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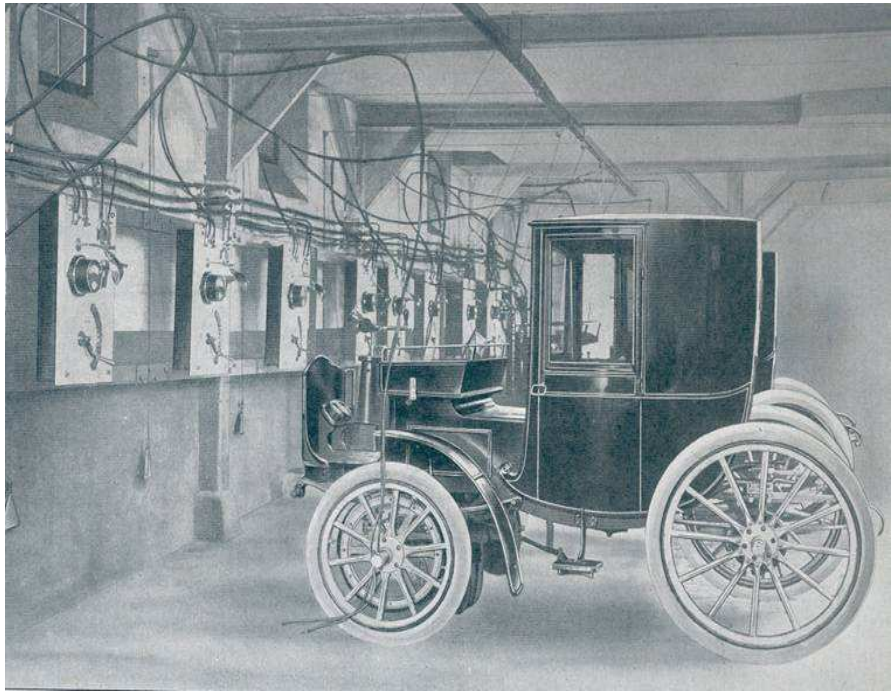
Projectes demostratius i primeres experiències amb mobilitat elèctrica
Experiència d'Endesa

Santiago Cascante

endesa

XIX Century

XXI Century



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1 Background – Evolution & Standards

Key Notes: EV charging technology is changing very fast
Global standards are needed to reduce risk investment

Paris MotorShow 2008

Paris MotorShow 2010

Geneva MotorShow 2011

CHAdeMO

Geneva MotorShow 2011

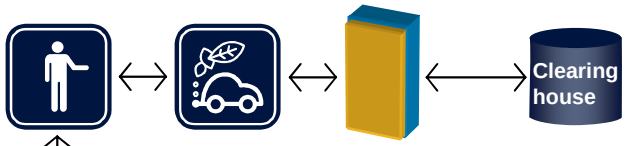
Standards

- TC69
- 61851
- FOCUS GROUP EC MANDATE
- Chademo

International Organization for Standardization

CHAdeMO

Berlin meetings 2008



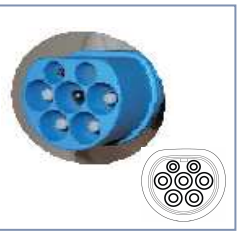
1st Task Force

Contract, billing, services → Provider

2nd Task For...

AC Standardization in IEC 62196-2 and SAE J1772™

Type 1	Type 2	Type 3
1- phase	1 to 3 phase	1 to 3 phase

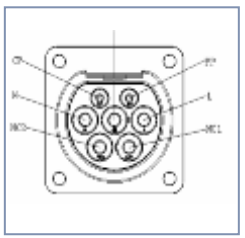
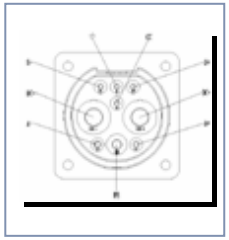




CHAdeMo System

CHAdeMo
DC

China

AC and DC Connector:	
AC	DC

IEC 62196-3 SAE J1772 NA

AC+DC Combo


Standardisation recommendation: Mode 3 charging

- Mode 3 is a safer and more reliable option to charge an EV in all available locations and should be the preferred long-term infrastructure solution.
- To facilitate EV market penetration, a transitory phase, depending on the market take-up, should be allowed in which existing infrastructure can be used in a safe way.
- Mode 2 charging (a Mode 3 vehicle charging at an existing socket with an ICCB) is an example of safe charging and should be allowed during the transitory phase at least in private locations.
- The same applies to other safe charging cases with existing Mode 1 EVs .

Source: eurelectric

2 Tradeoff Analysis

Key Note:
Power electronic and Storage Technologies
are the key player for EVs and for SmartGrid solutions.

