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Deliverable D2.3: Combined clustering of electricity networks and electric mobility uses for adaptative system operation regimes

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Executive Summary

This deliverable presents the methodology being adopted within the "XL-Connect" project for the investigation of the future user behaviour of EV-drivers and consequent impacts for the energy system. In D2.1 and D2.2, the user behaviour has been investigated by means of literature research, a survey and expert interviews. The findings resulting from the user behaviour analysis have been used for the formulation of the "XL-Connect" framework evaluating grid impacts of EVs.

In "XL-Connect", the assessment framework consists of several complementary components. A probabilistic calculation component stands for the cornerstone of the framework, which calculates the probabilistic power network state and grid security indicators based on two categories of inputs resulting from data-driven models. At first, a "Grid generator" defines grid operational or planning scenarios, which embrace grid structure properties including network topology, electrical properties of network elements or settings of controllable assets. Secondly, a "Scenario generator" composes power injection profiles and operational uncertainty (i.e. confidence bounds) related to consumption, production, energy storage or EV (dis)charging patterns. Finally, an "EV pattern generator" provides (dis)charging power profiles and the spatiotemporal probability of their occurrence in a power system. The scenario parametrisation of data-driven models is based on real-world datasets through data science approaches (e.g. cluster analysis).

Keywords: User behaviour, EV charging, power system, planning