



Department
for Transport

Intelligent Transport Systems to reduce Energy Consumption

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Chief Scientific Advisor





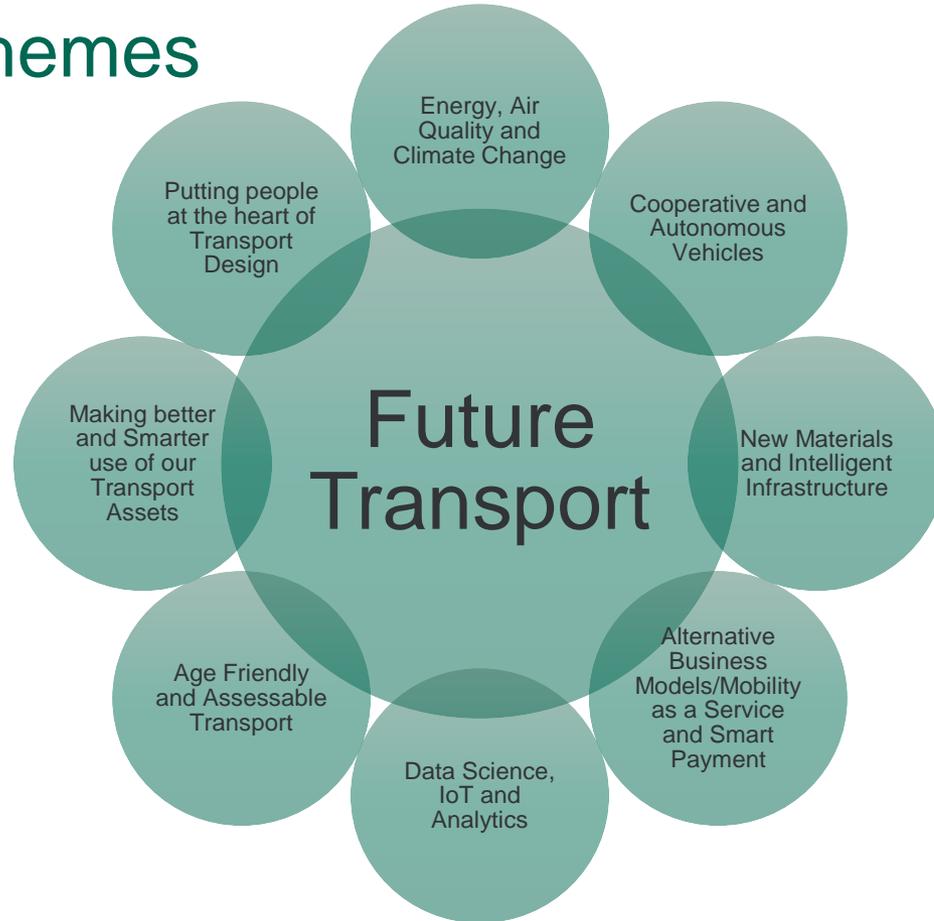
Department for Transport Research

- ▶ Rather than a specified programme, research tends to be carried out as needed to provide evidence and evaluation
- ▶ Key areas of interest include:
 - ▶ Ultra low emissions vehicles
Autonomous vehicles
 - ▶ Cooperative and Autonomous Vehicle
 - ▶ C-ITS and smart traffic management
 - ▶ Rail
 - ▶ Aviation
 - ▶ Maritime





Key Future Themes





Intelligent Transport Systems Contribution to Energy Reduction

- ▶ Electric Vehicles
- ▶ Connected C-ITS
- ▶ Automation
- ▶ Eco Driving
- ▶ Smart Traffic Management