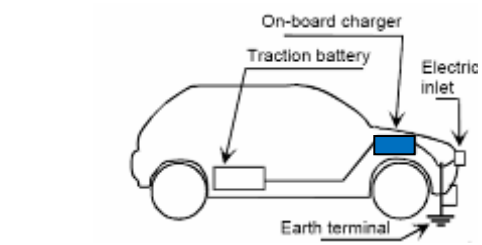
EV Charging methods: power levels, timing & location

Power nomination	Power in kW	Power in Amps	Recharge range/hour[	Recharge range/hour	Location e.g.
Normal	1-Phase AC connection	≤ 3.7kW	10-16 amps	<20 km	Home & Office
Medium	3-phase AC connection	3.7 -22 kW	16-32 amps	20 – 110 km	Public parking Shopping mall etc
High	3-phase AC connection	> 22 kW	> 32 amps	>110 km	Curb side
High	DC connection	> 22 kW	> 32 amps	>110 km	Motorway

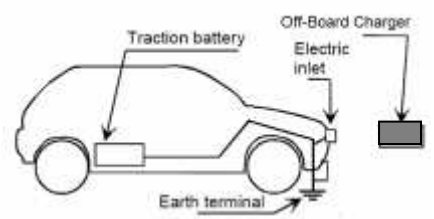
Source: eurelectric

- **The majority of user will charge at home (or at work) – tariffs. 1 Phase AC Connection 3,7KW.**
- **Fast DC Charge 50kW accelerate the EV mobility reducing the "anxiety range"**
- **Public / semi-public charging infrastructure requires for a positive business case high utilization and innovative business models**

Identifying a potential Mix of Private and Public **Charging Infrastructure**



ON-BOARD



OFF-BOARD

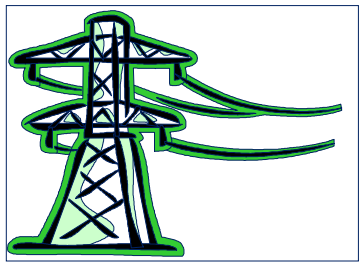
ON-BOARD CHARGER

OFF-BOARD CHARGER

Which is the best option for Normal Charge? And for Fast Charge?:

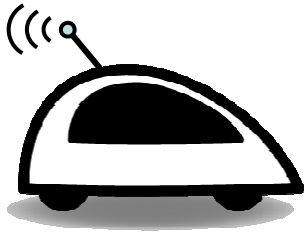
Features

+ Weight
+ Sustainability
+ Cost at EV side or Infrastructure operator side
+ Controllability of the Infrastructure
+ **Grid Impact , Power and Quality → THD**
+ Efficiency



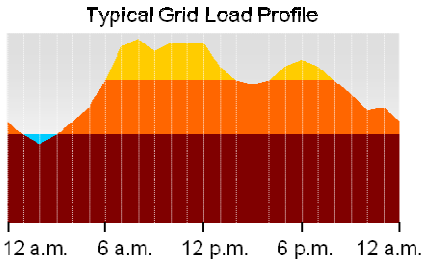
Power Distributor
Grid Operator

Do they have the same needs?



EV User

GRID BALANCING

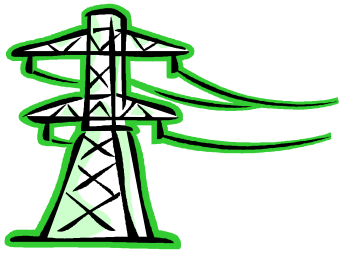


INDIVIDUAL MOBILITY

- Peace of mind
- Always charging when parking
- Possibility to extend range
- Real Time Information

Source: ELVIRE

Identifying a potential Mix of Private and Public **Charging Infrastructure**

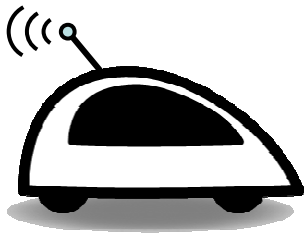


Power Distributor
Grid Operator

Emergence of new business…

NEW BUSINESS

- •Mobility Management
- •Energy supply and demand prioritization
- •Charge Infrastructure
- •Battery Financing & Warranty
- •Road Side Assistance
- •Real-Time Information Services
- •Contribution to Standardization
- •etc.



