9th International Conference on Clean Electrical Power

Special Session on

"Innovative methods and tools for urban district decarbonisation based on the energy community paradigm"

The EU Green Deal and the subsequent Fit For 55 package set clear targets for the European decarbonization path, supported at international level by the Paris Agreement. In this context, it is believed that urban areas will play a central role, given that they are responsible for 28% of global CO2 emissions related to the energy sector (IEA, 2020). Therefore, urban decarbonization represents a critical step, driven by (i) the electrification of residential energy demand and (ii) the decentralization of energy generation through local renewable production and energy sharing paradigms such as energy communities. However, as the production in urban energy communities largely relies on rooftop PV plants, the generation potential is unlikely to fully meet the demand, especially in urban areas due to their high energy demand density. Consequently, a portion of consumption will be inevitably supplied from the grid. For these reasons, it is auspicial to identify and develop solutions to (i) maximize the exploitation of local renewable production in energy communities and (ii) find methods to decarbonize the remaining energy demand with innovative solutions such as demand response, renewable-building integration, sector-coupling and off-site renewable generation.

This special session aims at gathering contributions able to cope with the above questions. This relates to possible contributions dealing with (but not limited to):

- optimization of urban energy communities operations to maximize local self-consumption by coupling local generation and demand;
- development of advanced building (BMS) and energy management systems (EMS) to integrate and optimally operate energy and non-energy sectors (e.g. electric mobility, buildings) in local energy communities;
- modelling of flexibility provision from all kinds of energy storage solutions (e.g. EV fleets, thermal inertia from buildings, district heating and cooling);
- optimization of utility-scale plants portfolios for PPAs to access off-site renewable energy (for example levering on the concept of community-PPA);
- optimization of interactive applications and infrastructures design to prompt users' engagement (e.g. gamification and nudging, human-machine interaction, demand side management).

This special session is organized by:

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