



Feasibility analysis and development of on-road charging solutions for future electric vehicles

Wireless dynamic charging – benefits and challenges

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Global initiatives towards electromobility

- **NORTH AMERICA**

- The US Transportation Electrification Program represents the world's largest EV demonstration project. \$400 million funding. Target: 1 million plug-in EVs by 2015.

- **ASIA**

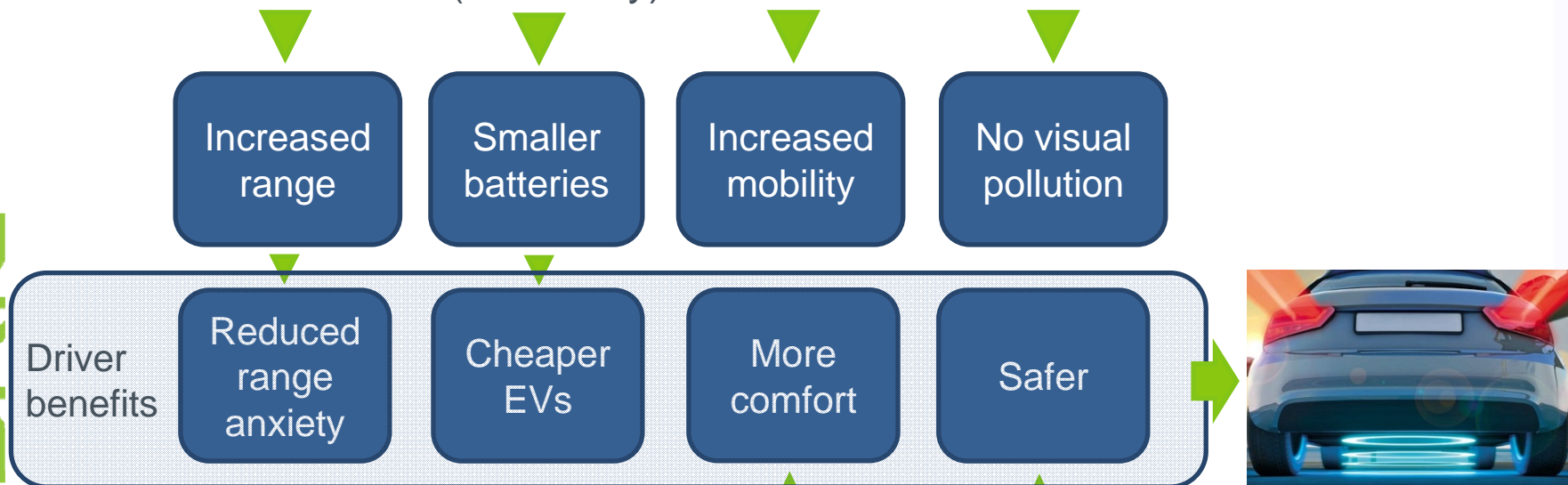
- China, Japan, Korea: government incentives, regulations promoting awareness and adoption of EVs.
- Toyota, Nissan, Honda, Mitsubishi joint development of charging infrastructure. Target: 8000 new normal chargers, 4000 new fast chargers.

- **EUROPE**

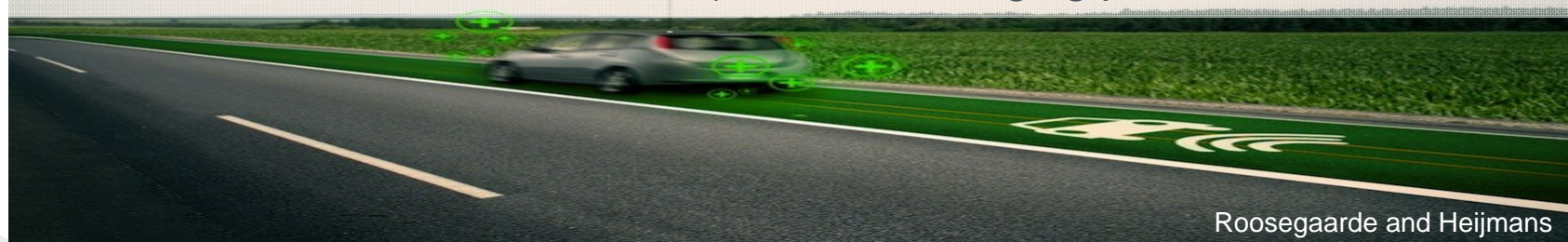
- 2013 European Parliament [resolution](#) requiring member states to install a specified number of EV charging stations and hydrogen and natural gas stations by 2020. Targets: Germany 86000, Italy 72000, UK minimum of 70000.
- Many EU funded R&D projects: EcoFEV, UNPLUGGED, FABRIC...
- Several national projects: Fastned (NL), ELMO (EE), CLEVER (DK)...