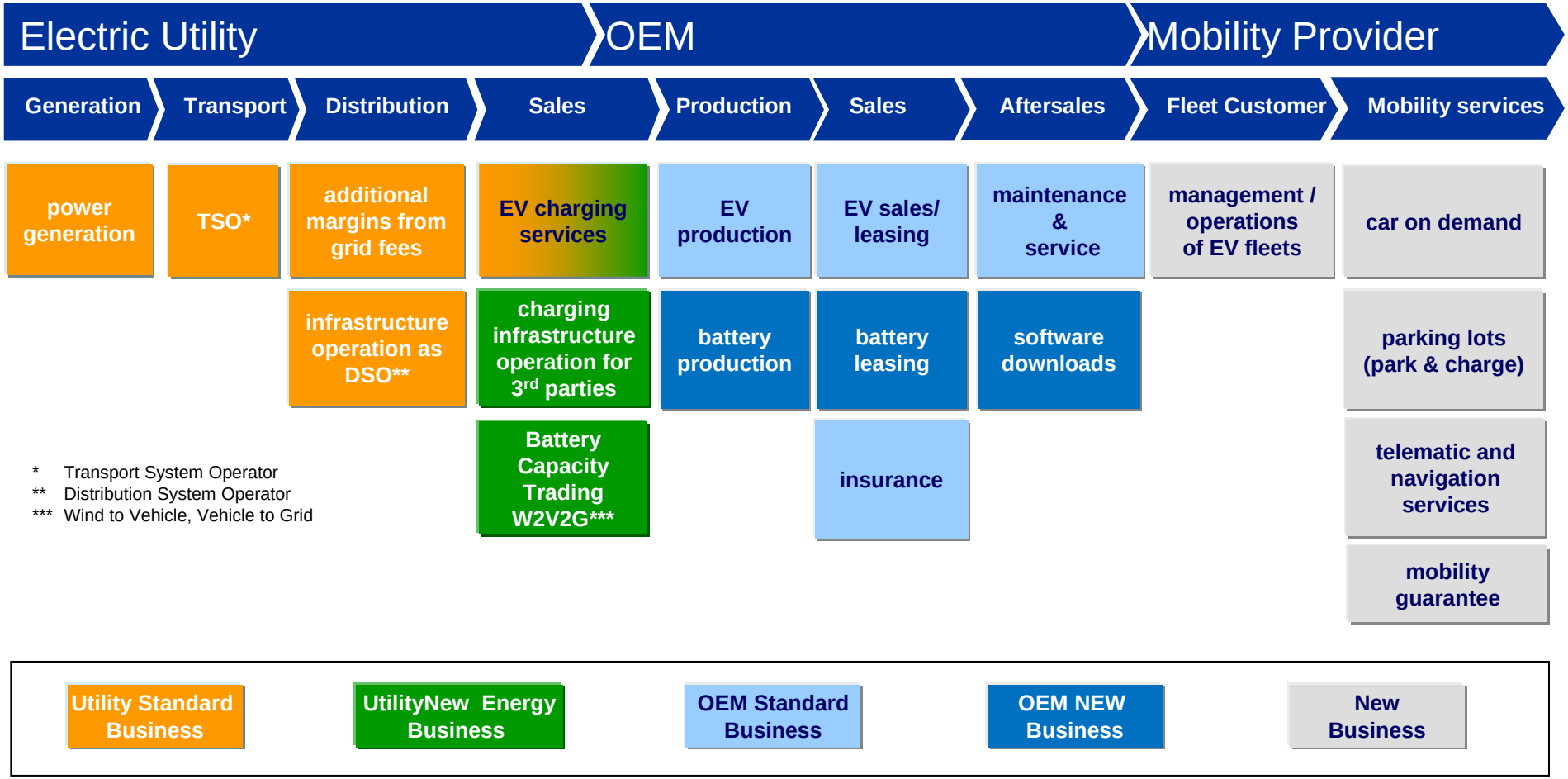
EV User

- Grid Balancing
  - Smart Charging
  - V2G Supply
- Roaming
- Optimization of green energy yield

- Deployment of Charge Infrastructure
- Allocation of Charge Sites
- Transmission of Charge Plans
- Smart Charging
- Road-Side-Assistance
- Billing / CRM

