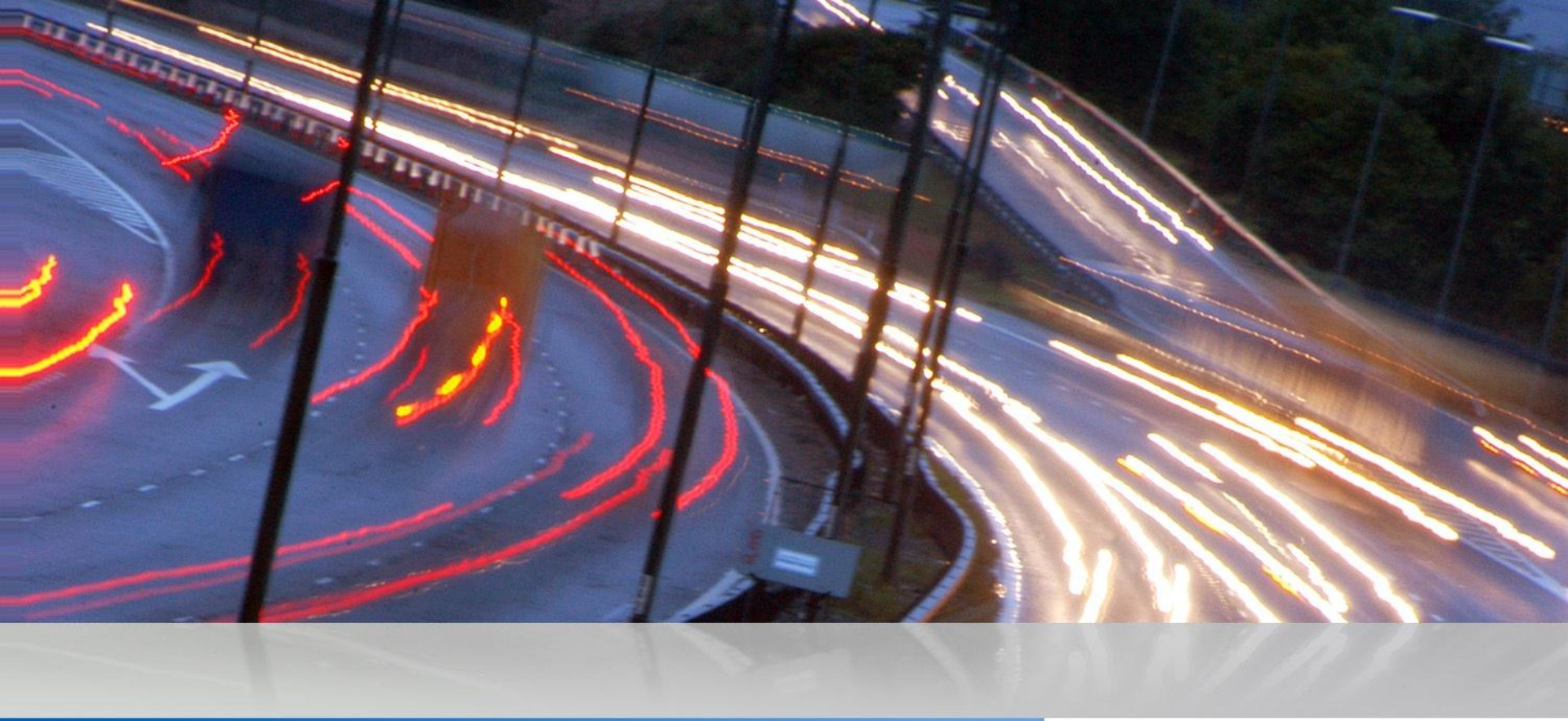


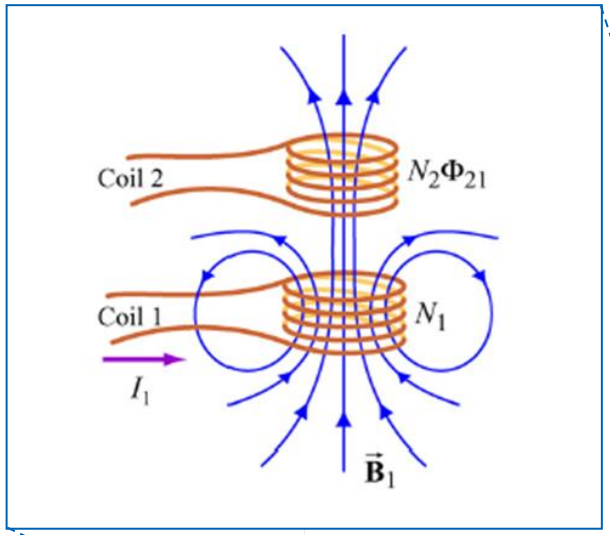
Wireless charging – update on latest activities in research and demonstration of the current technologies

IET International Hybrid and Electric Vehicle Conference 2014, Chongqing, China

Denis Naberezhnykh

2 October 2014

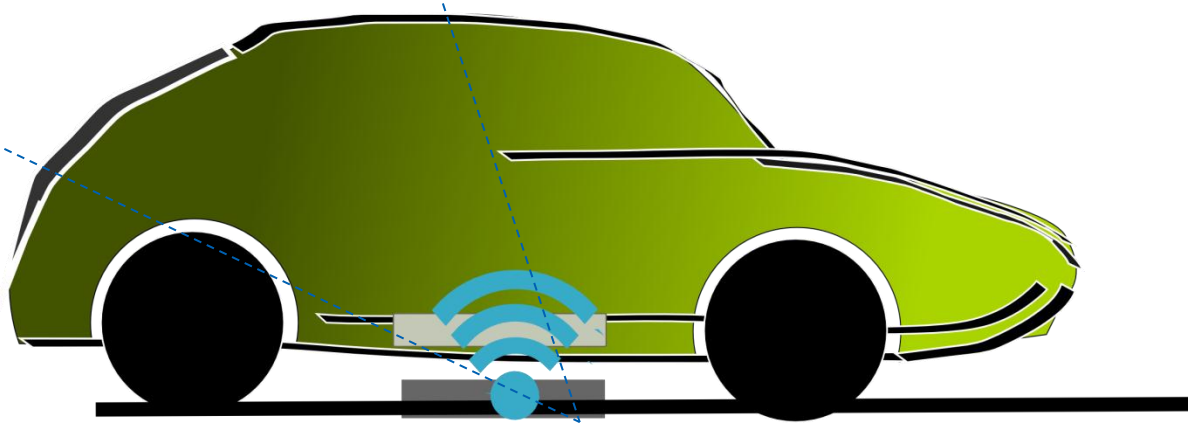
What is Wireless Power Transfer (WPT)?



