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Connect-EU Energy: Smart Grids

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Connect-EU Energy: Smart Grids

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Strategic Agenda

- Active Substation
- MicroGrids and VPP (Virtual Power Plants)
- Quality of electricity supply
- Suitable Infrastructure for integration of Electric Vehicle into the Grid
- PLC Communications (Power LineCommunication), WiFi, ZigBee
- AMR (Automatic Meter Reading) and AMM (Automatic Meter Management)

Active Substation

- Aimed to **maximize** the integration of the DER (***Distributed Energy Resources***) into the grid, it becomes a priority to convert electrical substations, known as a typically "***passive***" element of the electrical generation, transmission and distribution, into an "***active***" element in order to make them capable of controlling the ***electrical power flux***. It could be implemented meanwhile ***power electronics***, ***ICT*** (IEC 61850, etc.) and other emergent technologies as ***superconducting devices*** (current limiters and cables).

MicroGrids and VPP (Virtual Power Plants)

- The optimal integration of the ***DER***, more specifically ***renewable generation***, ***electric vehicles*** and ***storage devices*** (chemical batteries, flywheels, superconducting magnetic energy storage…), in the smart grids is achieved with structuring a set of these ***small-scale power generation systems*** and consumption to operate as a single point on the grid. This concept is known as ***MicroGrid***.

Quality of electricity supply

- The challenge of improving the ***quality*** of electricity supply in order to respond to the ***consumer's expectations*** of the availability of electricity is obtained through the Smart Grids. Its purpose is to incorporate much more power electronics and others (superconducting limiters) into the grid in order to get enhancements in the ***ITEPI*** (Interruption Time Equivalent to Power Installed) and in the ***wave quality*** (flicker, short interruption, harmonics, etc).

Suitable Infrastructure for integration of Electric Vehicle into the Grid

- The ***Electric Vehicle*** (EV) cannot be considered as a simple energy consumer, like other appliances. The EV is called to have an important role in the smart grids of the future. And in this overview, the ***battery charger*** becomes the interface between the EV and Grids, and its communication is regulated by standard ***IEC 61850***.

PLC Communications (Power LineCommunication), WiFi, ZigBee

- Introducing the communications on a massive scale (PLC Communications, Wi-Fi, ZigBee) will be essential for the smart grids of the future. At the same time, smart grids will be useful for ***new communication infrastructures*** that nowadays retain a minority role.

AMR (Automatic Meter Reading) and AMM (Automatic Meter Management)

- AMR (Automatic Meter Reading) and AMM (Automatic Meter Management) become essential technologies for the Grid, operating in a smart way, allowing emergent technologies as Demand Side Management, where the consumer becomes an active player.

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