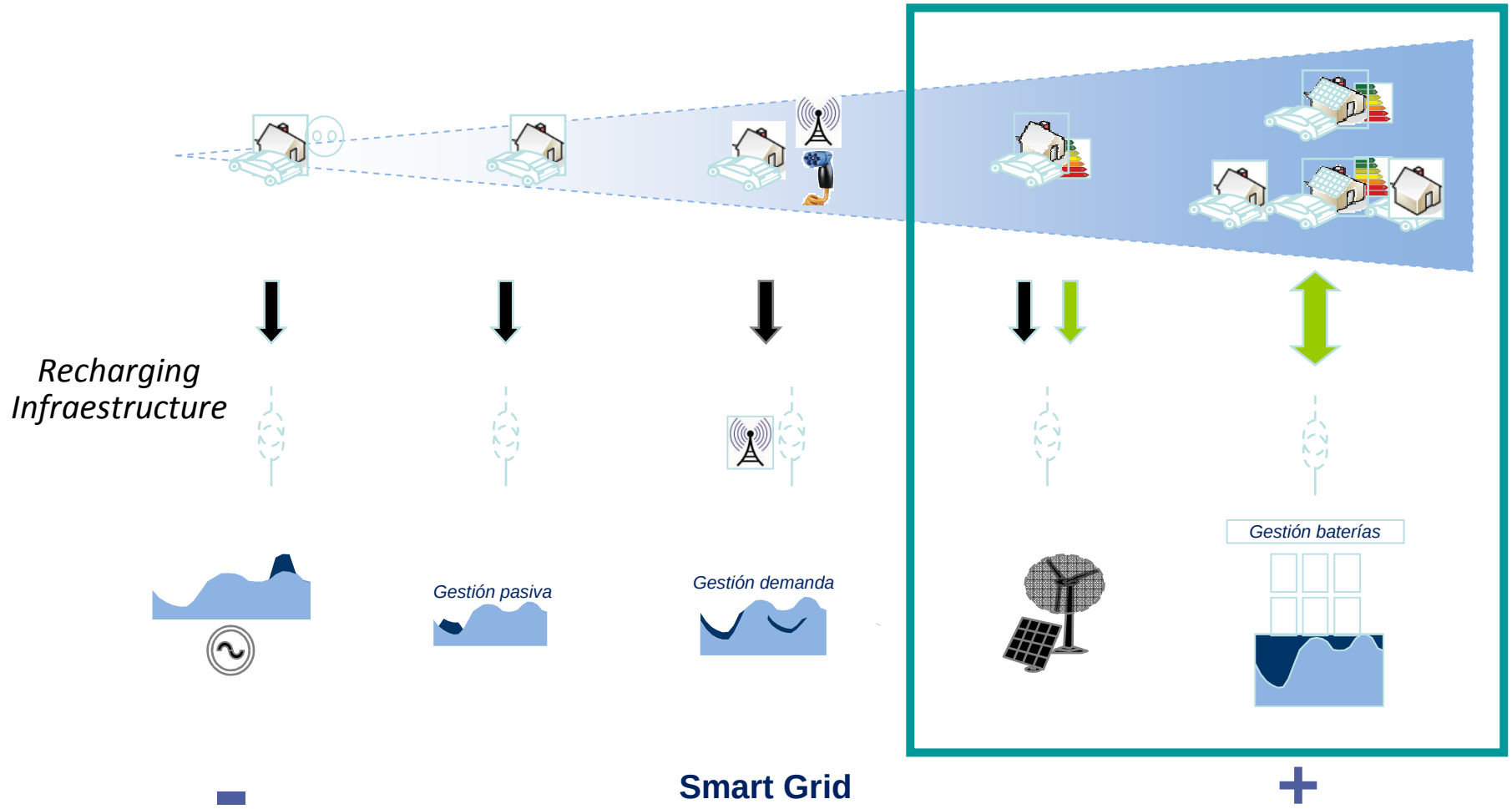
Identifying a potential Mix of Private and Public Charging Infrastructure