Static

A

While parked the car is recharging automatically

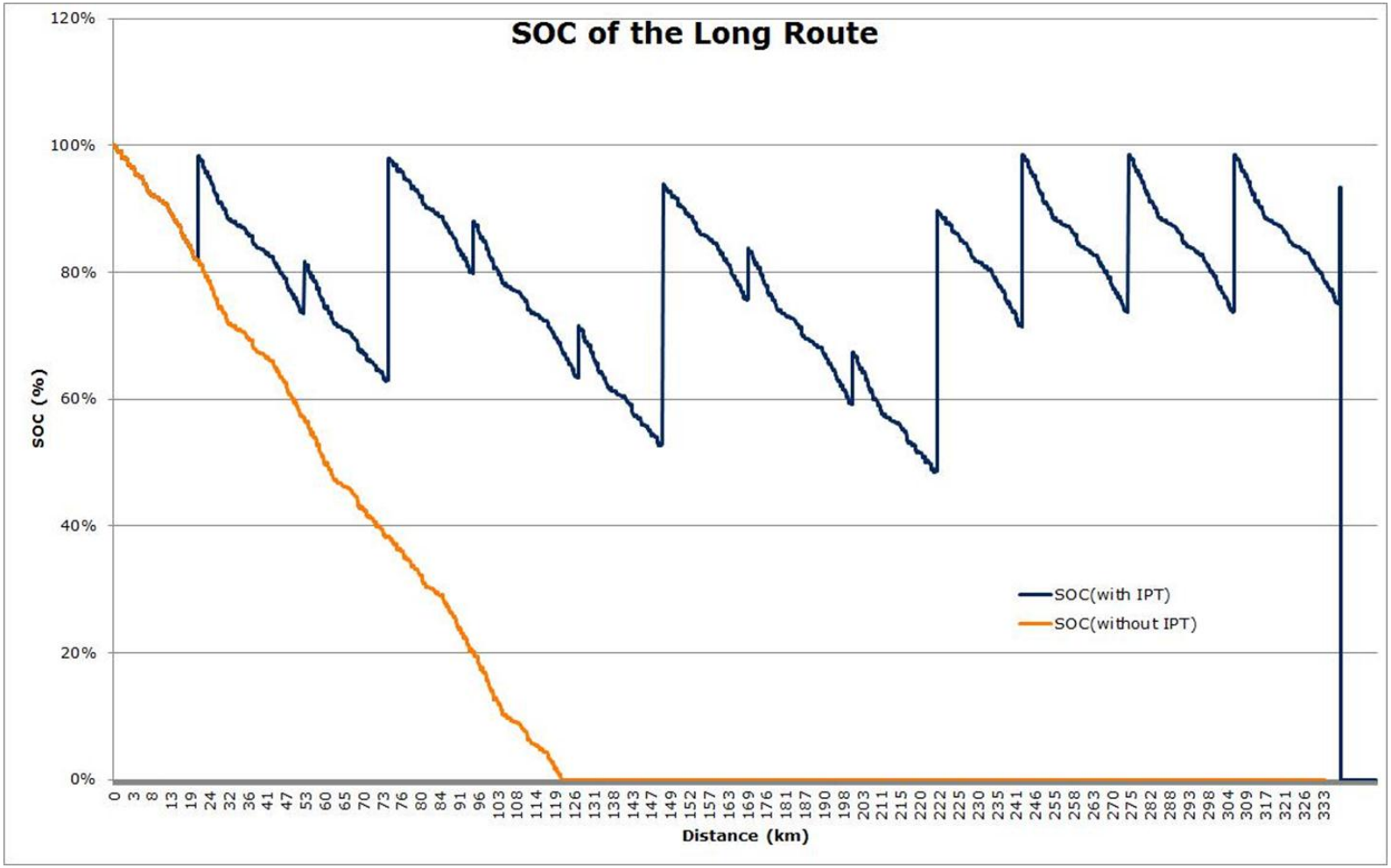


Source: SAET

Why use Wireless Power Transfer (WPT)?

Source: TRL

Why use Wireless Power Transfer (WPT)?



Source: TRL

Ongoing projects in wireless power transfer for EVs – UNPLUGGED

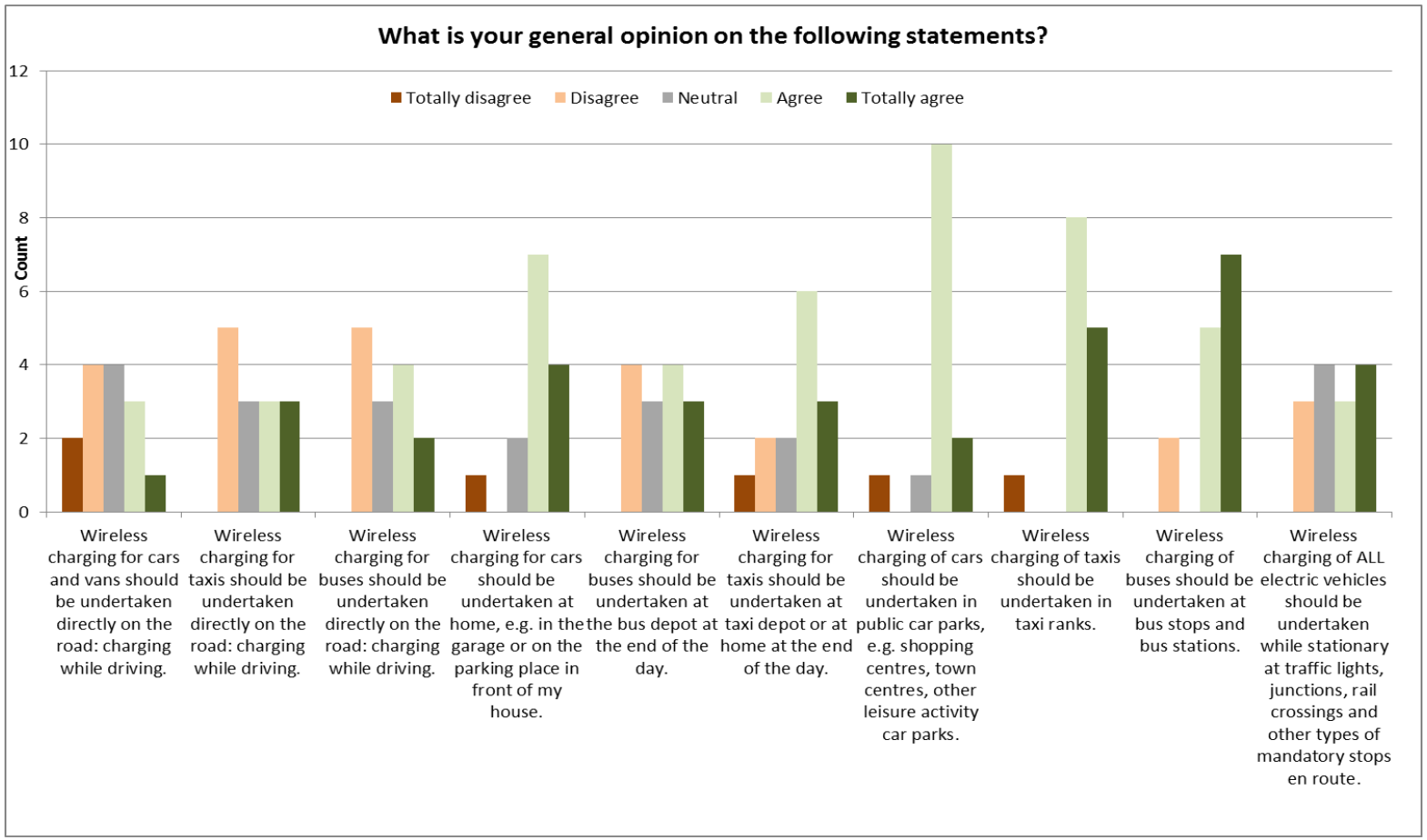
- UNPLUGGED – Lead socioeconomic impact and social acceptance analysis

European Research Project
- 17 partners
- 7 countries

Unplugged

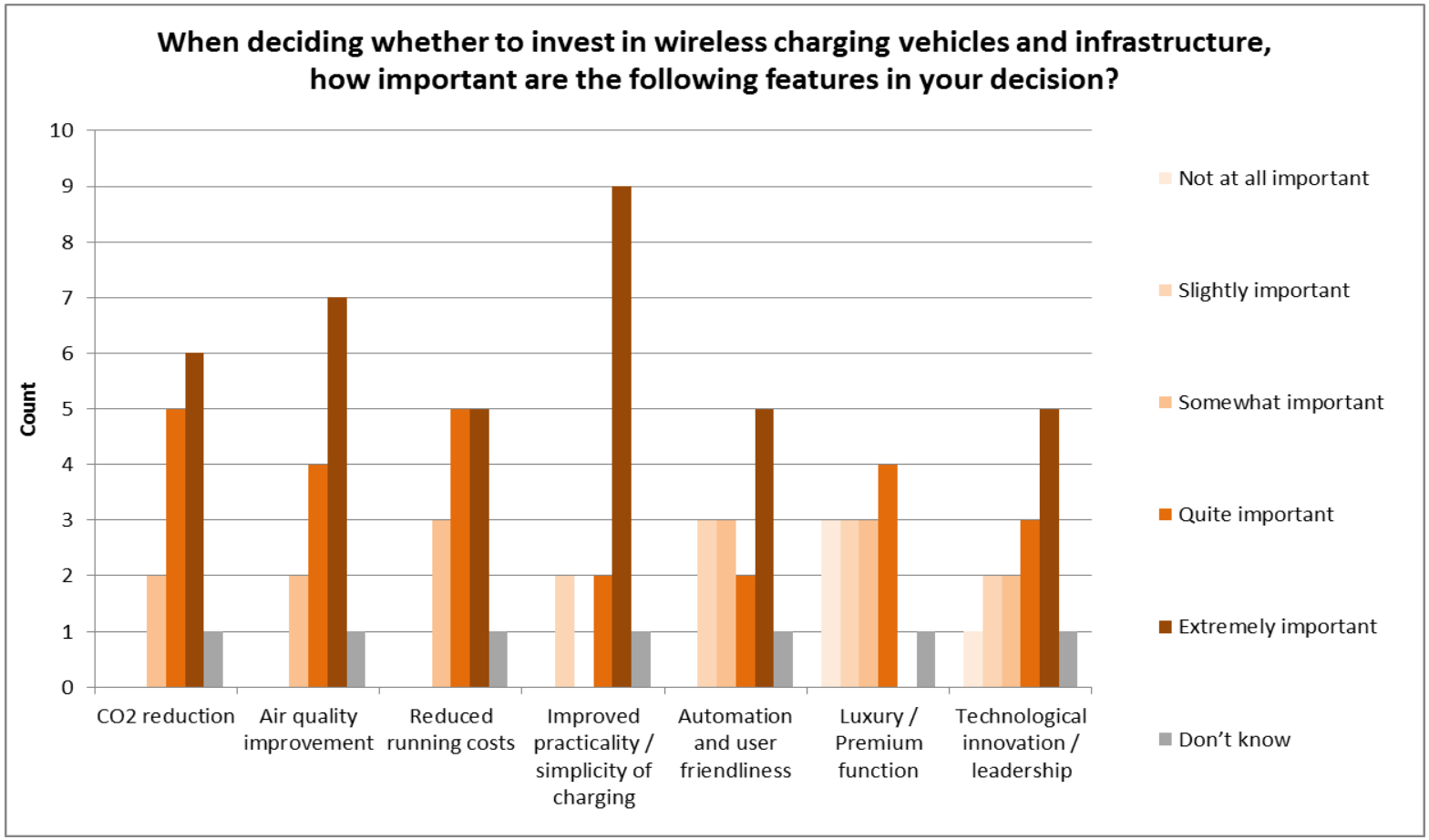
Ongoing projects in wireless power transfer for EVs – UNPLUGGED

