ELECTROMOBILITY SOLUTION FOR CITIES AND REGIONS

Alexandra David & Dr. Rolf Reiner / ELMOs project
**ELMO\textsuperscript{S} overall goal:**

to promote more sustainable transport through the development of electromobility solutions for cities and regions.

A Regions of Knowledge project under FP7
I. Paradigm Shift: From Ownership to Usage
Development of concepts for future business models able to create new mobility patterns in urban environments.

II. Cross-border Field Tests
Design of cross-border field tests to demonstrate state-of-the-art in technology and infrastructure, to identify further research needs and to analyse acceptance by users.

III. Joint Action Plan
Elaboration and adoption of a cross-border action plan to strengthen the research and knowledge base and contributing to competitiveness of European «mobility industries».
ELMOs Concept – Social Economic Benefits

Problem Areas
- CO2 Emissions
- Energy Scarcity
- Congestion
- Noise Emissions

Technologies, Concepts & Solutions
- Optimised Research infrastructure
- Business Models
- ICT
- Energy
- Automotive

Cities & Regions
- Holistic Mobility-concepts
- Incentives
- Infrastructures
- Cross-border Field Tests
- Early Adapters
- Citizens' Readiness

Market Uptake
- Electromobility Academy

Joint Actions

Socio-economic Benefits
- Quality of Life
- Competitiveness
- Sustainable Growth

Quality of Life

Sustainable Growth

Competitiveness

Market Uptake

Electromobility Academy

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Partner & Competences

- tcbe – ICT Cluster Switzerland
- autocluster.ch
- University of Applied Sciences Berne
- Energy
- Automotive
- ICT

- Automotive Cluster Slovenia
- Institute for Work & Technology (Coordinator)
- City System GmbH

- Panon Novum Innovation Agency
- Hungarian Vehicle Engineering Cluster
- VLOTTE - Vorarlberger Electroautomobile GmbH
- CARS Economic Development Agency Region Stuttgart
- Pôle Véhicule du Future, Elsass Franche-Comté

- Cluster
- Science
- Model Region
- Field Tests

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E-Mobility Related Challenges and Deducted Priorities

Priorities

Thematic Priorities

- Sustainable Mobility
- Business Models
- Efficiency of Intermodality
- «Green» Energy

Strategic Priorities

- Cross/Open Innovation
- Smart Specialisation
- Cluster Development

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Joint Actions

- Help local authorities to prepare local electromobility strategies and action plans
- Test seamless and interoperable e-charging and billing systems
- Implement an “e-commuters without borders” scenario
- Prepare joint research projects on wireless charging systems for electric vehicles
- Implement a “photovoltaic-sharing” model for electric vehicles
- Create awareness-rising campaigns towards public / private large fleet owners and the general public
- Establish one-stop-shops for electromobility
- Create a practical Total Cost of Ownership calculation tool for the general public
- Develop cross-border models for mobility by defining and expanding new interchanges such as tourism
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http://www.future-mobility.eu
PLATFORM SOLUTIONS: MOBILITY SERVICES

Dr. Rolf Reiner / Stuttgart Region Economic Development Corporation
•Requirements for an integrated mobility services platform
  – One face to the customer
  – Unified billing solutions
  – Intermodal approach
  – Multi modal routing services
  – Added value services
Example: Stuttgart Services

- **Facts & Figures:**
  - >100 partners in 40 projects with a total volume of more than € 110 million
  - 2015: > 2,000 EVs and 1,000 charging points
  - development of sustainable mobility systems and viable business models

- The platform project in the LivingLab BW² mobil
Stuttgart Service Card

• One card / app for
  – E-ticketing for public transport
  – Carsharing
  – Parking
  – Charging
  – Bike and pedelec rental
  – Metropolitan services
  – ....
Business model

- B2C service will start with 70 system-use-cases
  - Information
  - Reservation
  - Booking
  - Routing
  - Electronic ticketing
  - ...