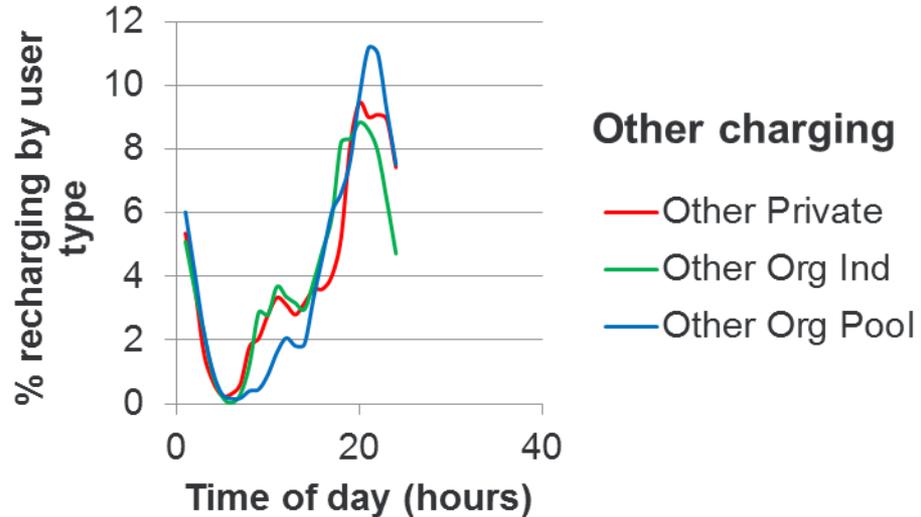
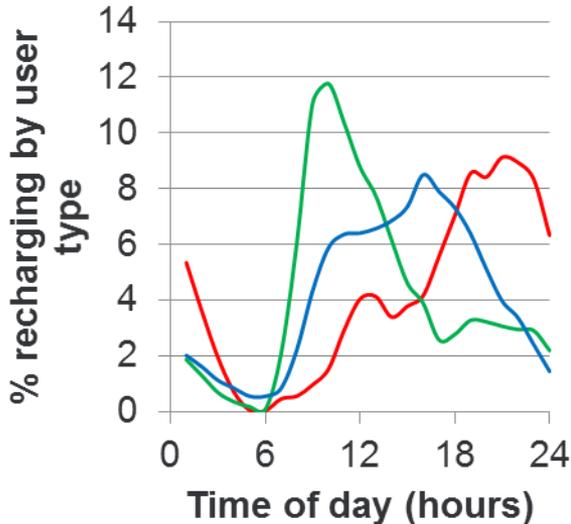
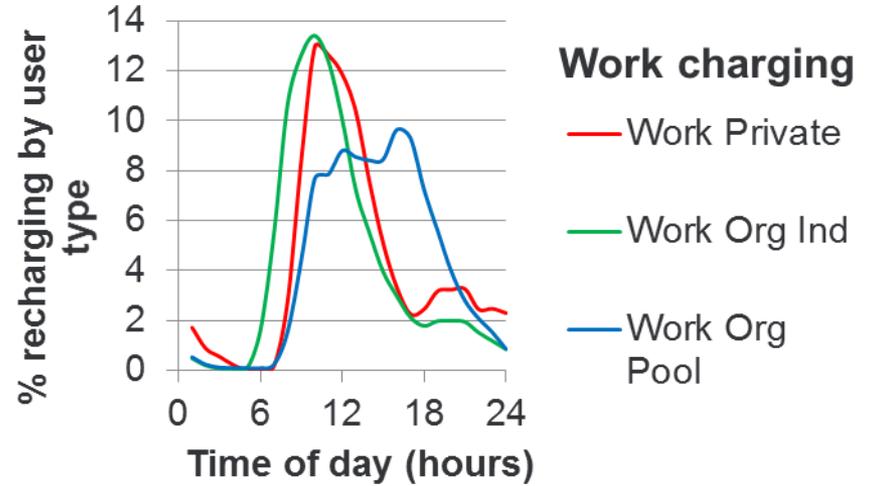
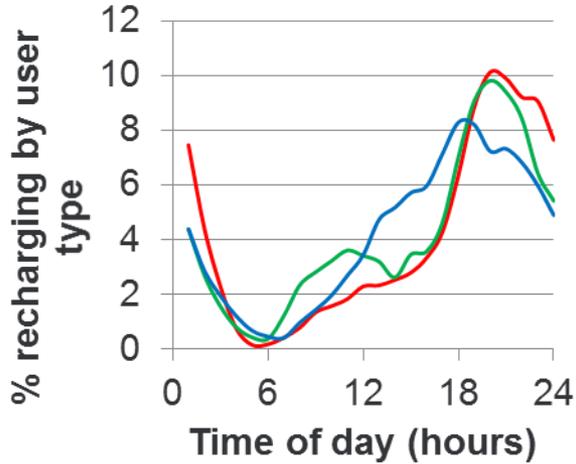
Ultra Low Emissions Vehicles (ULEVs)

- ▶ Office of Low Emissions Vehicles (OLEV) operates jointly with the Department for Energy & Climate Change and the Department for Business and Innovation
- ▶ It provides over £900 million to position the UK at the global forefront of ULEV development, manufacture and use
- ▶ Provides grants, supports a programme of research, and encourages uptake of ULEVs



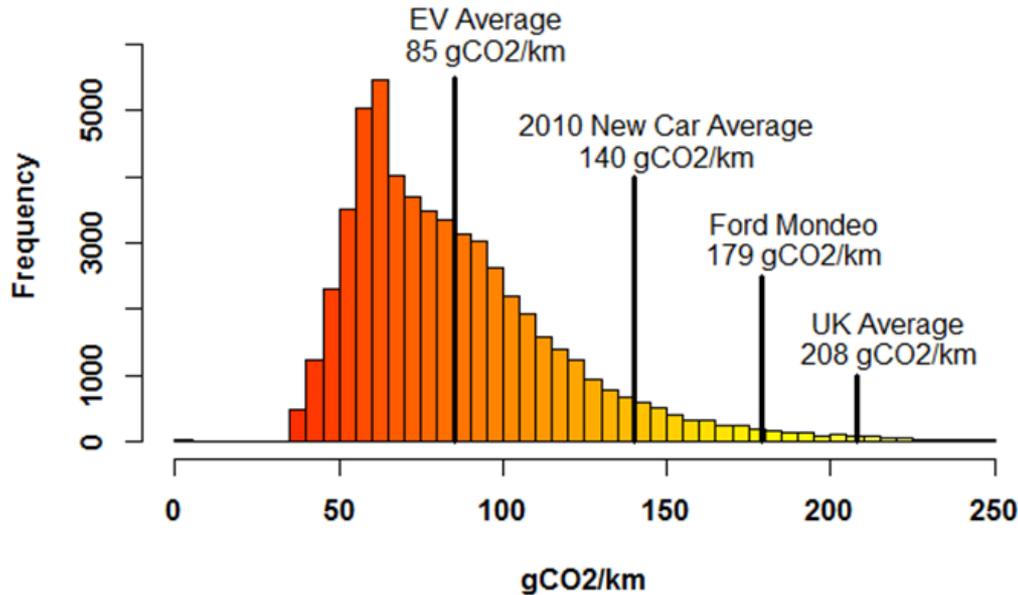


Understanding EV charging behaviour and energy demand





Emissions and Energy Use from EV's



Source SwitchEV Project (Newcastle University). Based upon data recorded from 65,000 EV Journeys