Unplugged



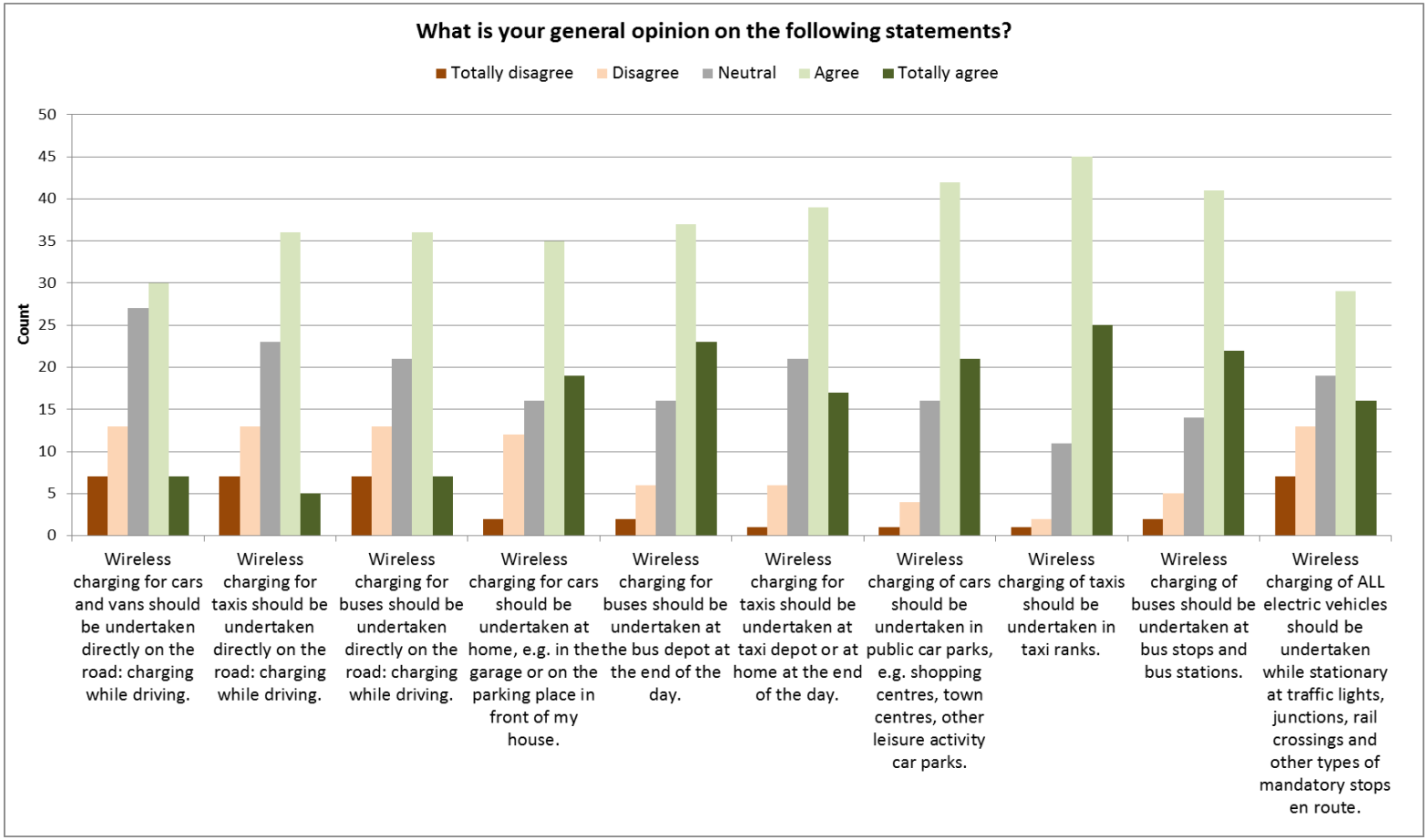
Ongoing projects in wireless power transfer for EVs – UNPLUGGED

Unplugged



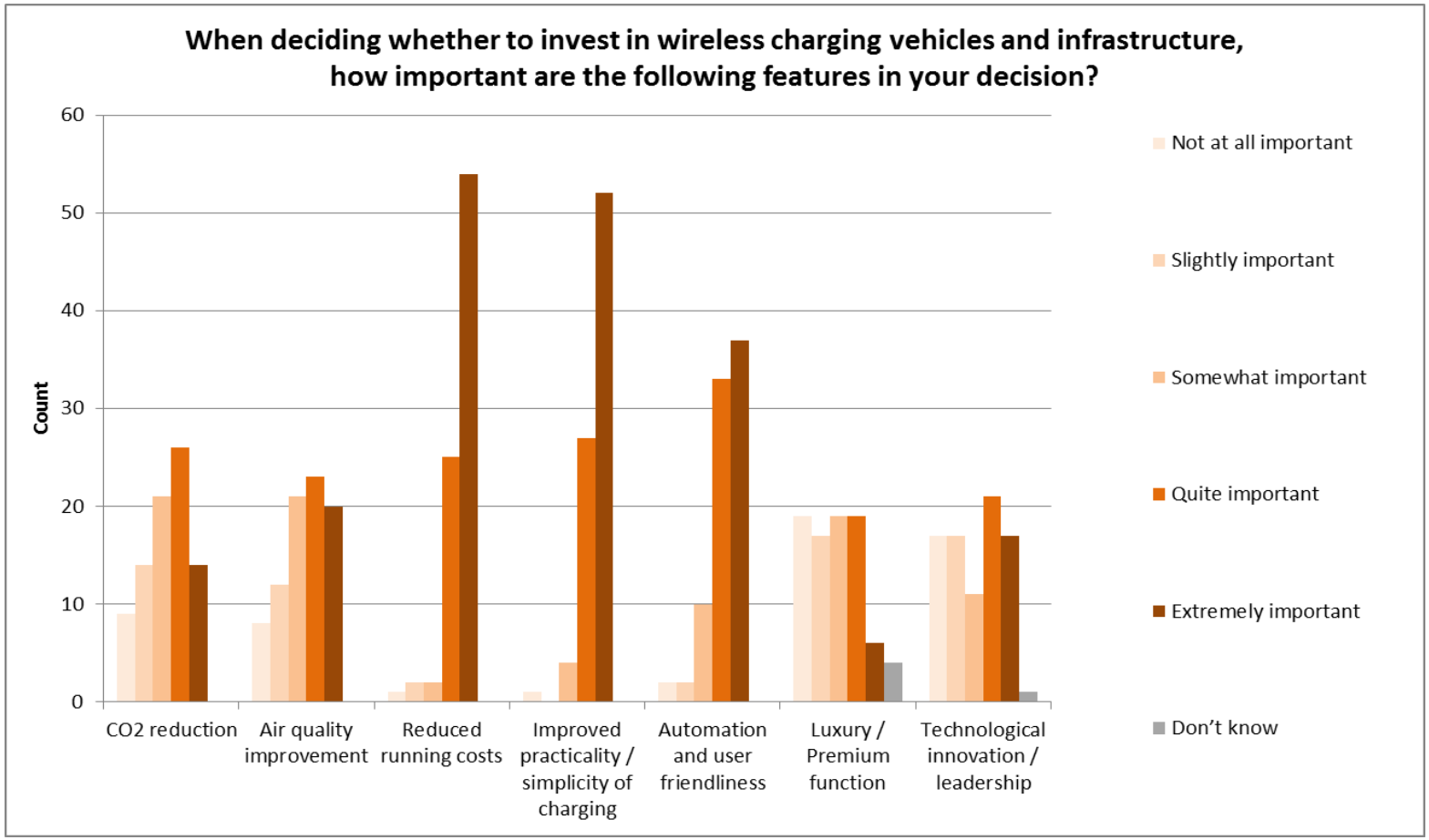
Ongoing projects in wireless power transfer for EVs – UNPLUGGED