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Technical approach

• System architecture based on business and system-use-cases
  – Hybrid architecture
  – B2B platform
  – Mobility platform (B2C)
  – Routingserver (B2C)
Field test early 2014 / Roll-out in 2015
Opportunities

- Cross border extension through Horizon 2020
- Integration of further services
- Reach-out: > 600,000 potential customers
- Your feedback is welcome!
A Few Facts About Cross-Border Commuting in Europe

- **About 800,000 cross-border commuters** (2007)
- A growing trend in many places
- Main countries of frontier workers’ origin: France, Germany and Belgium
- **Massive individual motorised traffic** despite all the efforts made by local authorities to develop local public transport solutions
- Related issues: congestion at rush hours, noise, air pollution, road safety
Is Electromobility Suitable for Cross-Border Trips?

- **Daily occurrence**
- Work-related journeys (but not only)
- **Rather long distance travelled**
- **Ride-sharing** (car-pooling) already a habit for many groups of workers
- Awareness of transport-related issues of employers
- **Specificities** to be addressed with cross-border commuting: billing systems, standards, etc.
• The Rhein Mobil Project As a Case Study

– French-German initiative fostered in 2012 by 4 automotive clusters and co-funded by the DEUFRAKO programme

– Electric mobility research pilots with an economic perspective

– Target group: cross-border workers (about 30,000 French frontier workers living in Alsace region are in employment in Germany)

– Challenge: are electric vehicles (EV) more economical than conventional vehicles?
- Rhein Mobil Project Partners
Rhein Mobil Project Overview

- Maximising the annual mileage of the EVs in the urban space in France and in Germany
- Optimised fleet management according to driving profiles, including smart charging
- Research on customer behaviour
- Including technical functions as well as and social aspects
- German pilots: electric 7-passenger vans electric cars (first results available)
- French pilots: electric cars (on-going: results yet)
• German Pilot Facts (1/2)

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>E-Wolf Delta 2 @ Michelin</th>
<th>Nissan Leaf @ Siemens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>154 km</td>
<td>175 km</td>
</tr>
<tr>
<td>Top speed</td>
<td>110 km/h</td>
<td>145 km/h</td>
</tr>
<tr>
<td>Speed-up 0-100 km/h</td>
<td>12,5 s</td>
<td>11,9 s</td>
</tr>
<tr>
<td>Average distance</td>
<td>Michelin Karlsruhe → Elsass 60-80 km per tour</td>
<td>Karlsruhe → Haguenau 70 km per tour</td>
</tr>
<tr>
<td>Commuters per car</td>
<td>7</td>
<td>Max. 4</td>
</tr>
</tbody>
</table>
**German Pilot Facts (2/2)**

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<tr>
<td><strong>Mileage</strong></td>
<td>35,400 km</td>
</tr>
<tr>
<td><strong>Cars on the road</strong></td>
<td>4 (up to 9 in the project)</td>
</tr>
<tr>
<td><strong>Number of charging processes (conventional)</strong></td>
<td>442</td>
</tr>
<tr>
<td><strong>Number of charging processes (fast)</strong></td>
<td>80</td>
</tr>
<tr>
<td><strong>Average consumption</strong></td>
<td>0,2 kWh/km</td>
</tr>
<tr>
<td><strong>Rekuperated energy</strong></td>
<td>Ca. 15 %</td>
</tr>
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Rhein Mobil First Results (German Pilots)

- On 35,400 km up to now 3.3t CO₂ saved
- High purchase costs above all are the reason for buying resistance
- State support is still necessary on account of high purchase costs
- Only with “sinking” vehicle prices (mass production) will EVs become more favorable than conventional vehicles
- Cross-border commuting within the range is well-suited to EVs
- The restricted range is not limiting if EVs match the right mobility requirements
- High vehicle occupancy requires fast charging, which leads to specific infrastructure investments
- Simple accounting systems required for “tanking” the EVs with electricity
Electric vs. Diesel Vehicle Total Costs

- **E-Fahrzeug**
- **Diesel**

<table>
<thead>
<tr>
<th>Project [month]</th>
<th>Total costs [€]</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>30000</td>
</tr>
<tr>
<td>12</td>
<td>31000</td>
</tr>
<tr>
<td>24</td>
<td>32000</td>
</tr>
<tr>
<td>36</td>
<td>33000</td>
</tr>
</tbody>
</table>

Cross-Border Electromobility
• Rhein Mobil Project Outlook
  – Until the end of 2013 a total of six vehicles are to be on the road
  – Installation of fast charging stations end of 2013 / beginning of 2014
  – Intensified training for drivers to increase recuperation
  – Intelligent fleet management, i.e. several carpools use one vehicle to achieve a high annual mileage and further reduce costs
• One Step Further
  – Relevance to roll out ambitious electric mobility schemes based on successful pilots like Rhein Mobil, CROME, etc.
  – Potential European regions concerned by massive cross-border commuting, such as neighbour areas of Switzerland, Luxembourg, Germany, The Netherlands and Austria, plus other spots in the proximity of Finland, the Republic of Ireland, Portugal, Liechtenstein, Andorra, etc.

