



# Fast Charging

## - a strategic view from E.ON

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Innovation and Projects, E.ON AG  
CHAdeMO Europe Assembly Amsterdam, 23.09.2011



## An overview. Of us.

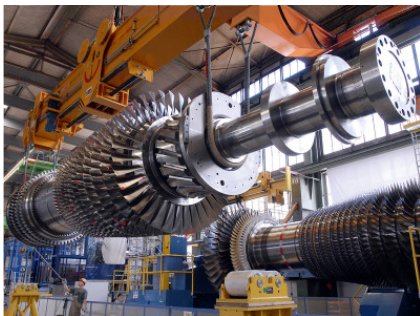


- E.ON is one of the world's largest investor-owned power and gas companies.
- At facilities across Europe, Russia, and North America, our more than 85,000 employees generated just under €93 billion in sales in 2010.
- Our objective is to make energy cleaner & better wherever we operate.
- We are implementing a new strategy to transform our company into a global provider of specialized energy solutions.

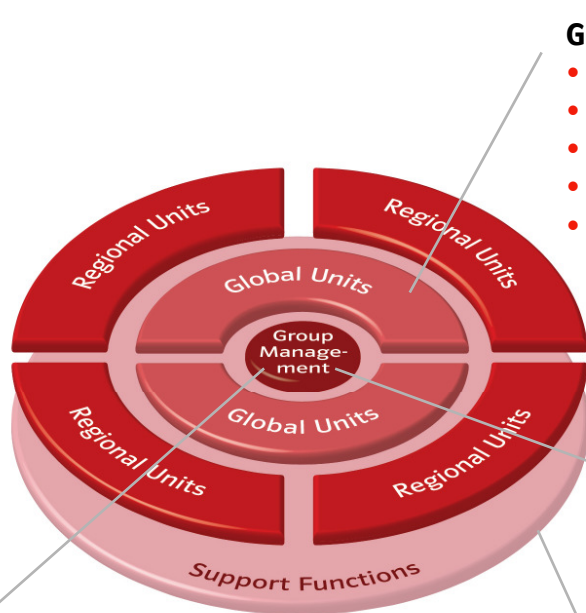
## Our focus

We focus on what we do best and where we can add the most value. And that's making and marketing energy in competitive, converging international markets. Our core businesses are:

- renewables generation
- conventional generation
- energy trading
- global gas
- innovative energy solutions for customers



# Our Group Structure



### Global Units

- Conventional Generation
- Renewables Generation
- New Build & Technology
- Global Gas
- Trading

### Support Functions

- IT
- Procurement
- Insurance
- Consulting
- Business Processes

### E-Mobility@E.ON

- Direct-report to Prof. Maubach, member of the E.ON AG board of management, responsible for technology
- Regional/ local E-Mobility business to be established within the existing retail network of the Regional Units



# Our e-mobility products focus on customer value-adds

**customer orientated**



**reliable**



**integrated**



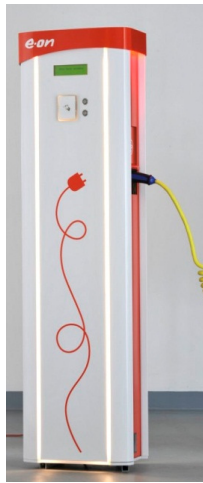
**cost efficient**



**environmentally friendly**

# E.ON: one-stop shop service provider for EV charging

## E-mobility package with 4 optional components



Configured charging infrastructure hardware as basis of the offer



Delivery, installation, service and maintenance









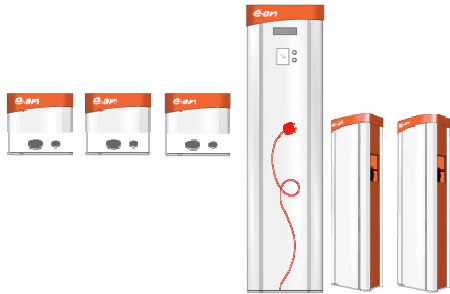





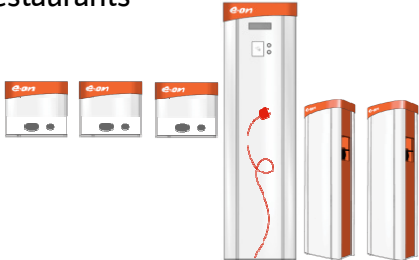


Energy supply & management



e-fleet consulting with partner companies

- Full service from the analysis of necessities and local conditions, plus consulting services, technical installation and commissioning & maintenance.
- Optional marketing support: events, co-branding


