

## EEE-AM 2023 Special Session 03

### TITLE

#### SS on Smart Sector Integration

### SESSION CHAIR

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### DESCRIPTION

The project "NEST, Network for Energy Sustainable Technologies" framed in the PE program "Green Energies for the Future" aims to connect the main laboratories and university research groups and the main national research bodies, identifying interdisciplinary skills in order to develop technologies for the conversion and use of renewable sources that should be sustainable, both from an environmental and a social point of view, and resilient for the energy production and distribution, while being less subject to the risks deriving from the current supply system of fossil fuels, basically, oil, and natural gas. The ambition is to build a competent Italian leadership, strongly integrated with the territory and companies and capable of supporting the future development towards sustainable and decarbonized energy production and distribution.

The current international political instability has highlighted the critical nature of energy supplies to the Italian national energy system, not adequately diversified in terms of types and origins of energy sources. The confidence that operating in the global market may self-compensate the uncertainty of energy supplies with increasing penetration of non-programmable renewables has been seriously undermined. The development of a more resilient national energy system encompasses the diversification of primary energy sources and the realization of a "multi-commodity" system based on "smart" networks of energy carriers (electricity, heat, hydrogen, methane and syn-gas, biofuels and e-fuels) interconnected with each other. Diversification of sources and "sector coupling" foster resilience also with respect to the transition from a "carbon constrained" to a "resource constrained" energy system, beware of Critical Raw Materials availability. This special session is in particular focused on the activities of Spoke 7 addressing the development of innovative solutions and enabling tools to support optimal integration of energy sources/carriers and "sector coupling".

The Special Session will thus primarily host contributions about:

- Multiscale simulation and digital twinning of integrated energy systems (modelling and simulation, co-simulation, IoT solutions for digital twins)
- Development and testing of solutions and technologies for smart sector integration (components and technologies for smart sector integration, also addressing flexibility, reliability and coexistence of different energy infrastructures)

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- Setup of platforms for interoperable development of applications and data exchange
- Analysis and management of economic-societal and legal-regulatory constraints