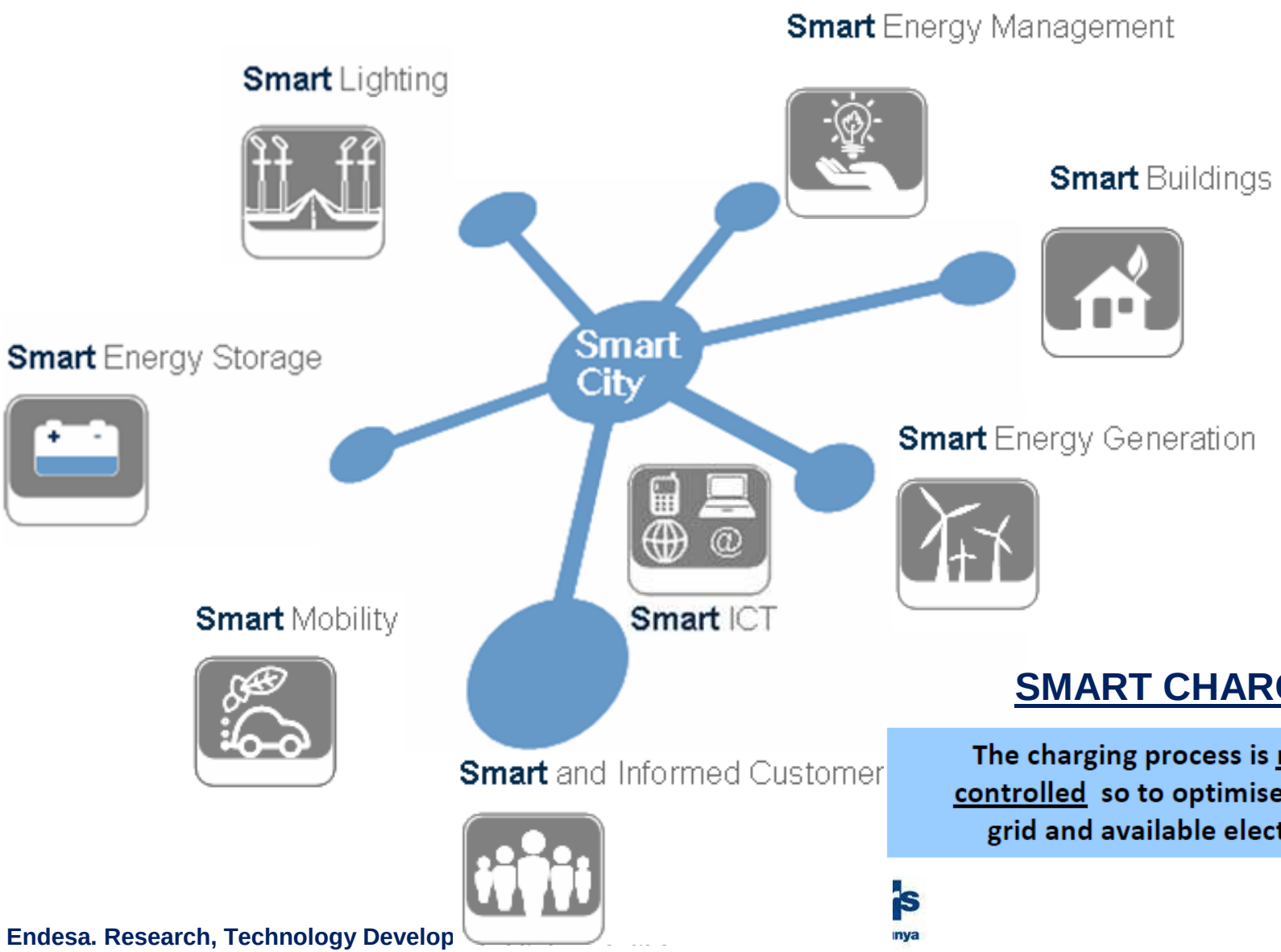
Electric Mobility.
Business Models along the Value Chain.



Source: BMW

Evolution of the EV Recharging Infraestructure and the SmartGrids





SMART CHARGING :

The charging process is managed and controlled so to optimise the use of the grid and available electrical energy

3 Endesa Infrastructure

Key Note:
Endesa has an infrastructure solution for the different market demands.

Identifying a potential Mix of Private and Public Charging Infrastructure

Private Environments

Public Environments

EV Charging Speed

FAST CHARGE

NORMAL CHARGE

FLEET MANAGEMENT:

Fast charging infrastructure is needed in fleets garages, along with normal charge, to allow an optimum charging process for EV use.

RECHARGING STATIONS:

Public charging stations, 15 min. charging in public spaces where people cannot wait for too long

HOME AND OFFICE

Offices and private parking, where charging speed is not critical

LONG STAY PARKING:

Long stay in public spaces such as airports, mall centres, train stations

ENDESA Recharging Infraestructure

Normal Charge

AC Charging station Mode 3
AC 32 A 400V
AC 16 A 230 V

Quick Charge

50kW Charging Station:

mode 4 DC CHAdeMO 125 A 400 V

Mode 3 AC 23 A 400 V (up to 63 A)