Unplugged



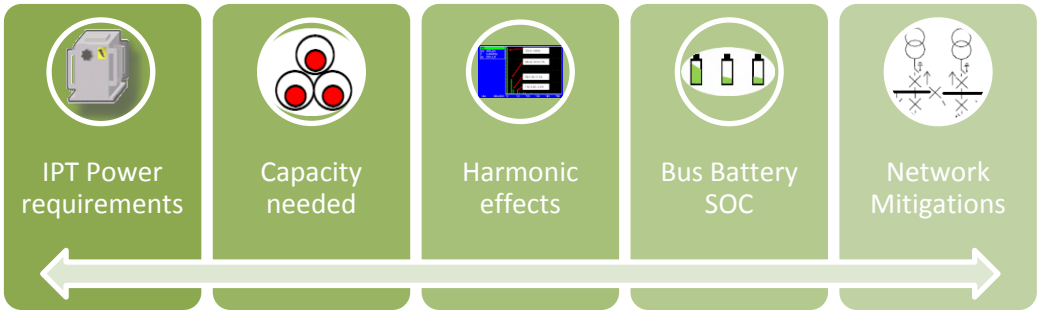
Ongoing projects in wireless power transfer for EVs – UNPLUGGED

Unplugged



Ongoing projects in wireless power transfer for EVs – Electric Boulevards

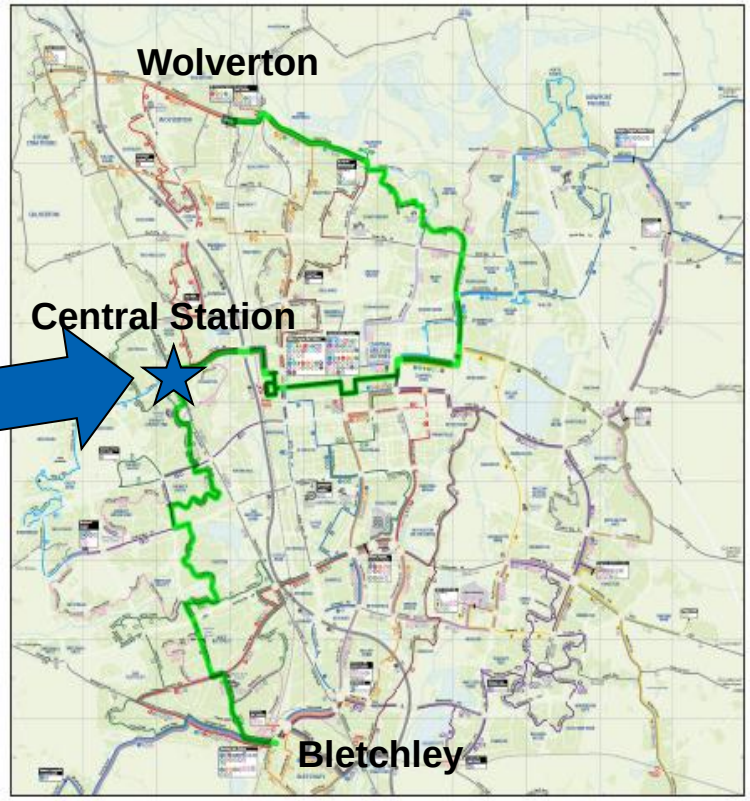
- Funded through the Low Carbon Network Fund
- Purpose:
- Evaluate impact of high-powered wireless chargers on the distribution network
- Understand implications of bus operations on these impacts
- Opportunities to help address greater demand from the network



Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- 8 buses on a single route
- 2 chargers at either end of the route – necessary to complete the route
- 1 charger at mid-point – allows for flexibility to study demand

WPD-owned inductive charger that will be flexibly used based on Bus battery SOC. Data will be compared with impacts on the network and the network condition.



Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- Based on the 9.5m WrightBus StreetLite EV
- 2 x 85kW motors for traction
- 54 Passengers
- 129kWh Batteries (588V)
- 12,900Kgs GVW
- 4 x 30kW Induction Plates

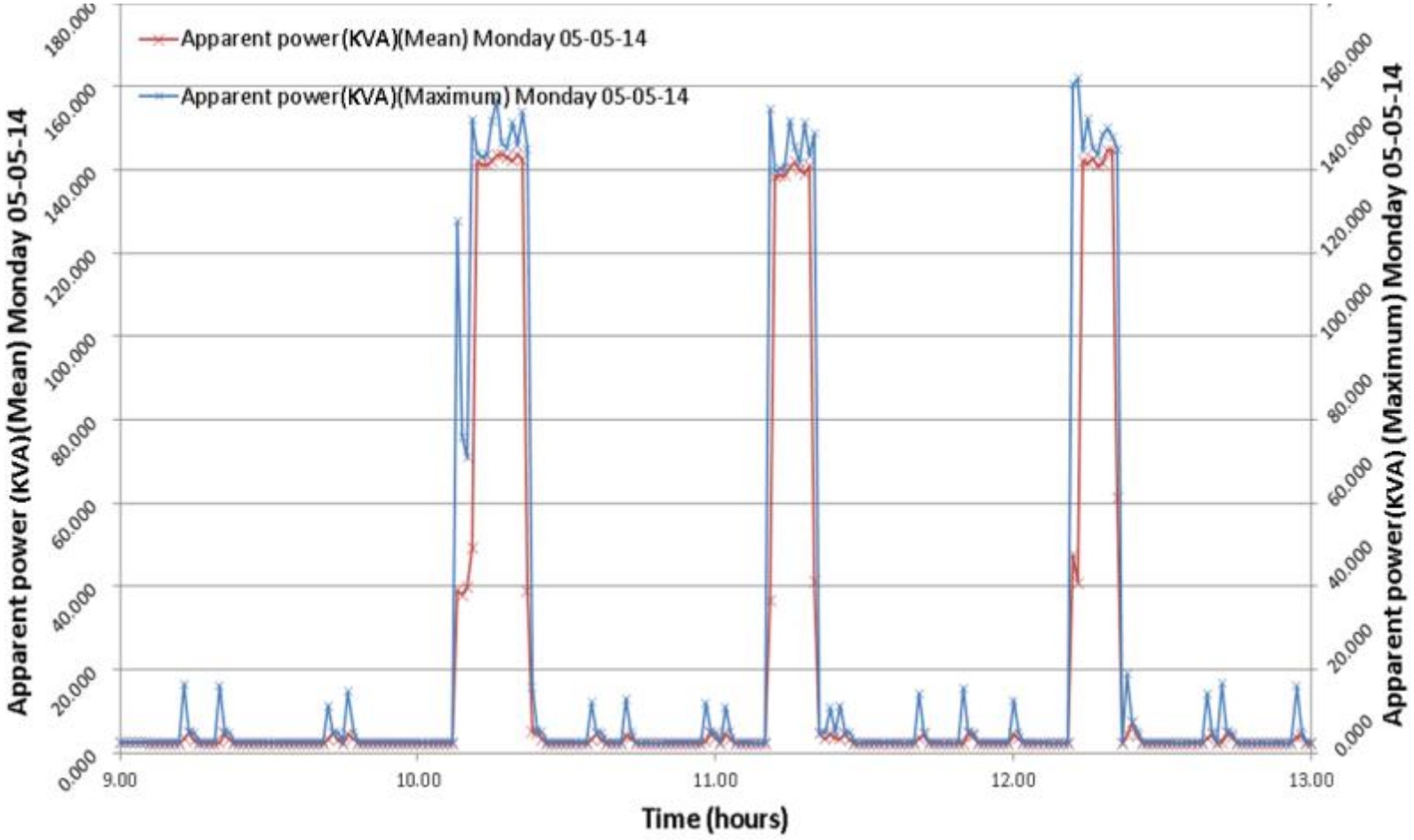
Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- Wolverton

