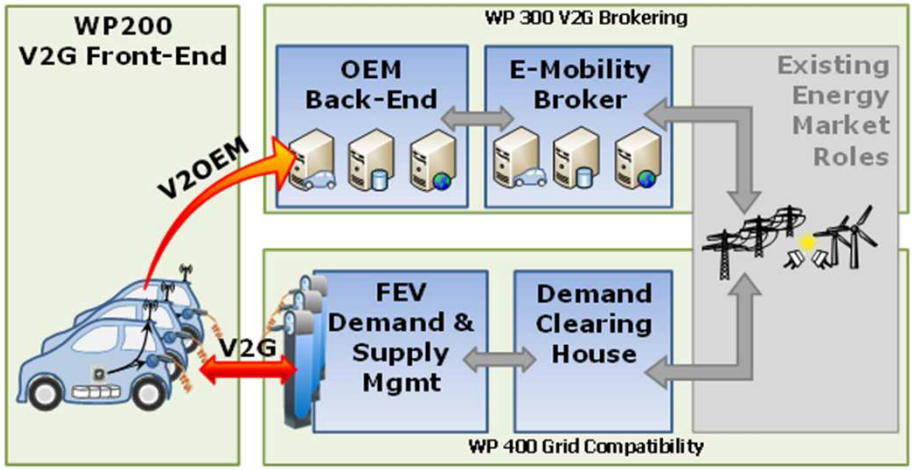
Electricity Demand and Supply Harmonization for EVs:

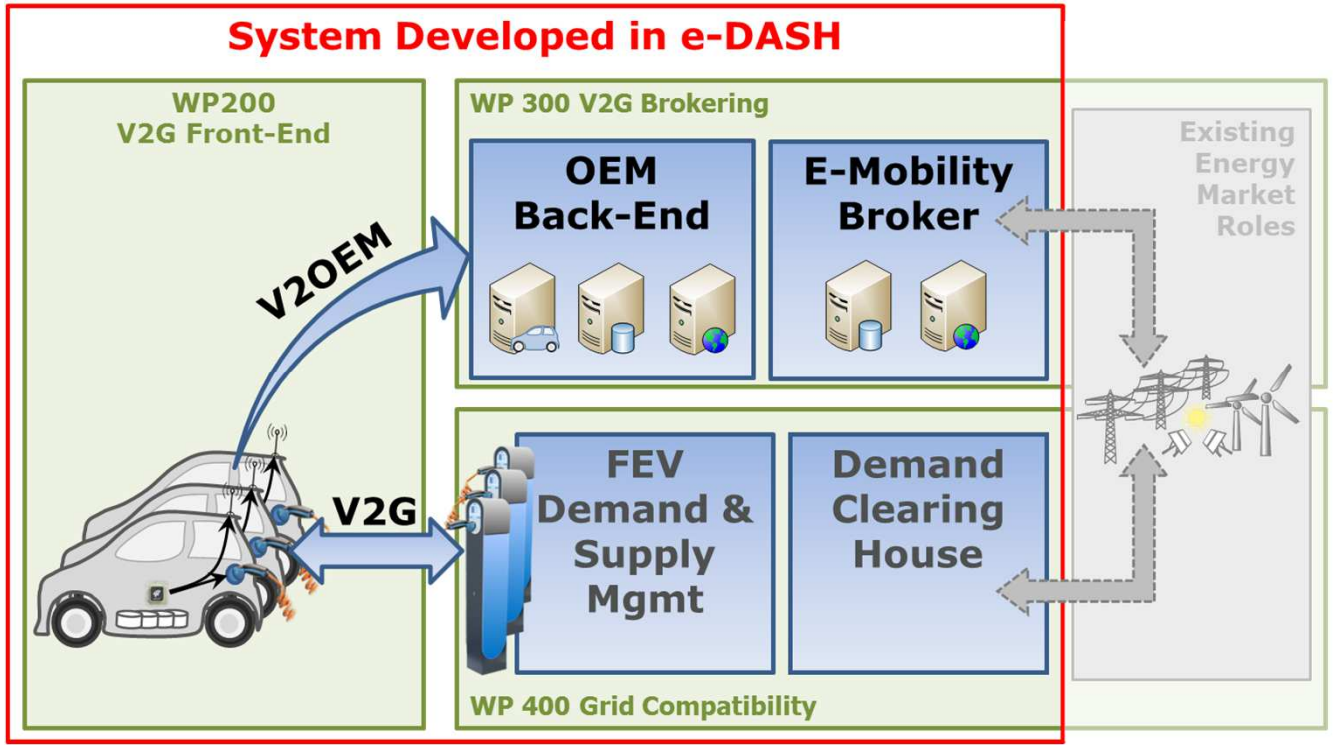
"e-DASH"

