The Energy Infrastructure “Roadmap” for Transport

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Light vehicles in the UK

- Light vehicles are expected to remain central to UK mobility in 2050
- Cutting transport carbon emissions is expensive compared to most other sectors
- Light commercial vehicles represent a small but growing share of the light vehicle fleet
- Major strategic challenges of the coming decades around:
  - Congestion – a drag on the UK’s economic competitiveness, but there are political barriers to building new infrastructure
  - Decarbonisation – a major shift to lower carbon vehicles is expected to be needed

16% Light vehicles contribute around 16% of CO₂ emissions

1/3 Only around a third of UK car mileage is in urban areas. Over two thirds of UK mileage is on motorways and major “A” roads

400bn 400 billion person-miles are travelled by car each year – 10x more than rail and 20x more than bus/coach

28m There is a total park of over 28m cars
Light vehicles as part of the wider UK energy system

The ETI undertakes analysis of the overall energy system

ESME is used to identify the lowest cost system that meets:
- End use demands (given available resources)
- Overall CO\textsubscript{2} limits
Light vehicle options

- **Has an established, low cost, mature supply chain.** Is complementary to fuel supply for heavy duty vehicles.

- **Hybridisation, lightweight structures, improved aerodynamics and powertrain efficiency** could deliver a 50% reduction in fuel consumption by 2030 with a 10-15% increase in capital cost.

- **Can contribute to overall CO₂ emission reduction with relatively minor investment but steps need to be taken to ensure vehicle compatibility soon to enable longer term benefits to be realised.**

- **Considering both plug-in hybrids (PHEVs) and pure battery electric vehicles (BEVs). Hinges on the ability to supply the required electricity.**

- **Continued innovation could enable hydrogen fuelled vehicles to be successful. Development of a new hydrogen nationwide supply chain would be required for this to be rolled out.**
Consumer travel patterns

• Understanding how consumers use vehicles is critical for assessing the energy supply requirements of those vehicles
• The ETI worked with the DfT to develop a model of UK travel patterns, derived from the National Travel Survey
• Homes are by far the most frequently visited location providing the best opportunity for recharging of vehicles
• Less than half of cars regularly visit a workplace (despite this being the second most frequently visited location)
Charging at home

- The majority of homes have suitable parking and access for home charging
- Connections for most homes could support up to two 3kW charge points or a single 7kW charge point

For 3 or 7kW connections, parking durations at home (or work) generally far exceed required charging times, even looking at a range of battery sizes.
Electricity supply requirements

- Electricity supply must meet demand at any instant in time
- Generation capacity has to be sufficient to meet peak electricity demand
- Any increase in peak electricity demand (even if it only occurs once every few years) will require additional capacity in either storage or generation
- Peak electricity is extremely expensive to make available.
- The implications for vehicle recharging are especially significant for rapid recharge points.
- The decarbonisation of transport through electrification will rely on the decarbonisation of the power sector
Electricity infrastructure requirements

- Whilst individual properties have sufficient capacity for charge points, the distribution network does not have enough capacity for all dwellings to draw their maximum power demand simultaneously.
- The network is sized assuming everyone has different patterns of behaviour.
- An increase in local peak demand will trigger a need for significant investment in the electricity network or in local storage capacity.
- This is likely to be exacerbated by greater electrification of heat supply.
- A larger proportion of renewable generation would also impact the availability of electricity for vehicle recharging.
Final thoughts

• The automotive sector is a global industry and economies of scale play a large part in the platform development decisions that are taken

• Other sectors will have an influence over the viability and cost effectiveness of taking different pathways to decarbonising light vehicles. **These sectors will have their own drivers**

• There are critical considerations for the energy supply chain whichever route to decarbonising transport is taken

• Developing strategies to best exploit the different paths that could emerge will be vital to a cost effective and successful transition