- Bletchley

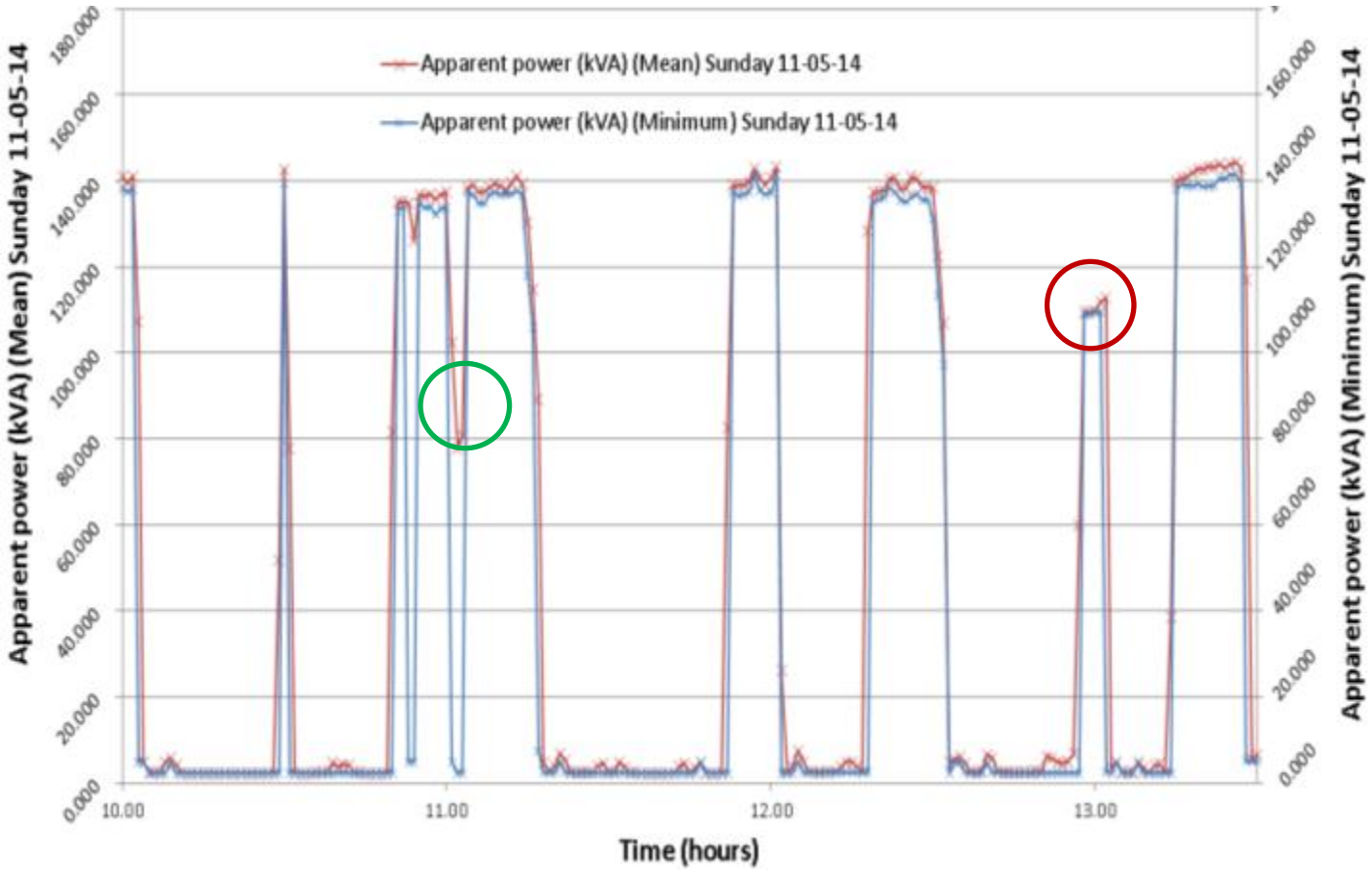
Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- Power usage profile



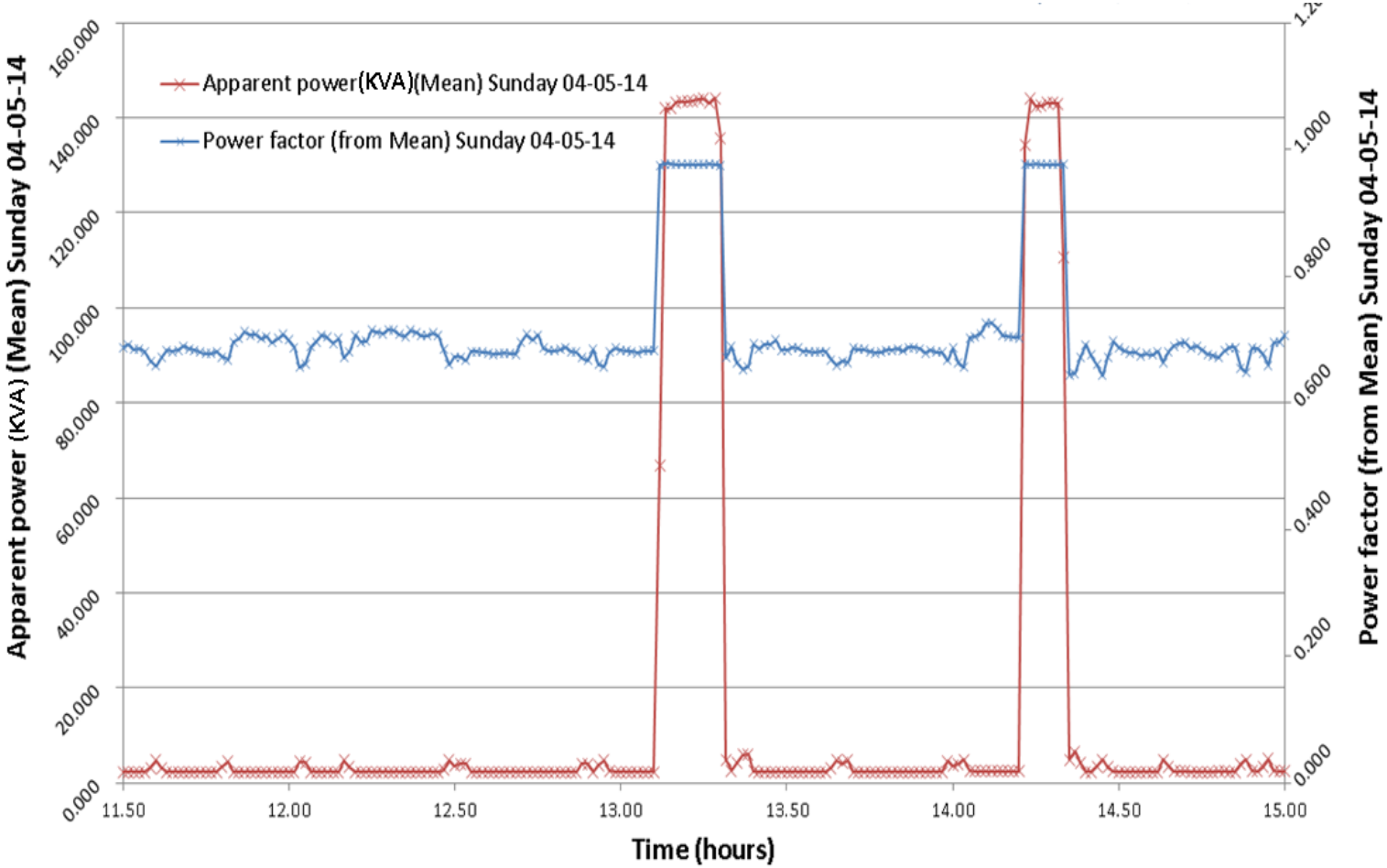
Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- Some anomalies – to be investigated in future analysis



Ongoing projects in wireless power transfer for EVs – Electric Boulevards

- Power factor variations



Ongoing projects in wireless power transfer for EVs – ZeEUS

- ZeEUS – Lead UK demo evaluation activities, provide expert advice to transport operators on EV and WPT technology