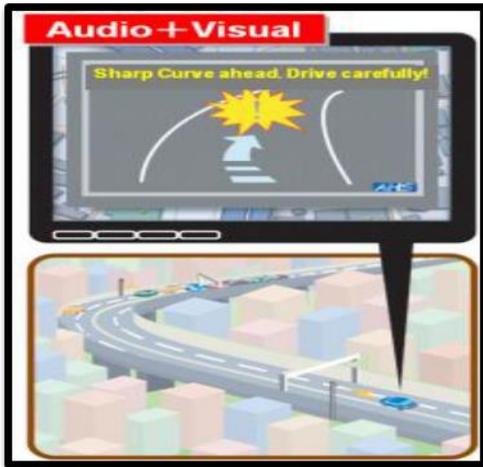
Connected ITS (C-ITS)

- ▶ Developing connectivity between the infrastructure and the vehicles
- ▶ Delivers traffic management infrastructure that can cooperate with vehicles to deliver a level of optimisation
- ▶ Department funding a number of ‘smart corridors’ to facilitate this, including:
 - ▶ M2/A2 Corridor
 - ▶ Newcastle : Gosforth Corridor
 - ▶ Coventry corridor





C-ITS Use Cases currently under evaluation in UK



**Road Hazard
Warning (RHW)**



**Red Light Violation
Warning (RLVW)**

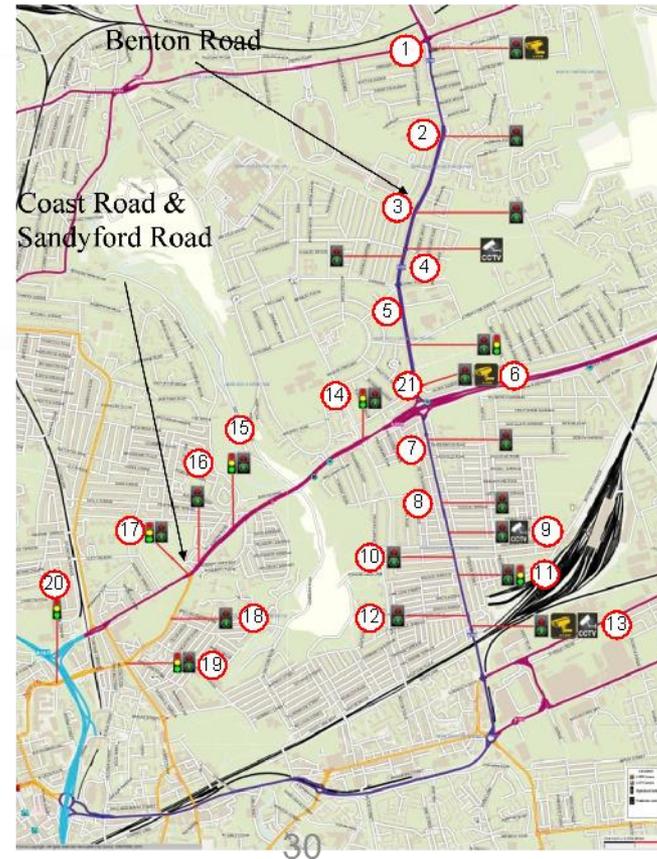


**Energy Efficient
Intersection Service (IEIS)**

Source: Compass4D Project



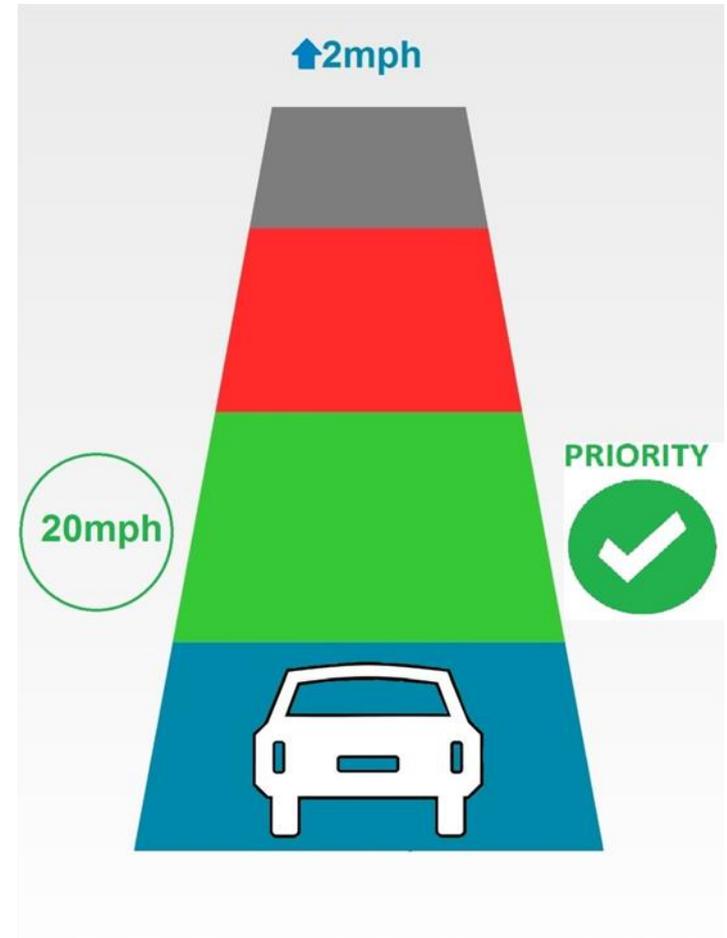
Compass 4D: Newcastle upon Tyne





C-ITS: Speed Advice and Priority

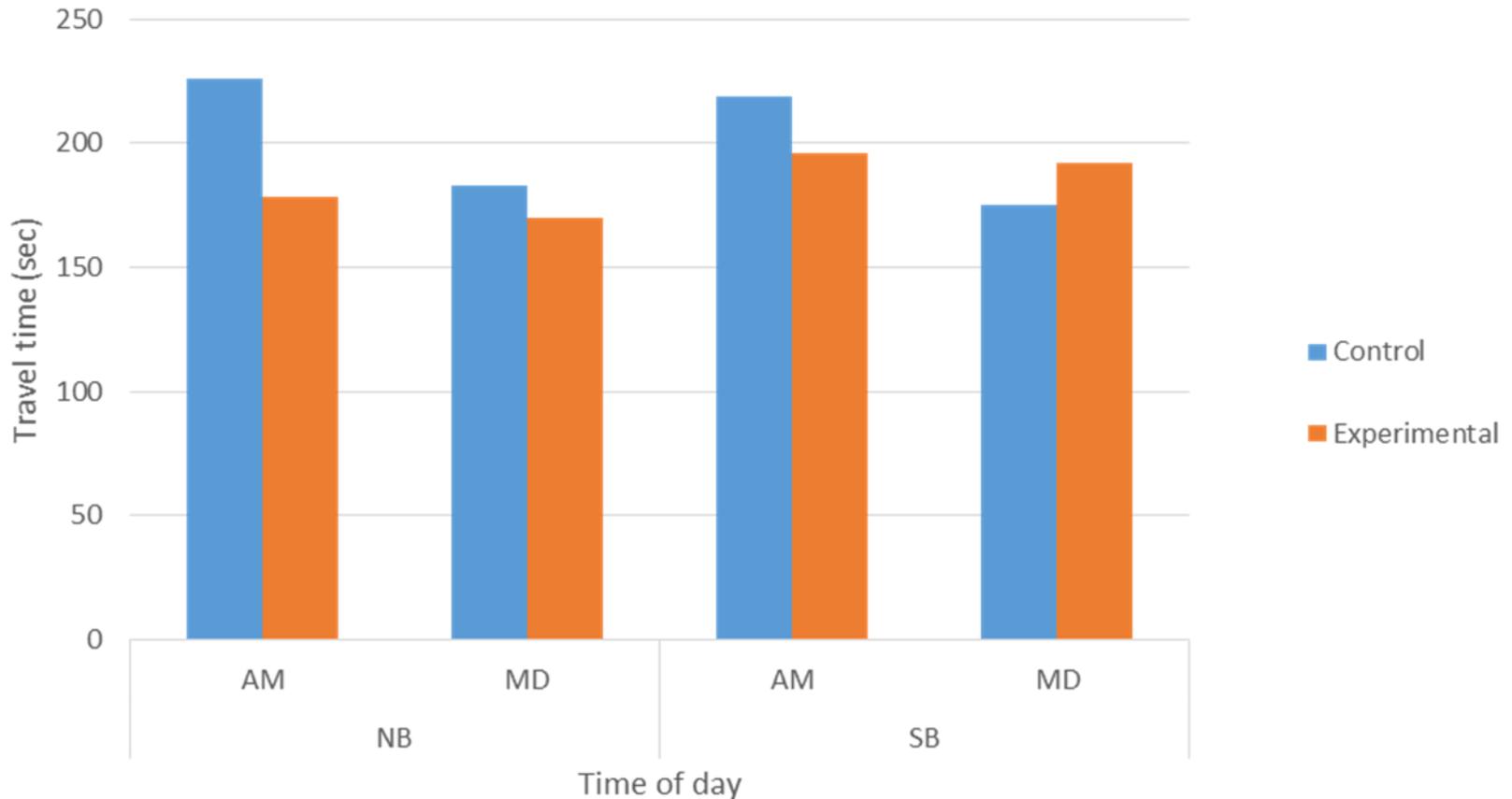
- Optimum speed to ensure passage through the signals on green.
- Confirmation that priority has been requested