Normal Charge

Identifying a potential Mix of Private and Public Charging Infrastructure

Endesa Infrastructure

Enginyers Industrials de Catalunya


endesa
CONÉCTATE AQUÍ
PUNTO DE RECARGA VEHÍCULO ELÉCTRICO
TAXI
endesa


P


endesa


punt de recàrrega vehicle elèctric
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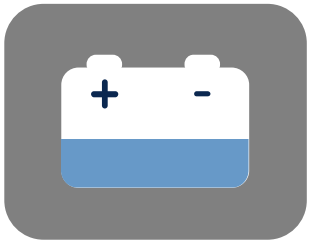
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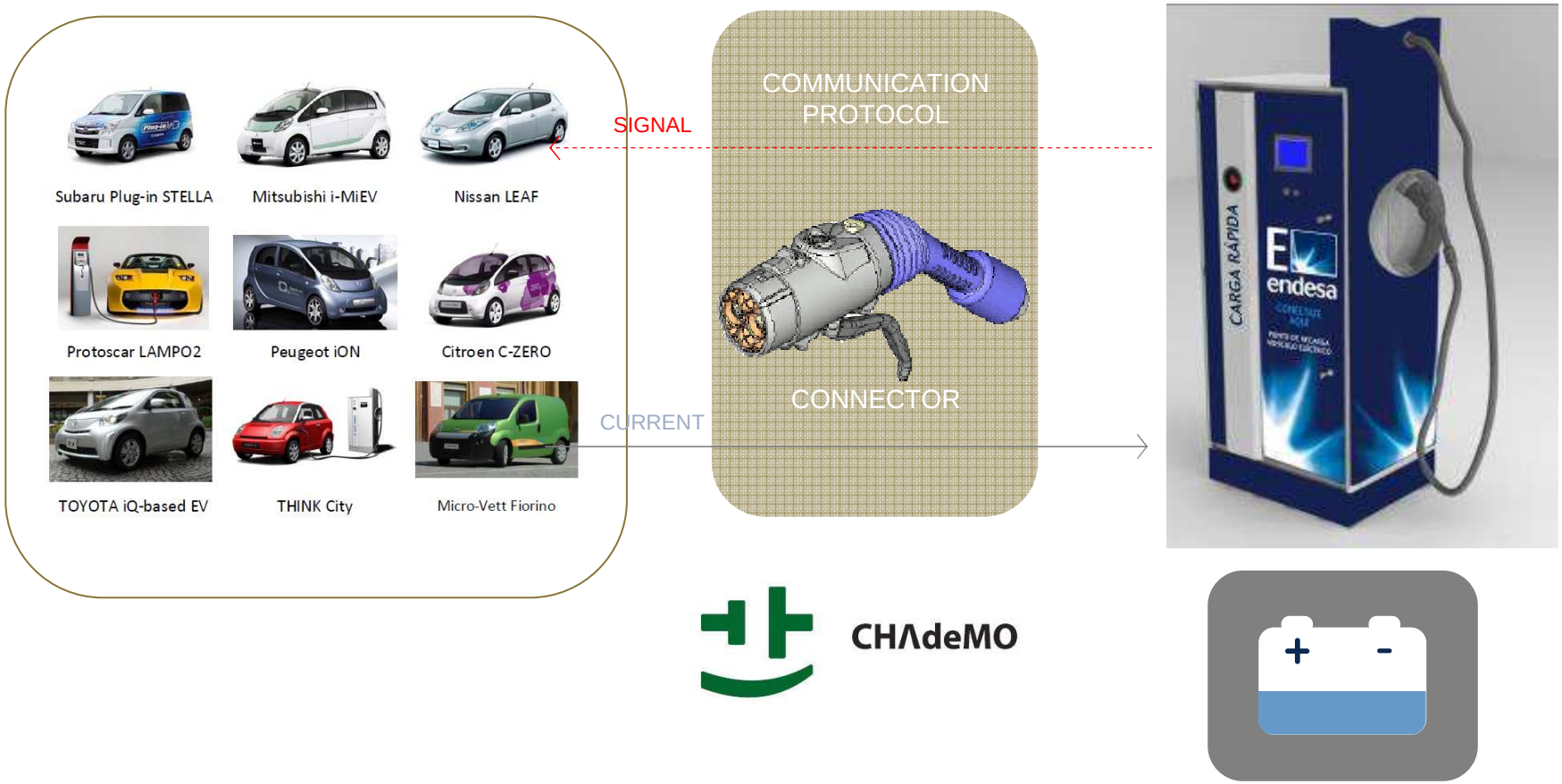
Quick Charge

DC 50kW


Subaru Plug-in STELLA
Mitsubishi i-MiEV
Nissan LEAF
Protoscar LAMPO2
Peugeot iON
Citroen C-ZERO
TOYOTA iQ-based EV
THINK City
Micro-Vett Fiorino
SIGNAL
CURRENT
COMMUNICATION PROTOCOL
CONNECTOR
CHAdeMO
CARGA RÁPIDA
endesa
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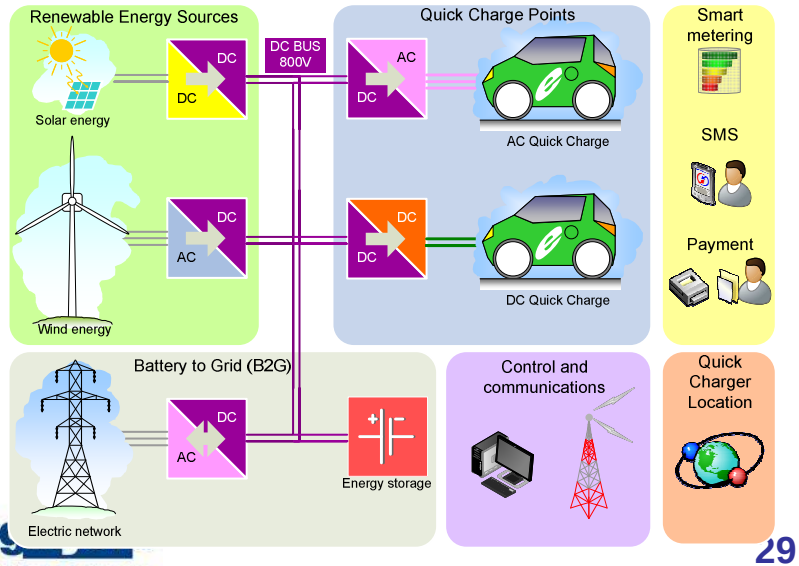
Identifying a potential Mix of Private and Public Charging Infrastructure