# Our concept: Customized solutions for different mobility and parking concepts

Private	Fleet	Public and semi-public parking	
 <p>Private households</p>  <p>Real Estate</p> 	 <p>Company parking</p>  <p>Fleet services</p>  <p>Municipal fleets</p> 	<h3>Park&amp;charge concepts</h3>  <p>Car parks</p>  <p>Hotels</p>  <p>Airports / Train stations</p>  <p>Retail / Restaurants</p>  <p>Municipalities</p> 	<h3>DC fast charge</h3>  <p>Rest stations / Highways</p> 


# E-Mobility requires reliable access to power

**Fast Charging : mobility complement to long-time parking / slow charging**


**Long Parking time (6-7h)**



**At home**




**At work**




**In parking garages of airports, train stations, recreation centers...**


- Principal charging infrastructure
- Low-cost charging @home and @work
- Value-add service in public spots (e.g. recreation centers)
- ! Low earning potentials limit economic business perspectives



**Short stops (<30 min)**



**Short stop locations** © McDonalds



**Gas stations & Highways**

- Increase range of EVs for longer journeys
- Reduce customer's „range anxiety“
- Provide solution for curbside-parkers

**→ DC Fast charging solution complements charging needs of EV users**



# DC Fast Charging Concept

**DC Fast Charging takes ca. 30 min. – available customer time to be filled!**

Customers will come to DC Fast Charging Stations ...

**30 min at most for full car charging**

... looking for additional services while they are waiting

- When parking for a short period of time (less than 1h)
- Unexpected recharging need
- To extend range in longer journeys



Fastfood Restaurants



Daily procurements



New charge &... activities in future?

- "Strategic locations of DC stations will prove to be a customer value-add" (Frost & Sullivan)

**Forced parking time during car charging incentivizes customers to look for services in the meantime**



## Our Background in Fast Charging "Flottenversuch Elektromobilität"

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Innovation and Projects, E.ON AG

CHAdeMO Europe Assembly Amsterdam, 23.09.2011

## „Flottenversuch Elektromobilität“, Berlin, 26. Juni 2008



- Dr. Maubach  
CEO E.ON Energie AG
- Prof. Winterkorn  
CEO Volkswagen AG
- Mr. Gabriel  
Bundesminister für Umwelt,  
Naturschutz und Reaktorsicherheit



### 20 Cars „VW Twindrive“

- Project duration: 2008 - 2012
- Place: Wolfsburg, region Berlin
- Plug-In Hybrid, Range Extender
- Range electric approx. 50 km
- Test of 4 Li-Ion battery types
- Interface Car/Grid

Combination of  
Smart Meter Technology and  
On-Board Battery Management

## DC off board charger (as one part of the infrastructure)

- Use of "standard" components
- Charging power 30 kW
- Special requirements:
  - Housing
  - Air conditioning
  - Protocols
  - Communications
  - Connector
  - Cable
  - And so on.





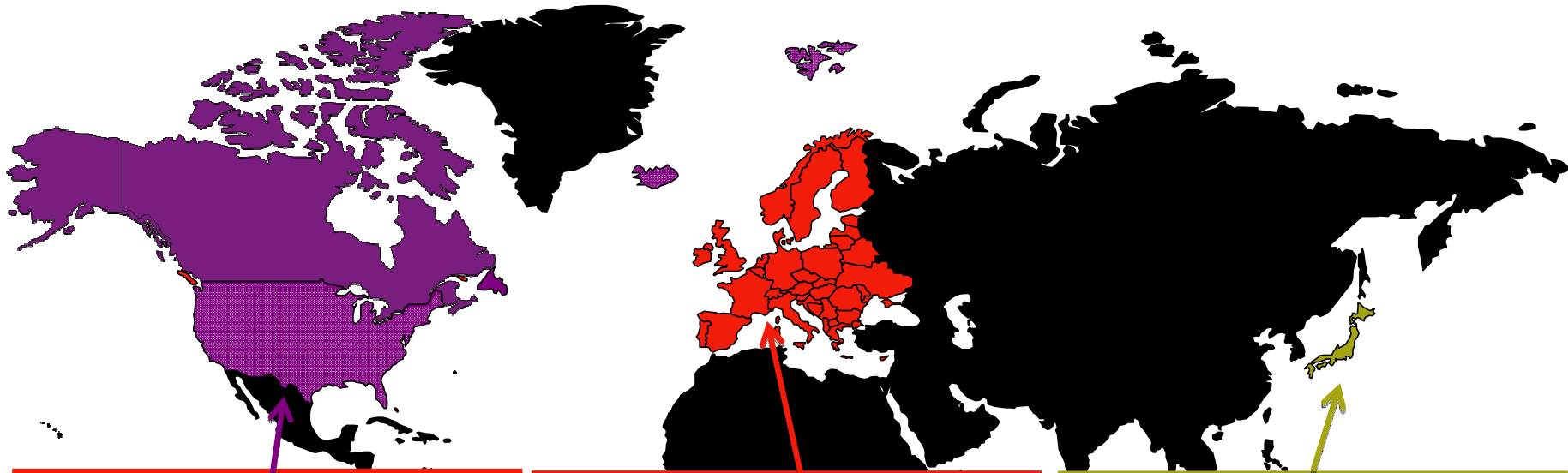
## Background in Market Overview Fast Charging Study (End of 2010)

