FG4 - Smart cities, smart grids and digitalization: modelling insights and lessons learned

Organisers

This session is organised by the H2020 MAGNITUDE and Planet projects. The contacts are:

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Short description

Cities are at the forefront of the decarbonisation challenge and represent living labs for the study of innovative smart grid technologies and initiatives.

This focus group considers four different aspects of the future energy systems in the cities:

- Multi-energy systems (e.g. district heating/cooling systems, industrial sites, campuses, public and commercial buildings) in their urban environment
- Renewables and flexibility resources in the cities - how to integrate and exploit them?
- Electrification of transportation at city level
- Evolution of the role of distribution system operators.

The priority is given to the presentation and discussion of real-life case studies and how the technical outcomes of these projects can inform policy.

The following aspects are considered: strategies and modelling, market and regulatory issues, data management and digitalization, and policy recommendations

Main takeaways

The participants in the focus group were split in four sub-groups corresponding to the above four topics. The main takeaways of these four parallel breakout sessions can be summarized as follows.

Multi-energy systems (MES): there is a need of clear requirements for the services they can provide and of standardization of the equipment for control and measurements. In fact, there is no standardization as such in Europe in this field and this is a big issue for replicability of the very sophisticated tools, which have to face with very low level functionality but tailored on different regulation systems. MES, as electricity service providers, are subject to fragmented European regulation and market rules. This makes the MES assessment difficult in terms of potentials (e.g., new business opportunities, reliable and distributed flexible resources for the electrical system) as well as barriers (e.g., regulation - service duration, shape - and market - payment for availability/energy provision, downward services, and so on).

Renewables (RES) and flexibility resources in the cities: it is important to consider the contribution of industries both in term of installation of renewables and the exchange of energy flows with the networks. Demands of industries are easier to predict than residential users but there is a significant diversity among the different types of industries. For RES integration in city or town environment

there are some issues to solve, such as the integration of PV in buildings (e.g. light weight panels) and vibration for wind turbines (in case of installation close to built-up area).

Electrification of transportation at city level: in this case, it is necessary to properly define what "electric vehicles (EV)" means and to investigate the barriers/enablers for their development. Some participants indicated only Battery EV as EV (putting in evidence that the «fuel» is electricity), whereas others indicate that also Fuel Cell EV, Plug-in EV are «electric vehicles» (the electricity is used to make it work). Regarding barriers/enablers, some of them have been highlighted in the discussion:

i) user needs and willingness to own an EV (e.g., work paths versus holiday usage, first or second family car, and so on),
ii) technical limitations of some batteries in terms of km (strictly coupled with the first point),
iii) the request of new infrastructures (not only the electrical ones, but also adequate spaces to install the private chargers),
iv) the role of shared mobility (also public transportation) in pushing the installation of public charging stations

Evolution of the role of distribution system operators: two main aspects have been discussed:

- Regulatory aspects necessary to properly implement storage and flexibility in the planning procedure: the regulatory aspect is key whatever new mechanisms are to be put in place. Storage and flexibility should find their way, also in terms of definitions of services (maybe also in support to planning) and products.
- Clear definition of the roles of TSO and DSO for coordinated service procurements: if a coordinated system services procurement has to be carried out between transmission and distribution a clear definition of the roles of TSO and DSO and of their coordination needs is strongly necessary.