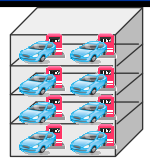
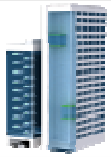
Endesa Infrastructure



4 Endesa Key E-mobility Projects

Key Note: High Penetration of EVs is essential to evaluate new e-mobility services

Testing Concepts							
E-Parking	Final Customer				Recharging Stations		Public Streets
	Condominium	Houses	Fleets	Parking public/private	Business as usual	Convenience store	





Green eMotion

ZEM 2 ALL

Identifying a potential Mix of Private and Public **Charging Infrastructure**

Green eMotion

Green eMotion – overall goals

- Demonstrating an integrated European approach to deploy electromobility in the EU, including vehicles, infrastructure, grid, electric vehicles (EV) IT solutions and user acceptance
- Developing and demonstrating an unique and user-friendly framework for green electromobility including:
  - Demonstration of interoperability by integrating various demonstration regions
  - Provide and proof a marketplace for electric vehicle services
  - Develop a baseline for standardization of network and charging infrastructure, vehicle technology and ICT solutions
  - Enable mass deployment of electromobility

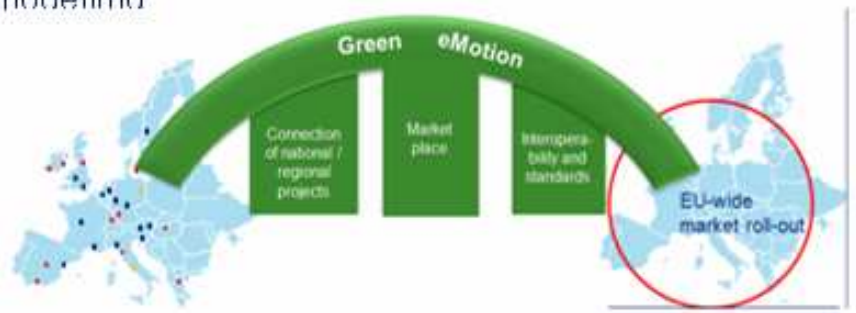
The Green-eMotion Partners

Development of an European Framework for Electromobility

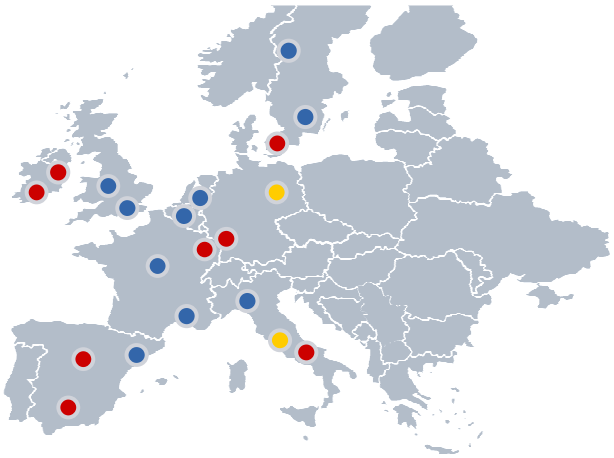
PROJECT LENGTH & Present situation	2011 – 2015	Contract Negotiation Phase **Project kick-off March 2011**	**PARTNERS**	42 partners from the automotive industry, ICT and energy products industry, cities and research institutions.	
FUNDING	FP7 call TRANSPORT - 2010 TREN		**TOTAL BUDGET & EC FUNDING**	41.98M €	24.20M €

The creation of a unique and user-friendly framework for green electro mobility in the EU through based on previous, ongoing and further demonstration projects throughout Europe, targeting mainly:

- → Interoperable technology
- → Consumer friendly services and business modelling
- → Sustainable rollout of electric vehicles
- → Assessment of viability of electromobility



Identifying a potential Mix of Private and Public Charging Infrastructure



National / regional projects

- Proof technology (equipment level)
- Test of operation and billing
- First business models
- Initial local consumer awareness

GREEN EMOTION

- **Connection of national / regional projects**
- **Market place**
- **Interoperability and standards**

