EEVC-2014

European Electric Vehicle Congress
Brussels, 2\textsuperscript{nd} - 5\textsuperscript{th} December 2014

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ICCS

FABRIC: “Feasibility analysis and development of on-road charging solutions for future electric vehicles”
Facts

**Full name:** Feasibility analysis and development of on-road charging solutions for future electric vehicles

**Project type:** Collaborative project

**Coordinator:** Dr. Angelos Amditis, ICCS

**Contact:** a.amditis@iccs.gr

**Budget/Funding:** 9 M€/6.5M€

**Start/End date:** 1 January 2014 / 31 December 2017

**Duration:** 48 months

**Website:** www.fabric-project.eu

**Supported by:**

EEVC-2014
European Electric Vehicle Congress
Brussels, 2nd - 5th December 2014
Consortium

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Project motivation

Necessity
- Reduction of greenhouse air pollutants.
- Reduction of fossil fuel usage in transport.
- Electrification of transport.

Research Needs
- Longer EV range.
- Wireless dynamic EV charging feasibility analysis.
- A priori lifecycle impact & feasibility assessment of large scale electromobility deployment.

Project Solution
- Infrastructure adaptation.
- Prototypes testing.
- Feasibility studies.
Vision

Large-scale adoption of pure **Electric Vehicles (EVs)** in future transportation systems through **Advanced on-road charging solutions** to improve:

- driving range and battery lifetime; energy efficiency and price of the Full Electric Vehicles (FEV), given the need for a smaller battery.
Objectives

• Fabric R&D objectives

Development & testing of advanced ICT & charging solutions;

Sustainable integration with road & grid infrastructures specifications;

Long-term socioeconomic impact & feasibility studies for large scale electromobility implementation;
Concept

- Assessment of wireless charging solution technological feasibility and market readiness at both component and system levels
Pilot activities: Italy

- Development of dynamic charging prototype no1 – Italy (POLITO, CRF)
  - 200m test track, 20m long coils, 20kW
- Development of dynamic charging prototype no2 – Italy (SAET)
- 50m, 10-150kHz load-resonant power frequency
Pilot activities: France

- Development of dynamic charging prototype no3 – France (QUALCOMM, VEDECOM)
  - 100m test track, QUALCOMM charging pads in series, 85kHz, >20kW
Pilot activities: Sweden

- Volvo test site in Hällered;
- Test track for conductive electrical road tests (DC 750V).
- Test track is 435m long, electrified part of the track is 275m.
Focus on technology: Vehicle

- **SAFETY**
  - Must Meet Standards
  - Foreign Object Detection
  - Living Object Protection

- **COEXISTENCE**
  - Must Not Interfere With Other Systems
  - On Vehicle
  - Implantable Medical Devices, etc.

- **SYSTEM DESIGN**
  - Standards
  - Efficiency
  - Cost

- **On board system**
  - Charging management
  - Authorization, authentication
  - HMI

- **Grid interface**
  - Efficiency
  - Interoperability
  - Compatibility

- **EASE OF USE**
  - Tolerant to Misalignment
  - Without the need for expensive and slow automatic parking or alignment technology
  - While still being compliant to regulatory framework

Source: QUALCOMM
Focus on technology: Infrastructure

- Road infrastructure adaptation for electrification;
- Electric grid integration;
- ICT technologies for:
  - Navigation, alignment;
  - Authentication, authorization;
  - Charging management, billing.
Expected outcome 1/2

- **ICT solutions**
  - Prototypes of on-board, off-board units for driver assistance, charging management, billing.

- **Charging solutions**
  - Assessment of various technologies and integration in an integrated wireless charging environment.

- **Road infrastructure**
  - Guidelines for installation and maintenance of e-roads.

- **Grid infrastructure**
  - Analysis of current infrastructure and guidelines for wireless charging schemes

- **Prototype vehicles**
Expected outcome 2/2

- Global assessment;
- Cost-benefit analysis and business models of large-scale deployment of on-road charging;
- Environmental life-cycle assessment and scenario analyses for achieving environmental targets;
- Contribution to standards;
- Feasibility study on societal perspectives towards on-road charging
Impact

1. Orienting future activities

Technologies
- Dynamic Charging
- Efficiency Improvement
- ICT Solutions
- Health & Safety
- Technical Standards
- Privacy & Data Security

Industry
- Vehicle Architecture
- Energy Storage (battery size)
- Power electronics
- Ergonomics & semi-automated driving
- Life Cycle Assessment
- Life Cycle Costs

Infrastructure & Social Impact
- Grid interaction
- Pavement infrastructure
- RES integration
- Costs & Investment
- Operation & Maintenance
- Customer acceptance
- Policy & Stakeholder awareness
- Collaboration & Partnership

2. Relevant Issues and evidence of BENEFITS

Energy Optimisation
- Environmental Benefits
  - Smart Cities
  - Social (End User)
  - Economic Benefit
  - Safety & Health
  - Standardisation
  - Harmonisation

3. Technological GAPS

FABRIC Consortium & External Reference Group
- National and EU projects experience and Reinforcement of all value chain levels;
- Cooperation and coordination with projects related with NMP, Environment, ICT and Energy, joint with European Green Car initiative advisory;
- Provide EU common positioning in on-road charging.
THANK YOU!
Any Questions?

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🌐 http://i-sense.iccs.gr/