Project Start:	**September 2011**
Project End:	**November 2014**
Project Budget:	**8.5 m€**
Project Funding:	**5.3 m€**
Contract Details:	**DG-CNECT**



e-DASH in a nutshell:

- aims at the harmonization of electricity demand in Smart Grids for the sustainable integration of electric vehicles
- enables fast charging of large numbers of FEVs in a brand-independent way and price-adaptive charging/reverse-charging at optimum price for the customer
- addresses sophisticated charge control, which saves the batteries from damages while charging
- allows real-time grid balancing to avoid unpredictable demand-supply situations due to spatially and temporally changing requirements



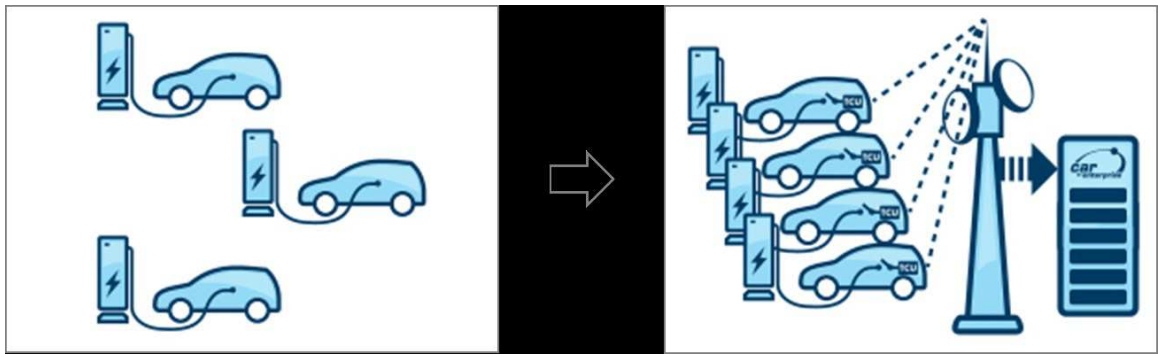
The project's approach is bringing together the FEV Market Potentials as Smart Consumer and the Energy Market Potentials

FEV Potential as Smart Device

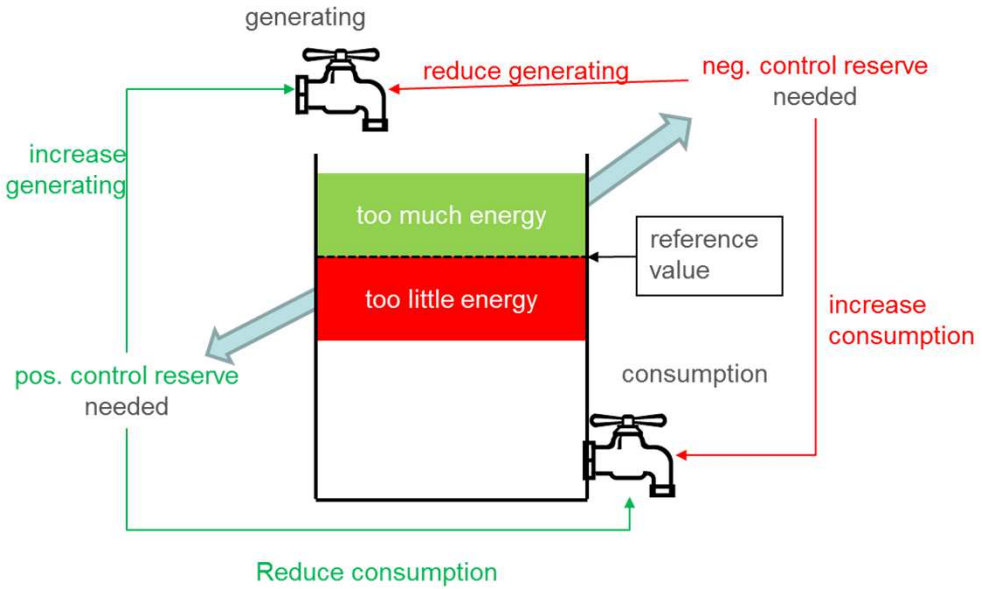
FEVs are considered as **D**istributed **E**nergy **R**esource**s** (DERs), which ***will enable:***

- ***Flexible control of the charging/discharging process***
- ***Precise forecast of energy demand or supply capacity for fleets***

Key to raise this FEV potential is to make the *step from individual FEVs with low relevance and uncontrolled charging behaviour to smart consumer fleets representing a controlled, reliable, predictable and significant energy consumer/source*.