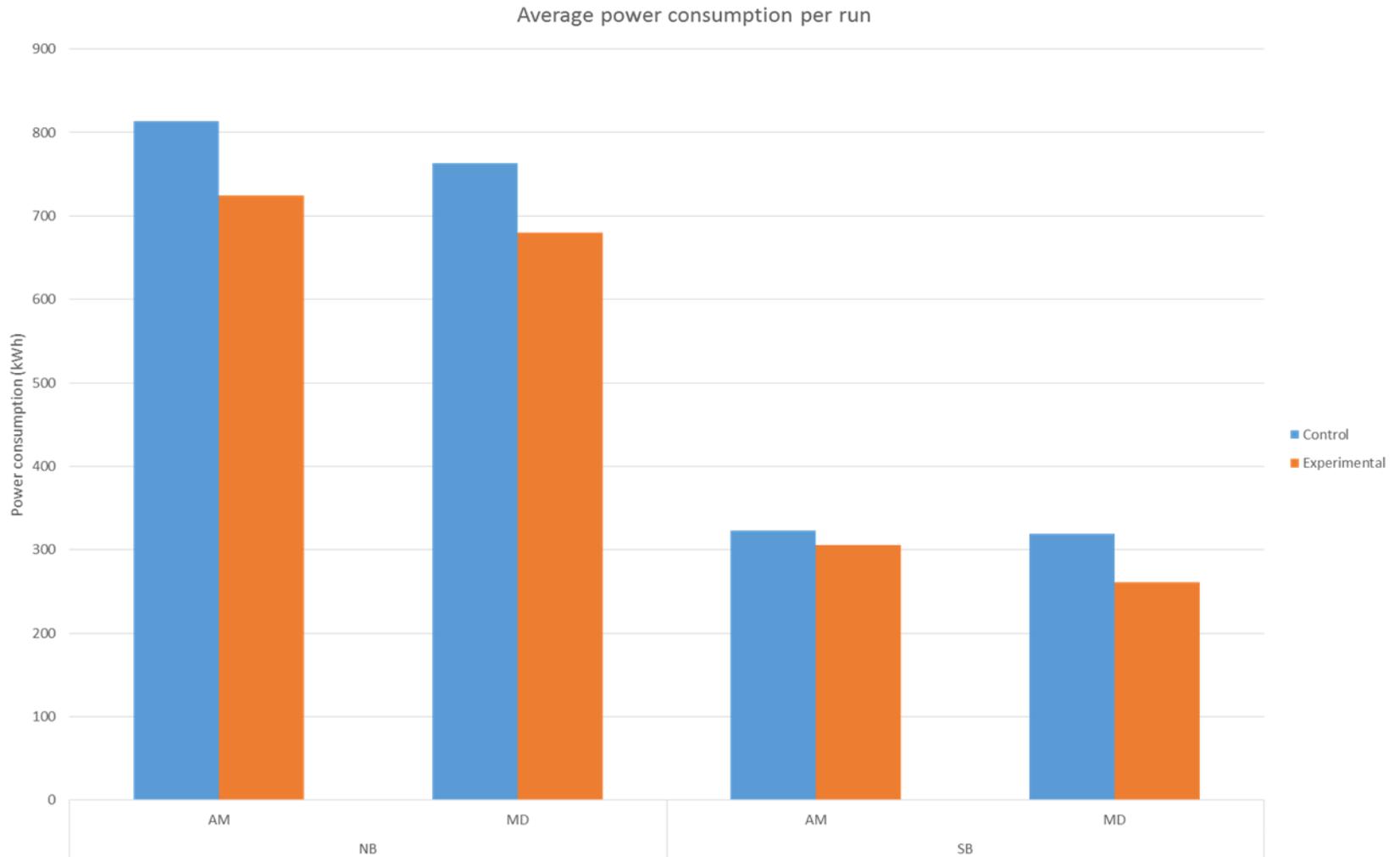
C-ITS: Evaluation of Link Travel Times

Link travel time by time of day





C-ITS: Energy Consumption with EEIS





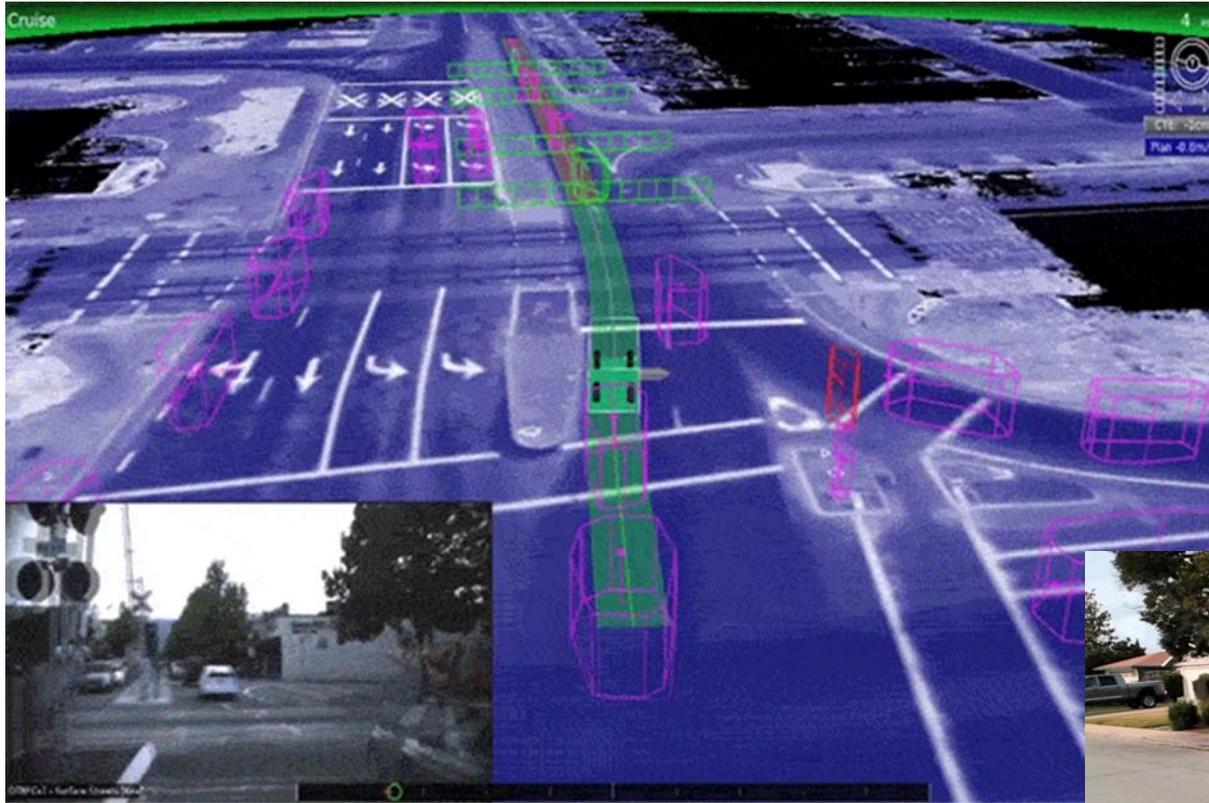
Autonomous Vehicles



- ▶ Centre for Connected and Autonomous Vehicles (C-CAV) works to promote them by:
 - ▶ leading innovating policy development in this sector
 - ▶ delivering a programme of research, development, demonstration, and deployment activity, worth up to £200 million
 - ▶ providing co-ordination across government departments
 - ▶ being the single contact point for stakeholder engagement



Making Sense of the Road Environment





UK Trials and Demonstrators

- ▶ Competition launched November 2014
- ▶ 4 cities will host trials:
 - ▶ Bristol
 - ▶ Greenwich
 - ▶ Coventry
 - ▶ Milton Keynes
- ▶ Bring driverless cars to public view
