Expected Results

- Specification of the V2G interface; a self-contained ‘consensus’ specification of the V2G protocol stack. These specifications will follow the ISO/IEC 15118 draft standards and will be incorporated for completeness. PowerUp consortium members shall contribute the project specification results for standardisation.


- Automotive V2G adapters for EV integration and V2G ready electricity meter prototypes.

- End-to-end demonstration of the V2G system.

- V2G interoperability testing capability; relevant for compatibility of follow-up multivendor products.

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Specification, Implementation, Field Trial, & Standardisation of the Vehicle-2-Grid Interface

![Diagram of the Vehicle-2-Grid Interface]

* The PLC interfaces on the COSEM & V2G sides may be same or different technologies
The need
The expected introduction of fully electric vehicles puts a significant additional demand on electricity production plants and distribution grids. This major change on the electricity demand side occurs at nearly the same time as an expected shift from stable to partly variable supply input, caused by the extension of renewable production capacities. It is therefore essential for the viability of these developments that the electricity production and demand sides become better coordinated. The Vehicle-to-Grid (V2G) interface concept is an essential mechanism for such coordination.

The limited driving range of electric vehicles is one of their biggest deployment challenges. For mitigating this restriction, it is essential that owners should be able to recharge their electric vehicles not only at home, but also at their destination, namely at parking garages near their offices or near train/subway terminals. The V2G interface concept is a mechanism for supporting this paradigm of nomadic electricity consumers. This new paradigm however raises questions about the architecture of measurement and billing components, as well as the involved value chains. A suitable design of the V2G interface shall support nomadic electricity consumption under any foreseen arrangement of the billing architecture or value chains.

Our Goal
The aim of the PowerUp project is to develop and validate the V2G interface, for achieving the anticipated V2G-enabled benefits. PowerUp shall progress through a full development cycle of physical and link-layer V2G interface specification, protocol design for scheduling of recharging and for accounting control, prototype implementation, conformance testing, integrated field trials and standardisation.

V2G integration into smart-grid networks
Smart electric meters for automated meter-reading are the primary entry point into a smart-grid network. PowerUp will develop V2G-ready electricity meters and will also develop infrastructure side V2G adapters that can be installed at the local low-voltage transformer site. This solution shall enable the use of V2G control interface in those regions, where the deployment of V2G-ready electricity meters is not feasible for some reason.

Robust grid operation & load balancing
Smart-Grid equipment enables flexibility between local and centralised load balancing. FEV-specific load balancing algorithms will be researched and prototyped in PowerUp; these will take this new smart-grid flexibility into account.

Support of nomadic electricity consumption
With the transition from traditional electric metering towards an architecture that supports e-Mobility, the number of involved actors grows and their interactions become more complex. The PowerUp project will map out the foreseen architectural arrangements, and will ensure that the specified V2G interface meets the requirements of nomadic electricity consumption under the anticipated main architecture scenarios.

Support of destination planning
The PowerUp project will address the essential V2G interface issues that arise within the route destination planning phase. Support of destination planning is important for system integrity, as drivers expect that the re-charging spot they are guided to will be functional, available and meeting other possible driver preferences. The project will specify an open interface between an electric utility and ITS service providers. Through this interface ITS service providers may poll real-time status and schedule information of the FEV re-charging spots. This data may be then broadcast to personal navigators or vehicles’ embedded systems.