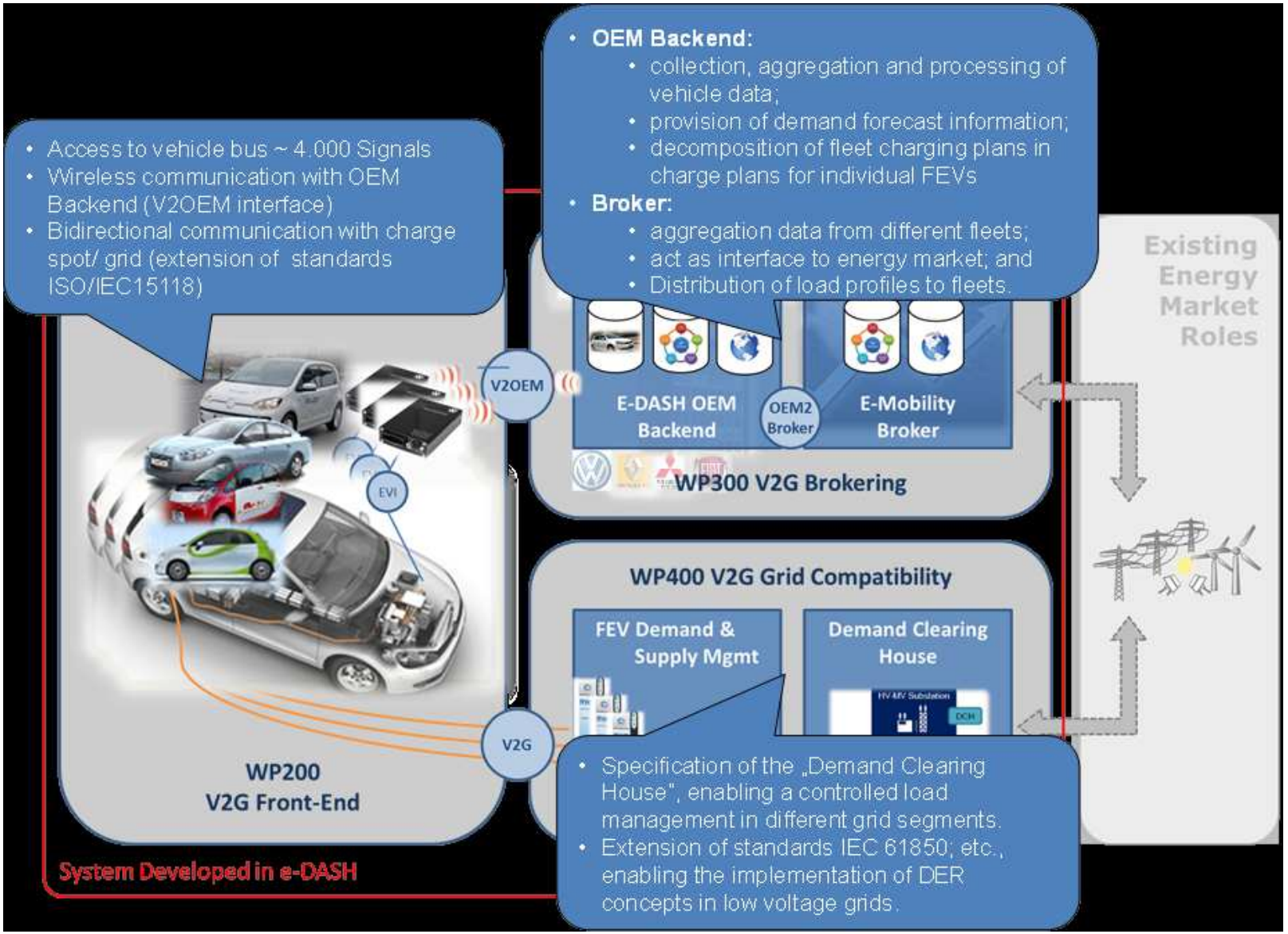
Basic Energy Market Mechanisms



In reference to the balancing of the energy production and consumption in the grid, the need for smart devices enabling **a flexible energy consumption/provision is of high and increasing importance to:**