- ▶ Look at practicalities of how they could be implemented some time in the future
- ▶ First tranche of trials go live by summer 2016
- ▶ Further on road trials of autonomous cars and of platooning will be launched in 2017





Platooning

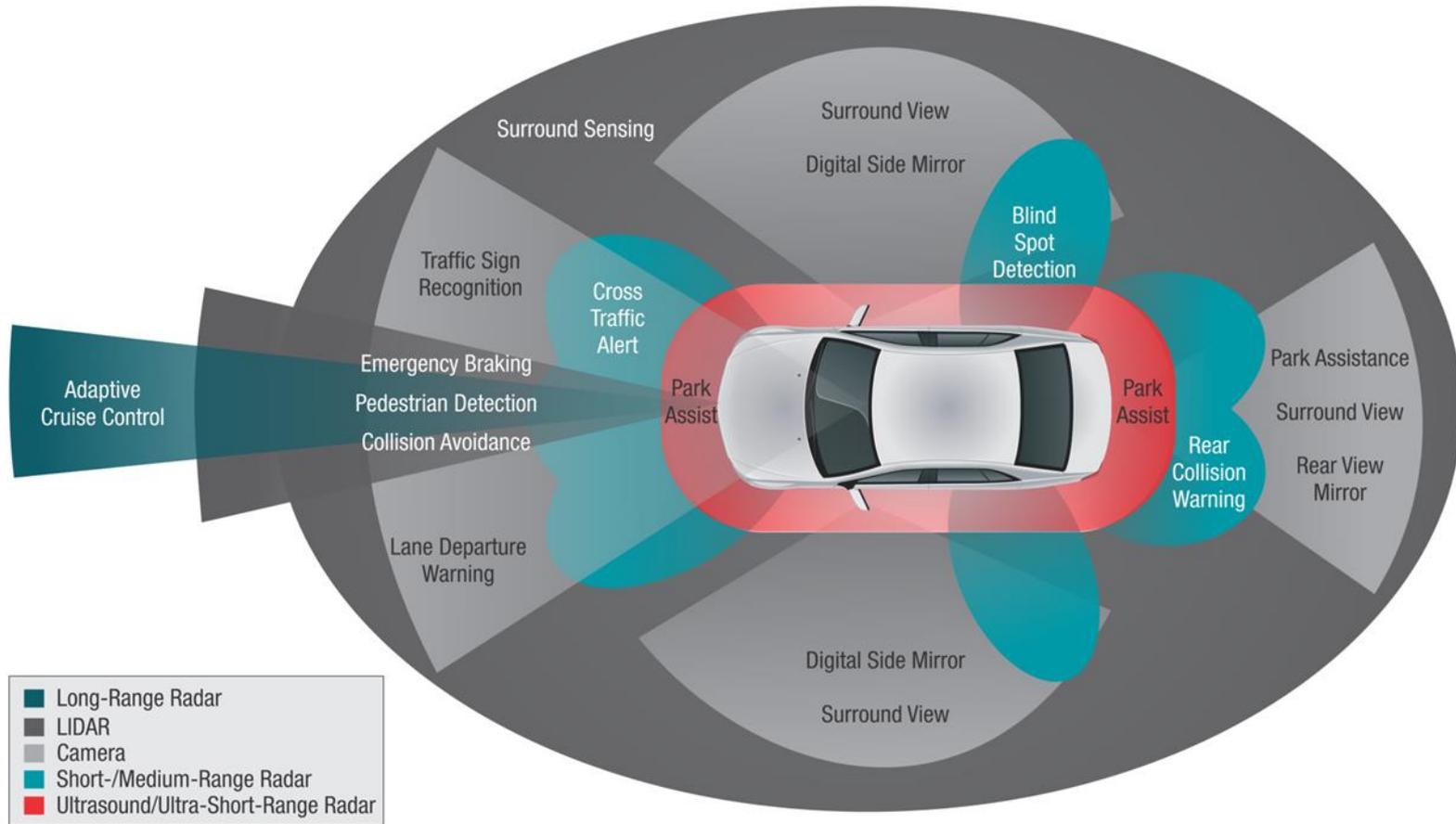
- ▶ Join vehicles together so they all follow the speed of the vehicle in front
- ▶ Potentially improve safety and increase road capacity
- ▶ Also can set optimum driving speed to reduce fuel use and associated emissions
- ▶ Some promising evaluation of reductions in fuel and energy from previous platooning trials in EU projects by significant margins ranging from 5-15%
- ▶ If driverless cars are 'crash-free' can we reduce their weight due to reduction in need for safety protection system – this will reduce fuel consumption and thus energy



