ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

MUR DM 117/Amet - Novel methodologies for the management and operation of energy networks with renewable energy sources and electric vehicles

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] AMET APPLIED MECHATRONIC ENGINEERING & TECHNOLOGIES S.R.L. [P.iva/CF:07707700014] Politecnico di TORINO [P.iva/CF:00518460019]

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Context of the research activity	Study and analysis of novel methodologies for the management and operation of energy networks with renewable energy sources (RES) and electric vehicles (EV), based on real-time simulation, artificial intelligence and data analytics. Progetto finanziato nell'ambito del PNRR – DM 117/2023 - CUP E14D23002000004

Objectives	The research will be carried out by the PhD student together with the Electrical Energy research group and the team of AMET S.R.L., as a team work. In particular, the involved Polito lab will be the Global Real-time Simulation lab. The research goal will be the study and analysis of novel methodologies for the management and operation of energy networks with renewable energy sources (RES) and electric vehicles (EV). The main focus will be on electric networks, but the study will be extended to other energy network, for example thermal and gas networks. The main applied methodologies will be: • real-time simulation with Power Hardware-In-the-Loop, in particular for the modeling of the physical layer and for the possible interconnection with real hardware devices; • artificial intelligence, in particular for the management and optimization of the network operation;

	• data analytics for the management and exploitation of large datasets, in particular regarding behavioral aspects and network status. In a first phase realistic test networks will be defined and modelled for real-time simulation. Then, datasets related to RES generation, EV utilization and consumption profiles will be defined. The main phase of the research will be devoted to the development of novel control and optimization strategies based on the network structures and datasets defined in the previous phases. The research topic is related to the research and innovation needs of AMET S.R.L., and is strongly related to missions 2 and 3 of PNRR, and in particular to energy transition, reduction of the environmental impact, and electric mobility.

Skills and competencies for the development of the activity	• base knowledge in the field of electrical and energetic engineering • interest in coding • B2 in Italian and English according to the "Common European Framework of Reference for Languages: Learning, Teaching, Assessment" (CEFR) classification