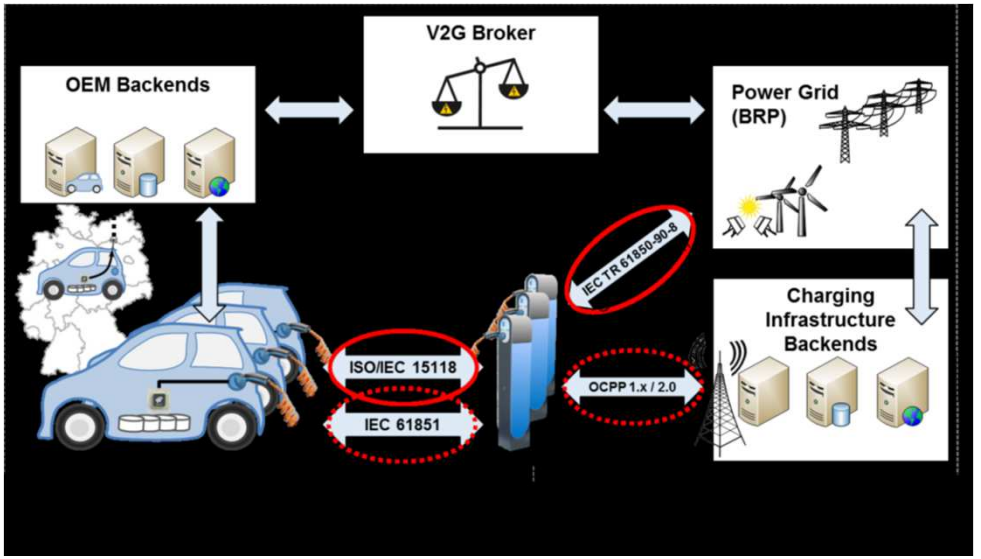
- **compensate volatility of energy production (e.g. due to increased share of renewable energy)**
- **smooth energy demand peak loads (reducing energy grid investment)**

Key to achieve this objective is a tailored charging/discharging process for individual FEV, according to their needs and constraints.


• OEM Backend:
• collection, aggregation and processing of vehicle data;
• provision of demand forecast information;
• decomposition of fleet charging plans in charge plans for individual FEVs
• Broker:
• aggregation data from different fleets;
• act as interface to energy market; and
• Distribution of load profiles to fleets.
• Access to vehicle bus ~ 4.000 Signals
• Wireless communication with OEM Backend (V2OEM interface)
• Bidirectional communication with charge spot/ grid (extension of standards ISO/IEC15118)
V2OEM
E-DASH OEM Backend
OEM2 Broker
E-Mobility Broker
WP300 V2G Brokering
Existing Energy Market Roles
EVI
WP400 V2G Grid Compatibility
FEV Demand & Supply Mgmt
Demand Clearing House
V2G
WP200
V2G Front-End
• Specification of the „Demand Clearing House", enabling a controlled load management in different grid segments.
• Extension of standards IEC 61850; etc., enabling the implementation of DER concepts in low voltage grids.
System Developed in e-DASH

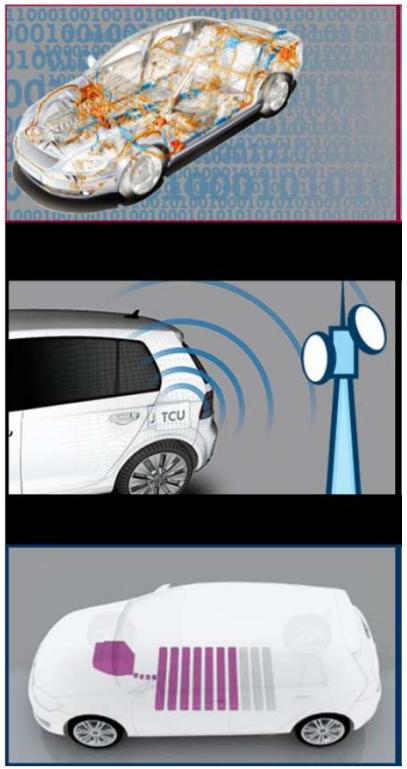
Vehicle to Grid Interfaces and Standardisation