[⑩ https://www.youtube.com/watch?v=tasa3D1vVTc](https://www.youtube.com/watch?v=tasa3D1vVTc)



Other Trends: Intelligent Vehicles





Other Trends: Insurance Black Box/EcoDrive

Eco-Driving or
Efficient Driving can
Improve fuel efficiency
By up to 20%

How to ensure the long
term effectiveness of
such strategies?

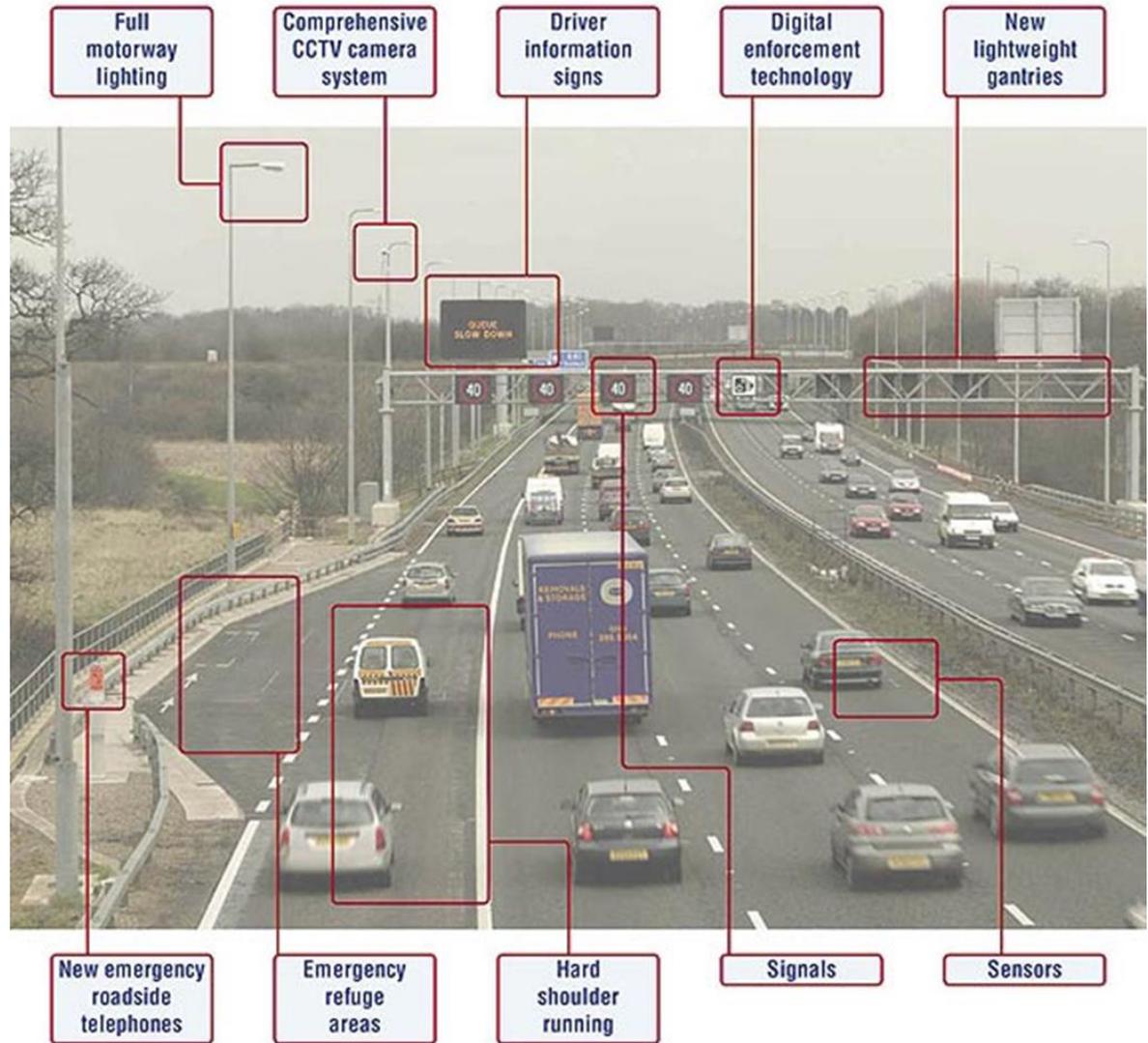




Other Trends: Managed Motorways

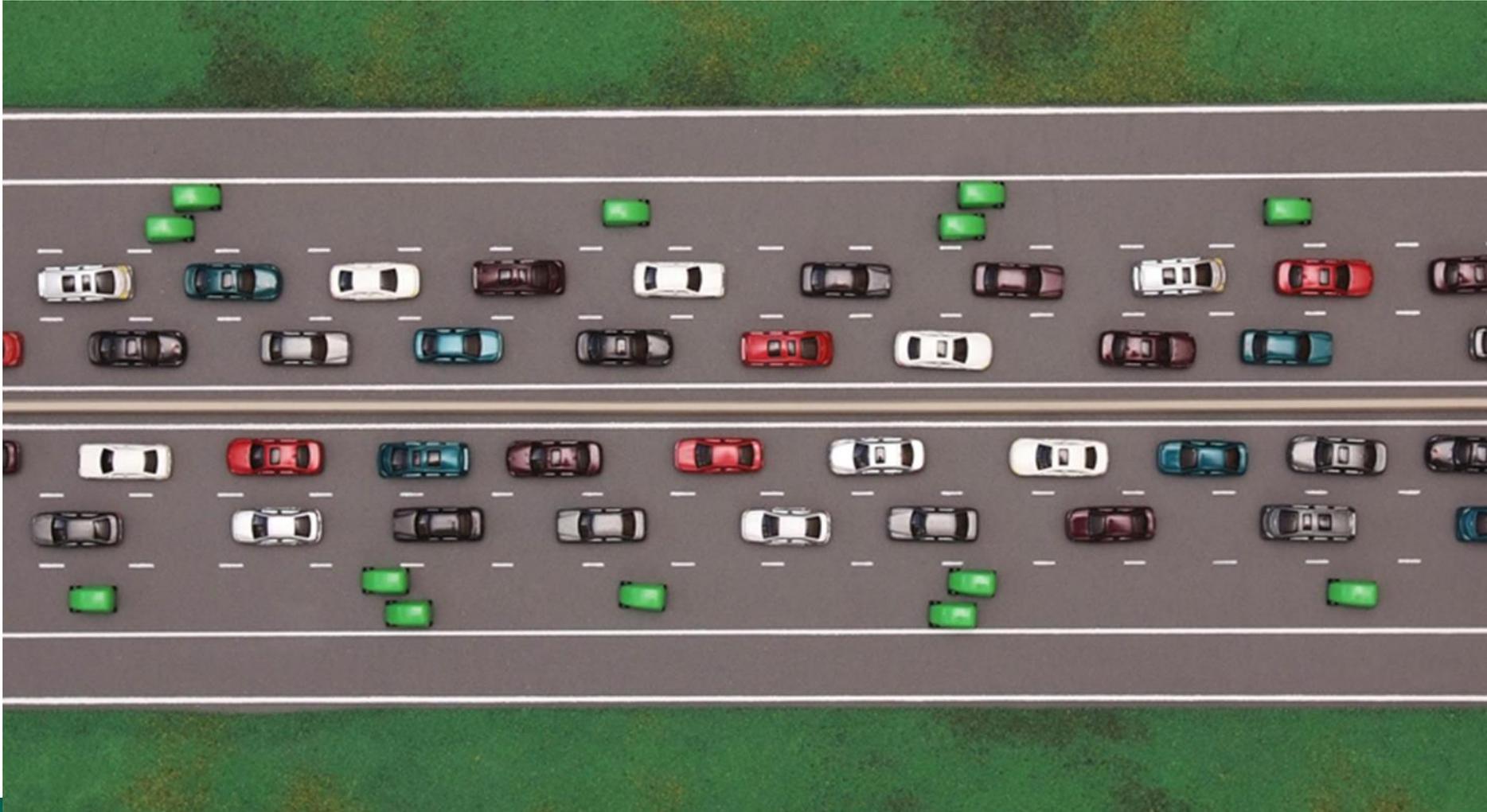
‘Smoother’ driving reduces fuel consumption by Up to 10%

Source: Highways England





Other Trends: Smart Capacity Management





Takeaways

- ▶ Challenges are international
- ▶ Need for Agility
- ▶ Role for Government
- ▶ Role for Research (H2020)
- ▶ Other key issues
 - ▶ Standards
 - ▶ Skills
 - ▶ People
 - ▶ Security and Privacy
 - ▶ Gather evidence of schemes effectiveness from energy reduction point of view





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