Matthias Mahrt, E-Mobility @ E.ON

Innovation and Projects, E.ON AG

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# Global Market Overview



## North America:

- ▶ Several key manufacturers
- ▶ Handful of installations to date
- ▶ 2 major projects underway - potential for hundreds of DC fast chargers to be installed by end 2011



## Europe:

- ▶ Handful of manufacturers
- ▶ Very few DC fast chargers installed
- ▶ Projects more reliant on government funding



## Japan:

- ▶ More than 10 manufacturers
- ▶ Driving standardisation
- ▶ Hundreds of DC fast chargers installed, hundreds more in 2011



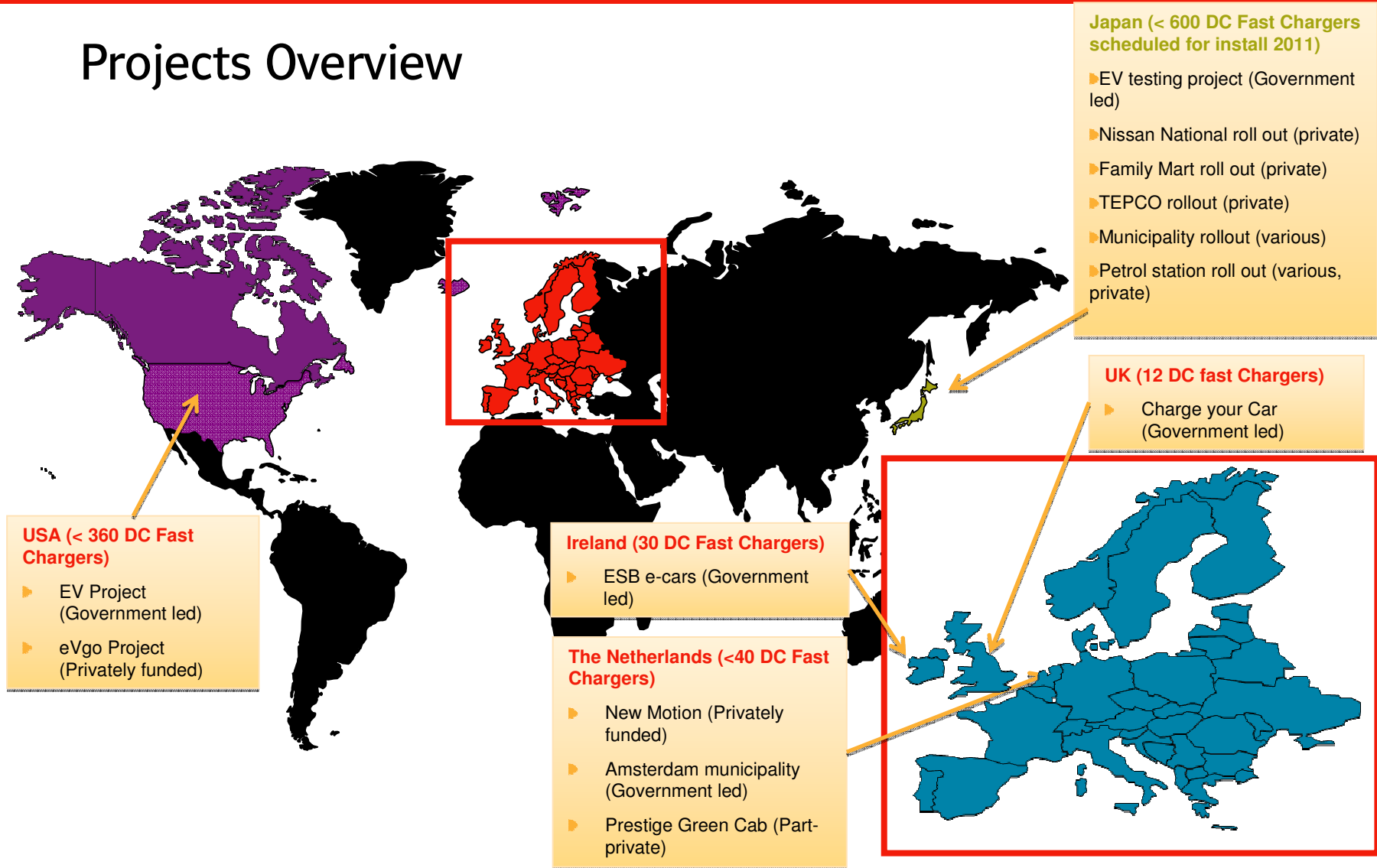
## Outcomes

- **Fast chargers procured in the next year should be CHAdeMO compliant**  
All manufacturers with product available for the European market are expected to meet this requirement.
- **Chargers need to be capable of upgrading**  
This is necessary to support potential future standards developments – particularly in Europe where an alternative DC fast solution is likely
- OEMs are supporting different fast charging solutions:

CHAdeMO	US "Solution"	European "Solution"
▶ Nissan LEAF	▶ (GM - Opel)	▶ (Daimler)
▶ Mitsubishi i MiEV		▶ (Porsche)
▶ Peugeot iON		▶ (BMW)
▶ Subaru Plug-in Stella		▶ (Renault (also pushing for 22 kW AC charging))
▶ Protoscar LAMPO2		
▶ (Toyota)		



# Projects Overview





## Analysis of Maintenance approaches

	Maintenance arrangement	Example projects
<b>TYPE A</b>	Project Manager assumes responsibility for maintenance of the posts installed in the project	
<b>TYPE B</b>	Project Manager funds the maintenance but outsources all or part of the service to the charging post manufacturer.	
<b>TYPE C</b>	Project Manager arranges a maintenance contract but charges the host for this service	
<b>TYPE D</b>	Project Manager has no involvement in maintenance; this is the responsibility of the host.	

**Best practice is: TYPE B**

TYPE B maintenance can have two forms:

- ▶ Outsource maintenance to DC fast charger manufacturer
- ▶ Provide level 1 support in house, or via local partner. Outsource specialised level 2 support only.

