Theme 1 – Planning, development and operation of power distribution systems accommodating E-mobility

EV take-up has led to changes in power demand profiles and an increase in charging points; this will drive the need to reinforce distribution systems and enhance the management of network loading within existing capabilities, prior to any reinforcement. New power distribution systems planning methodologies, moving beyond fit-and-forget and incorporating the usage of smart charging and flexibility mechanisms are under development and testing in many regions. Data analytics techniques, such as machine learning and artificial intelligence, can provide new methods for detailed planning studies. These techniques can make use of real-time information on the consumption of energy in its different forms, on the traffic flows, on changes in social habits, on city economy, on geography and orography, etc.

Preferred topics for papers in Theme 1 are:

- Planning the development and the upgrade of existing power distribution networks for E-mobility integration
- Planning the charging infrastructure in new power distribution networks
- Charging infrastructure asset management as a means of extending the usefulness of constrained networks
- Impacts of operation aspects in the planning process and vice versa to optimize flexibility and network infrastructure for e-mobility integration
- Operating a system relying on smart charging
- New methodologies based on artificial intelligence (machine learning or expert systems) for planning and operating smart power distribution networks
- Charging infrastructure and power distribution systems physical modelling, simulation, and observation
- EV demand forecasting using socio-economic data, power systems models and power system measurements

Theme 2 – Equipment and components for E-mobility integration in power distribution systems

E-mobility deployment require special components and technical solutions to cope with fast increasing demand, to integrate charging points and widespread e-mobility, while meeting high quality levels of service continuity and resiliency.

Preferred topics for papers in Theme 2 are:

- Components for active network operations (e.g., fault location, isolation and service restoration, dynamic load management, power flow management, power quality conditioners)
- DC distribution and AC/DC hybrid solutions
- Technologies to manage flexibility and peak demand
- AC and DC charging stations for private and public transportation
- Technical solutions for upgrading existing assets
- Before and after metering smart charging and portable charging stations
- Innovative condition monitoring
- Power quality: disturbances and harmonics associated with EV rectifiers/inverters
- Inductive charging and solutions for charging moving vehicles

Theme 3 – Community involvement, regulatory challenges and business models associated with E-mobility – integration of E-mobility in smart cities and smart power distribution systems

The use of demand flexibility and smart charging principles are alternatives to substantial network reinforcements, when integrating E-mobility. Such solutions must be supported through appropriate business models, that provide the correct incentives for actors offering flexibility and smart charging, and of the development of regulatory frameworks that would maximize the value accrued from these solutions, optimizing the total cost to the grid customers. Smart grids and demand response technologies rely on vast quantities of consumer-specific, real-time electricity usage data. Viewed from an overall systems perspective, policy makers might consider that there is a wide public interest in making aggregate data publicly available, but at the same time they must also consider the privacy concerns of their constituents. An appropriate balance between consumers' privacy concerns and the operational needs of utilities and new market players should be found by using appropriate data management techniques to foster demand response, customer engagements and local markets.

Preferred topics for papers in Theme 3 are:

- Business models associated with the deployment of the charging infrastructure
- New business models supporting demand flexibility and smart charging
- Regulatory frameworks encouraging the usage of flexibility mechanisms as an alternative to network reinforcements
- Citizen and public authorities' awareness
- Cyber security challenges for charging stations in power distribution networks
- Data management and protection
- Impact of innovative market arrangements on resiliency
- Business models and solutions for EV charging in cities and communities
- Metering challenges related to the development of services associated with e-mobility