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

EVs: wireless charging feasibility

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ITS World Congress 2015, Bordeaux
EVs: market

total motor vehicles registrations (EU27) in 2013: 13,6 m units

In the first quarter of 2015 total alternative fuel vehicle registrations in the EU significantly increased (+28.8 %)

EVs registrations from 11,304 units in Q1 2014 to 24,630 units in Q1 2015
EVs: mapping charging stations

The following 100 locations match your search:

- **Collegno - IKEA Collegno**
  - Viale Svezia 1/a, Collegno, TO 10093, Italy
  - 5.5 Miles
  - Public - Membership Required
  - Operational Level 2: Medium (Over 2kW)

- **Rivoli - Mercato Rivoli**
  - Corso 4 Novembre, Rivoli, TO 10099, Italy
  - 7.1 Miles
  - Public
  - Operational Level 2: Medium (Over 2kW)

- **CASTAGNOLE PIEMONTE - Bed & Breakfast EDERA**
  - Via Sanfelice, 27, CASTAGNOLE PIEMONTE, TO, Italy
  - 12.1 Miles
  - Private - For Staff and Visitors
  - Operational Level 2: Medium (Over 2kW)
EVs: market estimates

**EV Market: Sales Estimates, Global, 2012–2018**

<table>
<thead>
<tr>
<th>Region</th>
<th>2012</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>119,800</td>
<td>700,000</td>
</tr>
<tr>
<td>Europe</td>
<td>371,000</td>
<td>500,000</td>
</tr>
<tr>
<td>North America</td>
<td>408,000</td>
<td>400,000</td>
</tr>
<tr>
<td>Other APAC*</td>
<td>15,000</td>
<td>34,000</td>
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- **PHEV** - Plug-in Hybrid Electric Vehicles
- **NEV/QC** - Neighborhood Electric Vehicles
- **eREV** - Extended Range Electric Vehicles
- **BEV** - Battery Electric Vehicles

*Other APAC – Australia, Japan, India and South Korea
The base year is 2012. Source: Frost & Sullivan
EVs: drawbacks

LIMITED
LONG
WEIGHT & SIZE
COST
PRICES
POOR
UNFRIENDLY

vehicles’ driving range
recharging times
batteries
battery manufacturing
EVs versus other vehicles
charging infrastructure network
user experience in plugging EVs
EVs: options to overcome drawbacks?

Quick-fast charge infrastructure
high power recharging units to recharge up to 80% of the battery state of charge in few minutes

Battery swap
robotized systems for complete battery substitution in few minutes

Wireless charging
electric supply systems applied in specific areas to transfer electric energy to EVs
Feasibility of EVs wireless charging solutions
Feasibility of EVs wireless charging solutions

Wireless Charging
- static
- stationary
- dynamic

ICTs
- vehicle charging
- vehicle alignment
- energy mng

Test Sites
assessment

Feasibility
Q/A

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October 2015
FABRIC European project
Feasibility of EVs wireless charging solutions

Static charging

Typically the vehicle is parked (garage, parking slot, bus terminal...), for a long duration of time.

Stationary charging

The vehicle is en-route and stops for a short period of time (car waiting at the traffic light, bus at a stop, etc).

Dynamic charging

The vehicle may travel at constant or variable speed typically in a devoted special lane that hosts the charging infrastructure.

Read more ➔ http://www.fabric-project.eu/

FABRIC European project
Feasibility of EVs wireless charging

SAFETY
• Interference with living being?
• Interference with objects?
• RF regulatory framework?

AVAILABILITY
• In all weather conditions?
• Network availability?
• Misalignment?

VEHICLE
• Interference with vehicle systems?
• Efficient power transfer?
• Effective packaging for different vehicle models?

…

October 2015
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FABRIC European project
FABRIC Italian & French Test Sites

FABRIC European project
**FABRIC project team**

<table>
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<tr>
<th>Category</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Manufacturers</td>
<td>CRF, VOLVO, SCANIA</td>
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<tr>
<td>Energy Operators</td>
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<tr>
<td>Road Managers</td>
<td>TECNOSITAF S.p.A., sanef</td>
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<td>Technology Suppliers</td>
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<td>Research Institutes</td>
<td>ITU, IRL, KTH, TNO, fka, DITEN, circe, Politecnico Di Torino, TU Berlin</td>
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<td>SMEs</td>
<td>QiEnergy, enide, AAV, MECT, AMET</td>
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<td>Association</td>
<td>ERTICO ITS EUROPE</td>
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after more than 100 years of history on Evs ...

1889: Thomas Edison built an EV using nickel-alkaline batteries

... FABRIC is pointing to a new EVs’ generation
Thank you!

Luisa Andreone

Centro Ricerche FIAT
Vehicle Research & Innovation

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