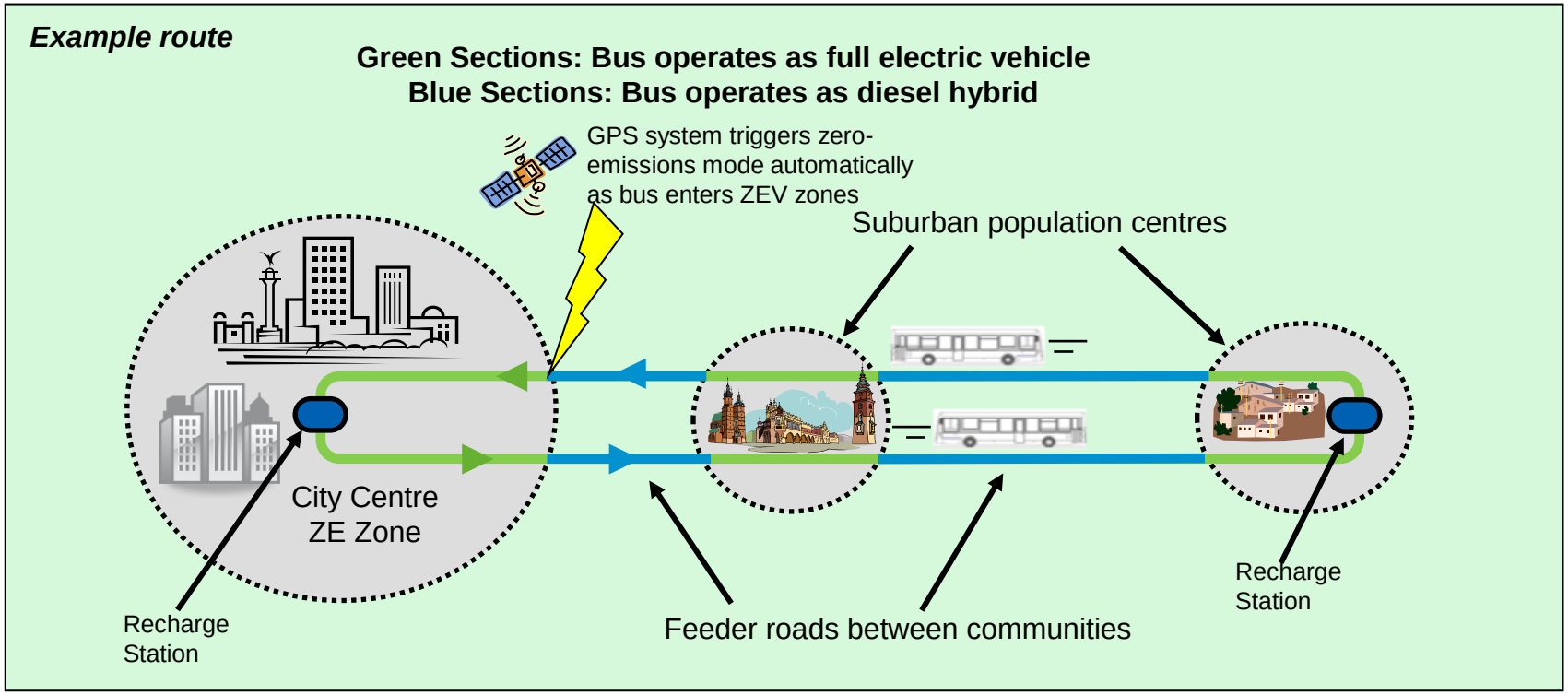
ZeEUS

Zero Emission Urban Bus System

European Demo Project
- 40 partners
- 10 countries

Ongoing projects in wireless power transfer for EVs – ZeEUS

ZeEUS
Zero Emission Urban Bus System



Ongoing projects in wireless power transfer for EVs – ZeEUS

ZeEUS
Zero Emission Urban Bus System

- Demonstrations in UK (London and Glasgow)
- End of route wireless charging
- Starting summer 2015
- London working towards having worlds 1st Zero emission Zone from 2020

Dynamic WPT

Position 1

Vehicle detection & recharging system in stand-by

Position 2

Vehicle is charging by passing over the recharging pad and receiving transmitted power

Transmitted power depends upon:
- Speed
- Power unit
- Track length

Position 3

Vehicle has been automatically recharged while driving.

Ongoing projects in wireless power transfer for EVs - FABRIC

- FABRIC –Sub-Project Lead (Charging solutions, evaluation of results and road infrastructure integration)

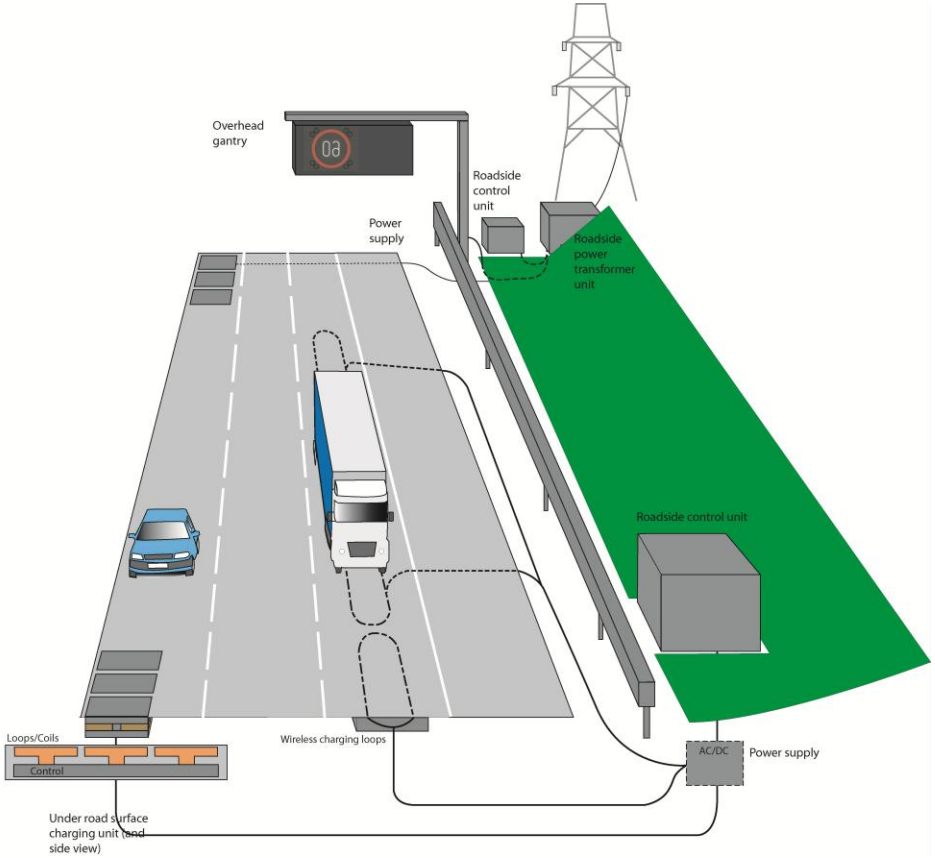
FABRIC
Feasibility analysis and development of on-road charging solutions for future electric vehicles