Why wireless charging

- Allows EV charging while travelling (dynamic) or during short stops ideal for urban environment (stationary)



- Drivers do not have to deal with dirty and potentially dangerous cables (rain, cable vandalism, cable wear, etc) + Easier charging process



Roosegaarde and Heijmans

Roadblocks for large scale electromobility adoption

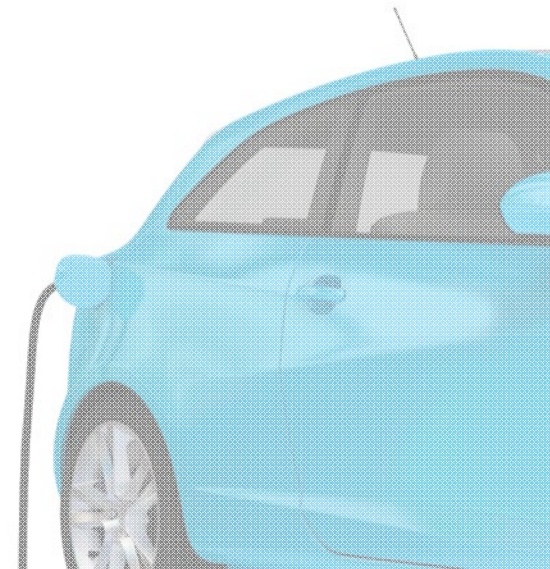
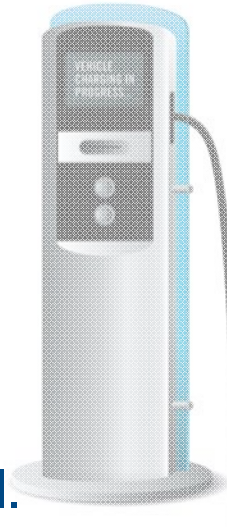
EVs as percentage of the whole fleet:

- France 0.83%
- US 0.62% (96000 sold in 2013)
- Japan 0.59%
- Germany 0.25% (7400 sold in 2013)

Current penetration of EVs very small.

Reasons:

- Weight and size of batteries.
- Cost of battery manufacturing.
- EV price premium over conventional vehicles.
- Small or non-existent charging infrastructure network.
- Long duration of charging.
- Plugging the EV in is not a user friendly experience.



Solutions:

- ITS
- Novel charging technologies




ITS solutions facilitating electromobility

- Accurate range estimation allows for “range anxiety” reduction and efficient trip planning.
- Cooperative ITS allow for robust traveling via re-routing, e-call, infrastructure pre-booking (charging stations, parking spots...).
- ITS functions such as automatic identification, authorization and accounting improve user convenience.
- Accurate and dependable charging infrastructure POI and maps combined with pre-booking and dynamic trip planning potentially allow the use of smaller batteries.
- ITS facilitate the implementation of new charging technologies (e.g. dynamic charging).

Charging technology trends – why go wireless?

Present

Future

Plug-in static		Conductive dynamic		Inductive dynamic	
Cons	Pros	Cons	Pros	Cons	Pros
User discomfort	Mature technology	Visual pollution	Easy installation	Expensive infrastructure	Smaller batteries
Long charging duration		Expensive pantograph systems	Smaller batteries		Cheaper EVs
Large and expensive batteries			Extended range		Extended range
Expensive EVs			Comfort		Comfort
Vehicle must be parked			Increased mobility		Increased mobility
					No visual pollution

FABRIC Integrated Project

Budget: 9 M€
 Duration: 48 months
 Coordinator: Angelos Amditis, ICCS
 Website: www.fabric-project.eu

Funding: 6.5 M€
 Start: 1 January 2014
 Contact: a.amditis@iccs.gr

Jan 2018

Dynamic wireless
charging of FEV

Relationship with other
projects

Innovation
Collaboration

User requirements
 Technical feasibility
 Standardization/
 Interoperability



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10/09/2014

FABRIC, ITS World Congress Detroit

FABRIC

Session highlights

- **eCo-FEV project and system presentation: Functionalities, architecture and standardization towards large scale deployment** - Andrea Tomatis, Deputy Laboratory Manager and Senior Researcher at ICTL of Hitachi in Europe, France
- **Dynamic wireless EV charging and the related R&D studies being performed in FABRIC SP3** – Denis Naberezhnykh, Head of Low Carbon Vehicle and ITS Technology, TRL LIMITED, UK
- **The future of transportation and an overview of QUALCOMM R&D in wireless static and (semi)dynamic EV charging technology** - Chris Borroni-Bird, VP Strategic Development, Qualcomm Technologies Inc, USA
- **Description of a major breakthrough that allows a 10-inch gap between primary/secondary coils for HDV inductive charging** - John English, Board of Directors member, WAVE (Wireless advanced Vehicle electrification) Company, USA
- **Assessment framework and challenges for EVs wide introduction** - Sebastiaan Meijer, Associate Professor, Head of GaPSlabs, KTH Royal Institute of Technology, Sweden



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Thank you!



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