

ENERGETICS

PNRR - The value of flexibility in aggregates of consumer/prosumers

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Dipartimento Energia [P.iva/CF:00518460019] Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	LANZINI ANDREA - andrea.lanzini@polito.it
Contact	MINUTO FRANCESCO DEMETRIO - francesco.minuto@polito.it
Context of the research activity	<p>The decarbonization of the energy system is pushing the development of variable renewable energy sources (V-RES). A high share of V-RES requires a deep transformation of distribution and transmission networks to accommodate the new capacity while maintaining the overall system reliable. Flexible demand (and production) becomes thus valuable in the future energy network. Flexibility can be achieved both by installing new physical/technological devices (e.g., batteries) and by coordinating optimally the actions of aggregates of users/prosumers.</p> <p>Progetto finanziato nell'ambito del PNRR: PNRR M4C2, Investimento 1.3 - Avviso n. 341 del 15/03/2022 - PE0000021 Network 4 Energy Sustainable Transition (NEST) - CUP E13C22001890001.</p>
Objectives	<p>The objective of this research is to study how aggregates of users and/or prosumers at the distribution scale might coordinate among themselves to provide ancillary services (e.g., balancing service provider, voltage regulation, fast ramp-up/ramp-down) to the distribution grid operator. The focus is on the amount of flexibility they can provide while minimizing the single and overall discomfort of each user. By means of conventional and newer optimization techniques (e.g., based on artificial intelligence algorithms), the methodological approach is aimed to identify the optimal management strategy that users should adopt to respond to flexibility services. Different user demand scenarios will be analyzed looking into the progressive decarbonization/electrification of the final users by adoption of electrified heating, electric mobility, etc.</p>
	<p>The ideal candidate for this position has a scientific background in physics, engineering, mathematics, statistics, and software development. The</p>

**Skills and
competencies
for the
development of
the activity**

development of the research activity requires a candidate with:

- Solid background in statistical methods and simulation techniques
- Solid background in mathematical and physical modelling
- Background on energy systems
- Background in computational methods
- Experience in object-oriented programming (e.g., python)
- Ability to analyze the scientific literature state of the art
- Scientific writing and reporting
- Proactive, independent, and parallel thinking
- Ability to work in a multi-disciplinary team