EEEIC 2025 CRETE

JULY 15.18 2025
CHANIA, CRETE
MINOA PALACE RESORT
PLATANIAS

INNOVATION FOR MONITORING, MANAGEMENT, CONTROL, AND COMMUNICATION IN THE SMART GRID

ORGANIZED BY
- **Elisa Belloni,** University of Perugia (Italy)
- **Matteo Intravaia,** University of Florence (Italy)

The green energy transition, driven by the need to tackle environmental pollution and climate change, represents one of the main challenges of our era. In many countries, the decarbonization process is leading to the actuation of incentive policies promoting the installation of new renewable energy plants. Given the typical intermittency of renewable sources, this shift from a centralized generation system to a distributed one poses various problems in terms of continuity of the supply and stability of the electricity network. To address these issues, it becomes essential to investigate innovative approaches and substantially rethink how energy systems are managed. The key component of this transformation is the Smart Grid, where interconnected control devices enable punctual and efficient management of energy flows. In this rapidly evolving framework, advanced tools and strategies are needed to effectively handle the new entities that are becoming integral to the electricity system, such as Renewable Energy Communities. The primary objective of these communities is to align energy consumption with renewable energy production locally, with the aim of establishing self-sufficient microgrids that could potentially have a net-zero impact on the electricity transmission network. Artificial Intelligence, in the form of optimization and forecasting algorithms, plays a central role in achieving these goals. The establishment and operation of Renewable Energy Communities, and more in general of the Smart Grid, involve processing and transmitting vast amounts of data to ensure that these advanced algorithms work properly. This presents significant challenges for telecommunications infrastructure, in terms of data handling, resilience and security. Computational efficiency becomes a critical factor, making paradigms such as edge computing highly relevant. By processing data where it is generated, edge computing minimizes the need for extensive cloud transmission, sending only essential information to more powerful computational units.

Given the relevance of these topics, the proposed Special Technical Session focuses on the latest advancements in tools and technologies for monitoring, managing and controlling Smart Grids and Renewable Energy Communities. Therefore, session topics include, but are not limited to, the following:

- AI-driven production and load forecasting techniques
- Optimization algorithms and reinforcement learning for energy management
- Edge computing solutions in the context of Smart Grids and Renewable Energy Communities
- Smart metering and soft computing techniques applied to electrical distribution networks
- Communication protocols and 5G integration in the Smart Grid
- Resilience and security of ICT systems in the context of the Smart Grid

IEEE EMC SOCIETY PES SAPIENZA ΠΟΛΥΤΕΧΝΕΙΟ ΚΡΗΤΗΣ