European Research Project
- 24 partners
- 9 countries

Ongoing projects in wireless power transfer for EVs - FABRIC

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

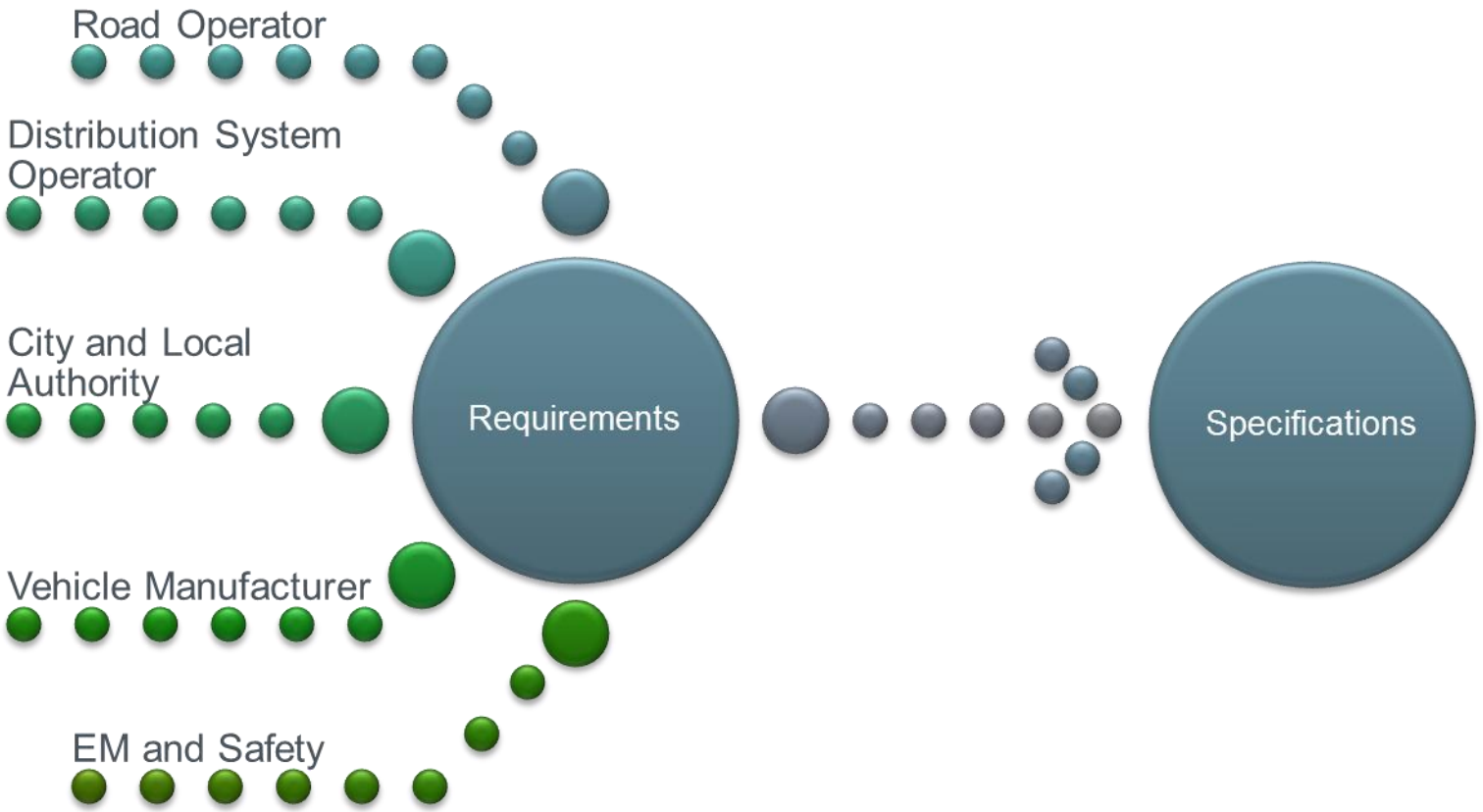
- Largest Europe-wide feasibility study on dynamic wireless power transfer
- 29 Partners (TRL is one of 5 core project partners)
- Will demonstrate up to 3 dynamic solutions in two test sites (Italy and France)



Ongoing projects in wireless power transfer for EVs – FABRIC

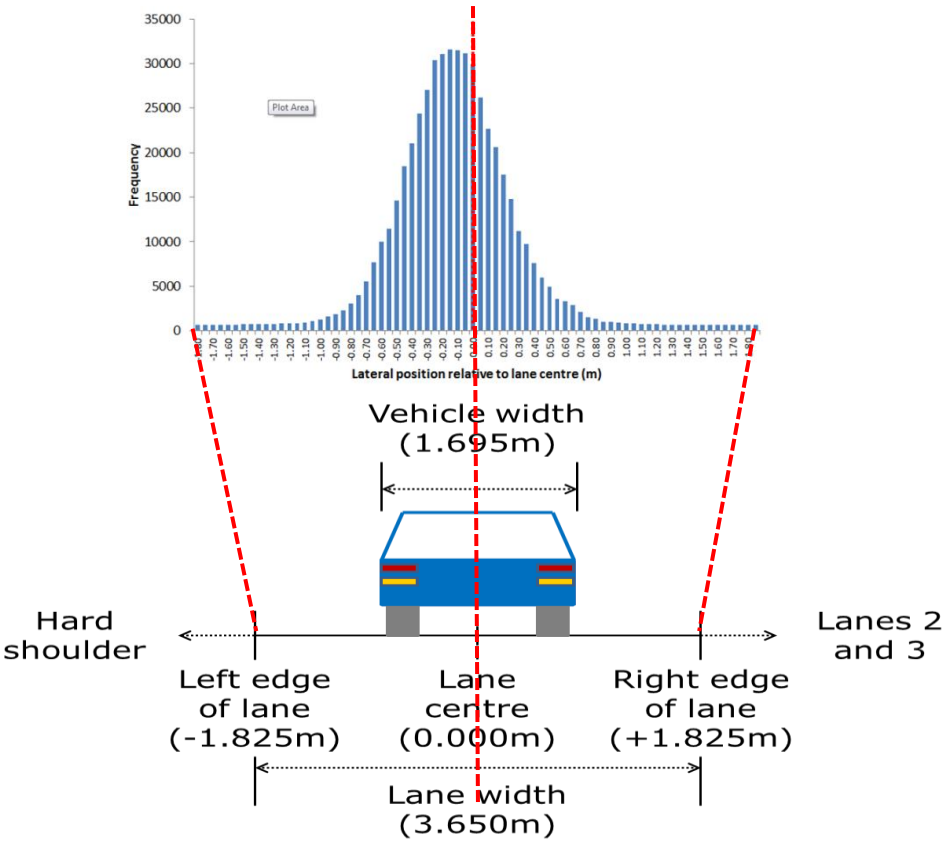
FABRIC

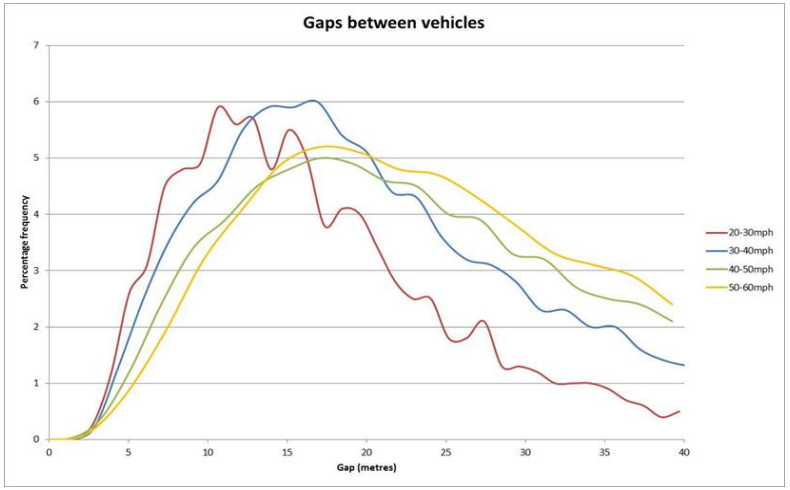
Feasibility analysis and development of on-road charging solutions for future electric vehicles

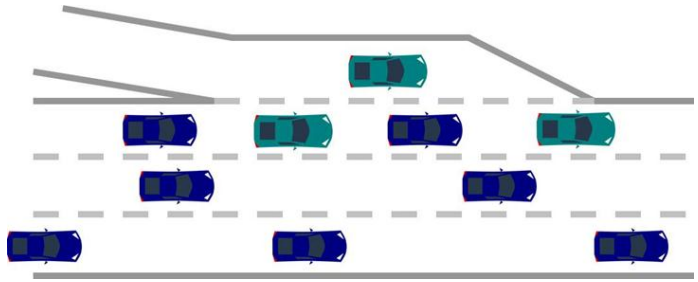


Ongoing projects in wireless power transfer for EVs – FABRIC

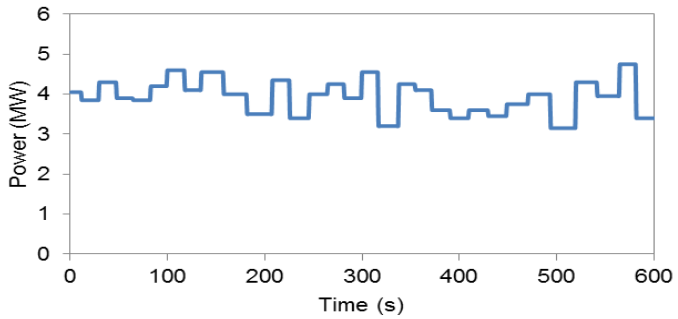
FABRIC
Feasibility analysis and development of on-road charging solutions for future electric vehicles

