYBRID ENERGY SYSTEMS: THE TANDEM EURATOM PROJECT AND BEYOND

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The overall ambition of the TANDEM Euratom project (“Small Modular Reactor for a European Safe and Decarbonized Energy Mix” – 2022-2025) is to *promote multi-purpose Small Modular Reactors (SMRs) integrated into hybrid energy systems as reliable, resilient, and affordable clean energy options in Europe*. The project focuses primarily on light water SMR technologies for near-term deployment in Europe by 2035, but also aims to support the deployment of Advanced Modular Reactors of Generation IV by 2050 when technology-neutral outcomes are identified. The intrinsic key feature of the TANDEM project is the development of an integrated vision of the low-carbon energy mix on a local/regional scale (a urban area or an industrial area). Indeed, the project considers nuclear energy as a source of electricity, heat and hydrogen to supply industrial processes and district heating in cogeneration mode, but also studies coupling (also referred to as “hybridization”) with renewables and energy carrier storage systems. The project is addressing the technical feasibility (safety, operability and flexibility of the energy supply) and economic viability of such hybrid energy systems, as well as citizen engagement regarding their deployment. The project provides methodologies and tools for the technical assessment of Hybrid Energy Systems (HES) and implements them on demonstrative case studies of energy systems to be decarbonized. By mid-2025, as expected, the project will release policy briefs and technical guidelines supporting the safe and cost-effective deployment of SMRs/ AMRs in urban or industrial areas consistent with the future European low-carbon energy mix in Europe. In parallel, TANDEM has built an open and long-term community that will ensure expertise in the field of nuclear HES and support the wide acceptance of multipurpose SMRs and AMRs. This European community has forged close links with other international communities and industrial stakeholders, to develop new collaborations and foster exchanges in the field of nuclear cogeneration, non-electric applications of nuclear energy and nuclear HES. The discussions between TANDEM and these international communities clearly underline that nuclear cogeneration and its integration into hybrid energy systems is a matter of utmost importance. TANDEM paves the way for the credibility of hybrid energy system integrating SMRs and AMRs on a local scale. Given the urgency of achieving net-zero targets and answering new energy challenges driven by the international geopolitical context, it is now time to turn the integration of SMRs and AMRs in hybrid energy systems into reality, while ensuring the competitiveness of the technologies implemented in HES and speeding up their deployment through digitalization. Achieving this goal will require to continue to tackle several R&D and technical challenges, enabling for fostering cross-sectorial collaborations between nuclear and renewable communities.

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