# Analysis: Challenges of site selection - Hosts

## Strategies for attracting 'hosts'

Projects have tried to attract hosts by offering:

- ▶ Free installation
- ▶ Free maintenance for the duration of the project
- ▶ The option of ownership at the end of the project

However even with these options the barriers can be too great to overcome and the project may have a limited choice of sites

## Barriers to finding suitable 'hosts'

It can be difficult to find suitable sites because:

- ▶ **Not many locations have suitable infrastructure already in place.**
- ▶ **It is hard for hosts to see the commercial value of having a DC fast charger on their sites**

### CASE STUDY: The EV Project, USA



#### Offer to hosts:

- Free installation and Free DC fast charger
- Free maintenance for duration of project
- Ownership of post after project (or option to have it removed)

#### Status:

Installation of 310 DC fast chargers has been delayed to April 2011 but will be complete by September 2011

#### Success factors:

- Free equipment, add-on business and the potential green credentials has attracted some high profile retailers.
- The option of free removal has also helped ('nothing to lose' attitude)

#### Impact on project:

Short delay to project

### CASE STUDY: Charge your Car, One North East, UK



#### Offer to hosts:

- 100% funding
- 5 year extended warranty
- Ownership of post after project

#### Status:

5 out of 12 sites have been confirmed

#### Main barriers:

- Site suitability
- Commercial benefits unclear – only those who want to appear 'green' are coming forward, too much perceived risk

#### Impact on project:

Installation was to be complete by March 2011, with 7 more sites to confirm the lack of suitable 'hosts' will delay the project.

## Summary, about the Study

- DC Charging fits into our concept of electro mobility products and services
- There is a chance for selling the service of "Fast Charge" instead of selling kWh
- The field of service and maintenance needs companies for level 1 support.
- There's a need for attractive cooperation models with the land owners
- We need a deeper analyze of the products which are currently at the market

*e-on*