The feasibility of using Dynamic Wireless Power Transfer for EVs

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FABRIC - Wireless Dynamic Charging For FEVs: Challenges And Concepts, 2 February 2016
Our Vision

To be the world leader in creating the future of transport and mobility, using evidence-based solutions and innovative thinking

Fast facts

- One of the largest independent transport centres in the world
- International reputation for first class consultancy, research excellence and project delivery
- A team of over 400 highly qualified transport specialists

Clients in 145 Countries

Over 800 Projects delivered in 2014

Over 4,000 TRL Reports available to download

TRL Software sold in over 60 Countries and 250 cities world-wide
Background

- Highways England published a research programme in 2014
- Prepare the SRN for future EV take up and facilitate their adoption
- Contribute to reducing GHG emissions and air pollution
- Focus is on identifying a wireless power transfer solution that could be installed under the road surface
Feasibility study: Powering electric vehicles on England’s major roads

http://www.highways.gov.uk/knowledge/publications/1902/
Trends in road vehicle electrification

- No revolution in on-board battery storage

- EV range will double by 2020 (as will battery capacity)

- Novel, more flexible vehicle usage and ownership leading to higher vehicle utilisation

Batteries unlikely to provide range comparable with ICE vehicles in the near future

Range anxiety could be replaced with “charging anxiety”

Increased demand in opportunistic charging
Feasibility study – concept
Project team led by TRL
Feasibility study results

- Does the technology already exist?

<table>
<thead>
<tr>
<th>Power:</th>
<th>140kW to 200kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency:</td>
<td>80%-90%</td>
</tr>
</tbody>
</table>

Images: Scania

FABRIC DWPT Conference
Feasibility study results

Power: Up to 200kW
Efficiency: 75%

Images: DW OLEV and KAIST

FABRIĆ DWPT Conference
Feasibility study results

- Can it be installed in the road?

![Diagram of pavement layers](image)

**DW OLEV / KAIST DWPT system**

**Modieslab – Netherlands**
Feasibility study results

- Can the system be connected to the electric grid?
## Feasibility study results

### How much will it cost?

<table>
<thead>
<tr>
<th>NPV (over 20 years, from 2010)</th>
<th>£17M per km</th>
<th>Construction, operation and electricity costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation and grid connection</td>
<td>£3.9M per km</td>
<td>Road works and provision of appropriate power supply</td>
</tr>
<tr>
<td>Operation</td>
<td>£1.2M per km</td>
<td>Maintenance and back office operation</td>
</tr>
<tr>
<td>Electricity cost</td>
<td>£12M per km</td>
<td>Electricity over 20 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental benefit (20 yrs)</th>
<th>% reduction</th>
<th>Monetised saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>45%</td>
<td>~£2M per km</td>
</tr>
<tr>
<td>Noₓ and PM</td>
<td>35% and 40%</td>
<td>Between £100k to £1M per km</td>
</tr>
</tbody>
</table>
Could this be the future?
Thank you

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