EU project Green eMotion

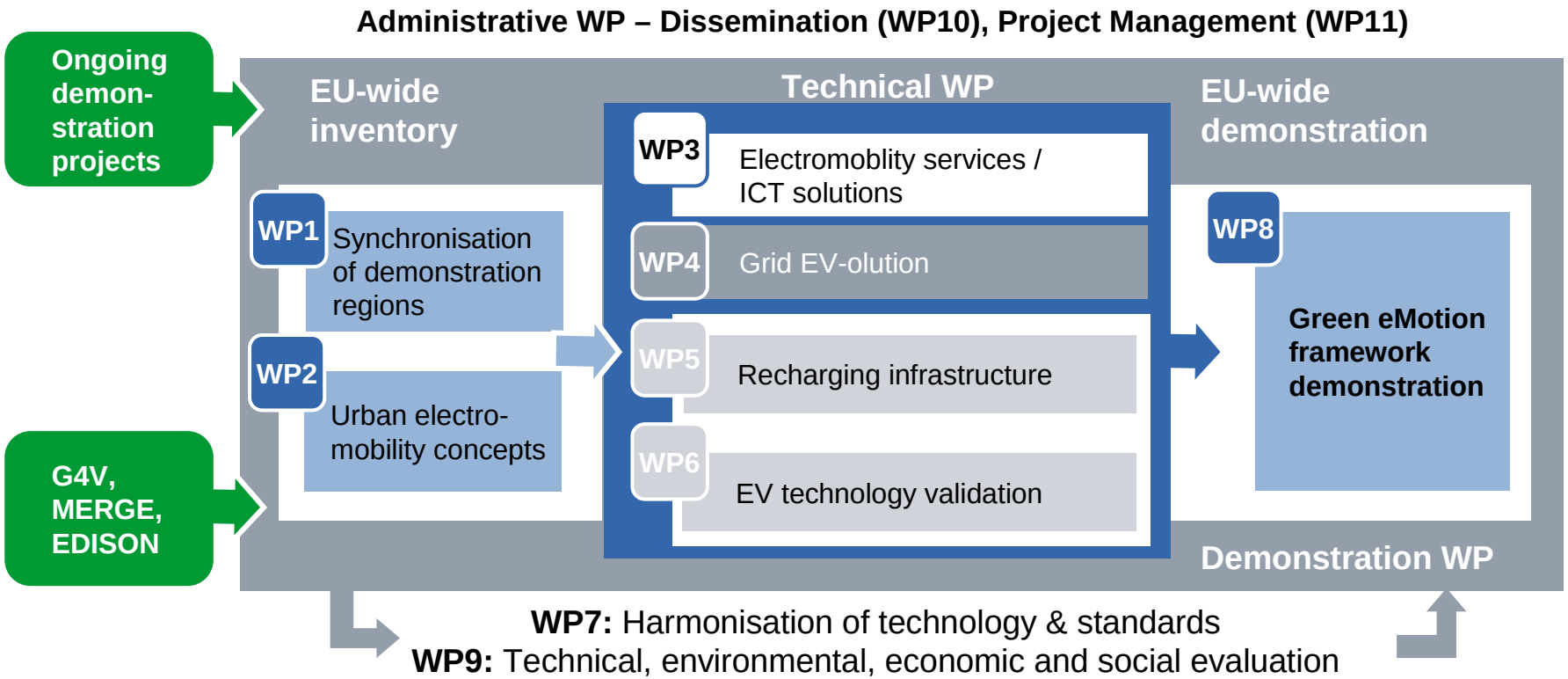
- Proof of interoperability
- Future proofing of protocols and interfaces
- Introduction marketplace and advanced services
- Wider consumer awareness and acceptance

Mass market (start)

- Standardised solutions for vehicles infrastructure, network and IT applications available
- Preconditions and user acceptance established

Legislative support
Promoting policies and regulation
Consumer incentives

Development and demonstration of a unique and user-friendly framework for green electro-mobility



Subject: Integrated European demonstration on electro-mobility – Vehicles, infrastructure, grid, IT applications, user acceptance

4 Endesa Key R&D E-mobility Projects

- Objective:
  - Research on fast charge system features a smart grid interface capability to prevent peak loading on the electrical utility.
  - Design Integrated energy storage into fast charge stations that could:
    - allow renewable energy sources to store off peak power generation in battery banks for later use.
    - allow the EV charging station to use a smaller electrical service and help prevent peak loading on the utility grid.
    - allow additional utilization as a stored energy resource to the utility grid for possible use during peak demand periods.

- Objective:
  - Research, design and implement a testing microgrid platform to evaluate the impact of different EVs configuration and applications on the network.
  - Research, design and implement on a new flexible load management system.
  - Research design and implementation of a prototype V2G DC 10kW-50kW charger and the associated potential services

Thank you very much for your attention!

Barcelona 2011

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endesa
light · gas · people