- **ISO/IEC 15118 by Proof-of-Concept Implementation of EVCCs and SECCs**
  - **Real-World Validation of the Standardized Specifications**
  - **First Proposal on Reverse Charging Support (incl. Power Electronics & Functional Safety Analysis)**
- **Harmonization between ISO/IEC 15118 and other Standardization Initiatives (e.g. Smart Energy Profile 2.0)**
- **Contributions to IEC 62913-2-4 Electric Transportation Domain in order to provide 1st attempt of top down approach of Electric Transportation in the Smart Grid**
- **e-DASH Project proofed for the first time that ISO/IEC 15118 may be associated with OEM-Specs**



The Telemetry enabled Electric Vehicle Fleet as a Smart Energy Consumer

The key enabling technology to realise such kind of innovative concepts are based on new telemetry concepts and solutions, ensuring the information transfer with vehicles, independent from their position or connectivity to the grid.



- ❑ Access to vehicle CAN bus with ~ 4.000 signals
- ❑ Gathering of service specific signals
- ❑ Resampling and data storage

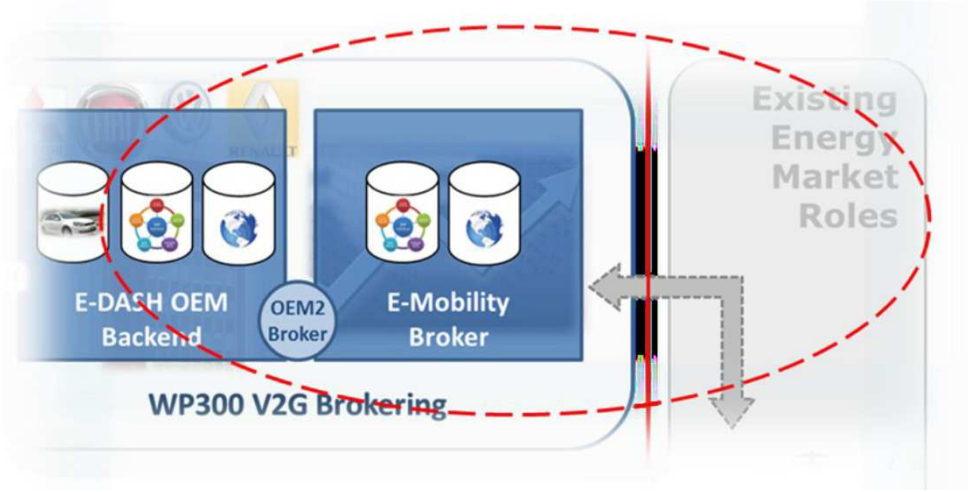
- ❑ Signing and compression of telemetric data
- ❑ Secure Transmission of data using wireless communication between FEV and OEM Backend (V2OEM interface)

- ❑ Provisioning of FEV specific charge plans according to defined fleet load profile
- ❑ Continuous monitoring of the charging process

Energy Brokerage for E-Mobility Fleets

The **Energy Brokerage represents the e-DASH interface to the Energy Market**. Therefore, the e-DASH e-Mobility Broker offers the charging flexibility of smart consumer fleets to the energy market actors (BRPs). The **main objectives of the E-Mobility Broker are** to:

- **negotiate energy requirements vs. energy offered**,
- **aggregate fleet forecasts into BRP specific flexible energy demands**
- **Decompose BRP load profiles into fleet specific BRP load profiles**



e-DASH Added Value to e-Mobility

Outstanding Achievements and Highlights of e-DASH:

- Demonstration of the concept regarding the harmonization of electricity demand in Smart Grids for the sustainable integration of electric vehicles
- Fast charging of large numbers of FEVs in a brand-independent way and price-adaptive charging/reverse-charging at optimum price for the customer including sophisticated charge control
- Enhanced V2OEM backend Telematics
- Initial steps to agree and develop a brand-independent data protocol

Beyond e-DASH:

- ❑ Modules and components of the e-DASH OEM Backend solution to be applied in future commercial services
- ❑ Reuse of developed OEM Backend technologies in the scope of future RTD project (e.g. Big Data in automotive industry)

AutoMat

Automotive Big Data Marketplace for Innovative Cross-sectorial Vehicle Data Services

AutoMat

European Research Programme Consulting

Electricity Demand and Supply Harmonization for EVs:

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The AutoMat Vision

Creating an OEM-independent Vehicle Data Marketplace to enable new dimensions for services.

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