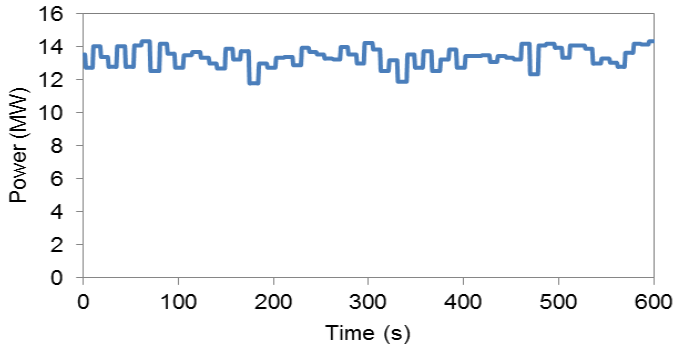


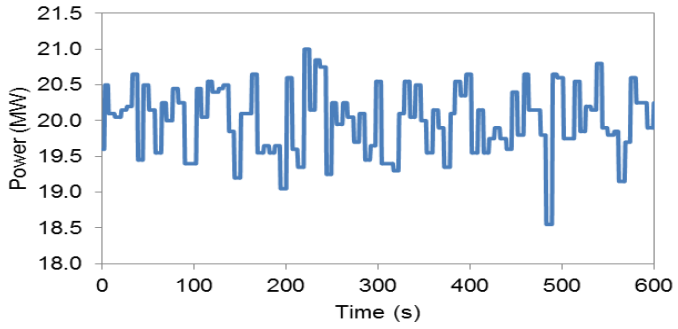


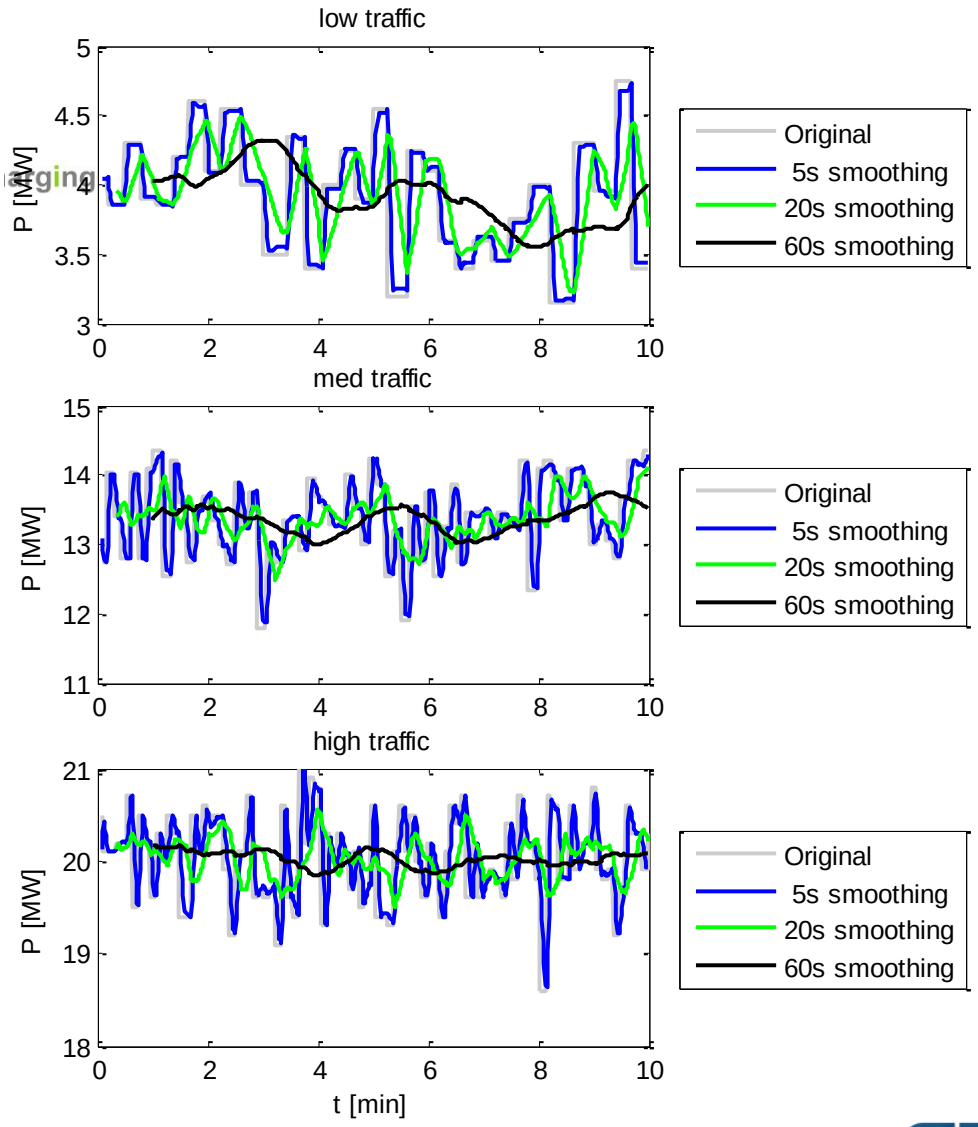


Ongoing projects in wireless power transfer for EVs - FABRIC



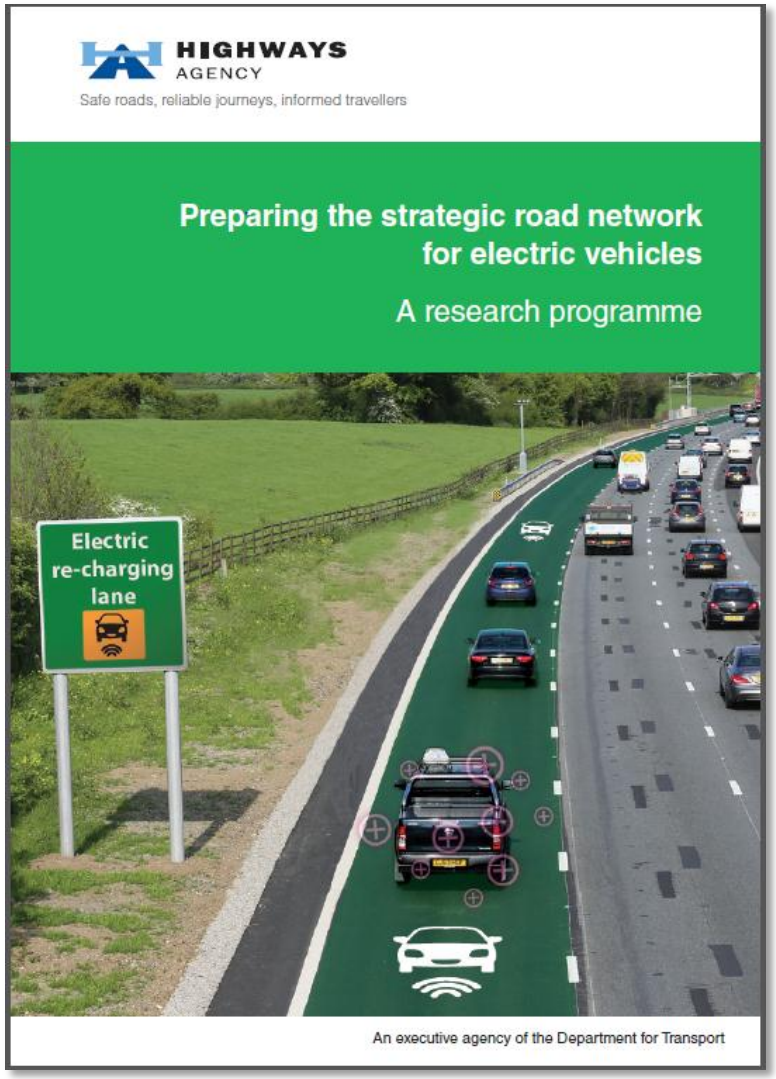






Ongoing projects in wireless power transfer for EVs – UK feasibility for dynamic WPT

- TRL commissioned to do the feasibility study
- Expected to be completed by Summer 2015
- Followed by on-road trials on UK motorway
- Prepare the SRN for future EV take up and facilitate their adoption
- Contribute to reducing GHG emissions and air pollution



Thank you

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Email: dnaberezhnykh@trl.co.uk