• Opportunities
  – Joint Actions in the framework of the ELMOs project
  – Horizon 2020 programme to be launched very soon
  – Your feedback and know-how welcome!
eROAMING/BILLING AND CROSS-BORDER PROJECTS

Dr. Reha Tözün/ Stuttgart Region Economic Development Corporation
• General problem: Charging stations are often operated by proprietary networks, which very often require drivers to have a membership beforehand.

• In practice: One driver, one vehicle, many membership cards.

• Roaming to allow drivers to get access to the networks of other providers is required.

• Ultimately, electric car drivers should have the same freedom that the “normal” drivers get to have at the filling pumps.
• Infrastructure providers: EnBW (one of the four biggest utility providers in Germany, has the largest charging points network in the region and Baden-Wurttemberg, mainly in the city of Stuttgart) and numerous small and local providers, with up to three charging stations each.

• Two potential roaming providers:
  – Bosch SI, technology supplier to Hubject (EnBW a co-founder) and
  – ladenetz.de (a joint initiative of the smaller utility providers in Germany)

• Especially the “occasional” commuters have difficulty in accessing the infrastructure and face additional charges.
Steps to a solution

- Three dedicated workshops and a broad discussion with all relevant stakeholders (e.g. utility providers, OEMs and suppliers, technology providers, local politics and planners, parking providers).

- A first solution in the form of a cooperation between two towns/districts Schwaebisch Gmuend and Goeppingen, which have their own local and publicly owned utility providers.

- Two separate and mutually independent projects, where diverse stakeholders in the process are involved, are used as vehicles to implement the first pilot solution (EMiS and iZEUS).

- Apart from minor issues, roaming between the two locations and the EnBW charging network (meaning the city of Stuttgart) is now live.
Next steps:

• In terms of the Stuttgart Region and Baden-Wurttemberg: to expand on the existing solution with further cities and to create roaming corridors.

• In terms of ELMOs project, two project ideas are being developed:
  – Seamless and interoperable e-charging and billing (tentative title)
  – e-Commuters without borders (tentative title)
• Key topic: Set up a transnational, interoperable booking and billing system for electric vehicle charging

• Objective: Initiate and implement a platform to accelerate the large scale pilot deployment of a Europe-wide interoperable booking and billing system for electric vehicle charging infrastructure, thus increasing the penetration of e-vehicles and reducing pollution.

• Lead Partner: CARS/Stuttgart Region
  – ELMOs Participants: Pôle Véhicule du Futur, Vorarlberg, Switzerland...)
  – Other Participants: European regions and cities with an existing e-activities.

• Fast-charging is a point of interest.
- eRoaming consortia/networks/infrastructure already in place in Germany, France, Switzerland, Belgium and Holland. There is need to assist the cross-links between them and help the expansion of DC-charging

- The project can and should build on these networks and the outputs of currently on-going projects, like Green eMotion, CROME (CROSS-border Mobility for Evs), iZeus and Rheinmobil, to name a few.

- Task: Creating a pan-European network that stimulates an efficient cooperation platform for private enterprises, local authorities and national as well European institutions.
JAP / 2.2: e-Commuters without borders

- Key topic: Set up a cross-border, consumer-oriented electromobility service
- Objective: Identify the existing cross-border commuter streams and stimulate the development of cross-border sustainable mobility services based on intermodality and carsharing in a 3-year project.

- Lead Partner: CARS/Stuttgart Region
- ELMOs Participants: Pôle Véhicule du Futur, Vorarlberg, Switzerland and potentially Friedrichshafen (based on BodenseEmobil)
- Other Participants: Border regions and cities in Europe with a high-level of regular cross-border traffic. Here key local partners are the regional development agencies, regional tourism marketing offices and local transport services providers, among others.
For more information on ELMOs project, please visit:  
www.future-mobility.eu