



Transport fuelling options An artist's palette

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Meeting the 2050 targets **ENERGY** UK & EU Policy framework

- UK Carbon targets perspective transport
- RTFO
- FQD
- RED
- End Users
 - Regulations
 - cost/logistic requirements
 - Driven by Vehicle/Refuelling/Supply Infrastructure



The size of the challenge: A potential scenario to reach 15% renewable energy by 2020

Source: Energy Trends June 2009 and DECC internal analysis

Fuelling Options



- Fossil
- Biofuels
 - Bioethanol
 - Biodiesel
- Gas
 - LPG
 - CNG & Biomethane
- Electricity
- Future Fuels



Current fossil issues



- Average new car sold in UK in 2009 produced 150gCO₂/km
- Total UK transport emissions 131.9 MtCO₂ in 2008
- Carbon footprint of fuel from UK refineries likely to worsen by up to 4% due to changes in crude slate/specifications
- Continuing refinery closures could cause an increase in supply and price volatility
- EU refining balanced to provide more petrol than diesel. Future mix dependent on vehicle sales – continued shift to diesel or switch to small turbo petrols?



Biofuels



- E5/B7 already in use as regular unleaded and diesel
- Other blends such as E85, B30 and B50 were available from selected retailers and wholesalers in UK until Govt Duty Derogation change
- UCO has derogation of 20p/l until April 2012
- Possible to use High Blends for return-tobase refuelling
- CO2 savings dependent on feedstock and previous land use



• Food v Fuel

Electricity



- Source
 - Additional demand generated from coal, gas or oil at 114g/km typically
 - Renewables: 5.5% 2009; DECC aiming for 30% in 2020
- Charging/storage options
 - Grid capacity already under pressure
 - Smart metering could enable overnight charging using offpeak/renewable electricity
- Range vs charge time
 - Dependant on speed and topography
 - Citroen C1 ev'ie 7 hours for 60-70
- Plug in Hybrids





Gas-LPG



- 10-15% CO₂ saving vs petrol
- Cleaner burning vs diesel
- LPG available at 1500 UK filling stations
- Proven vehicle technology
- Badly affected by duty changes
- No commercial scale renewable option yet developed



Gas-CNG & Biomethane



- 10-15% CO₂ saving vs diesel
- Cleaner burning vs diesel
- CNG available through grid network
- Main market is commercial vehicles/vans/buses
- Biomethane from landfill/AD/sewage treatment
 - 74-110% CO₂ saving
- UK Govt incentives to produce
 - RHI: 4p/kwh
 - ROCS: 8p/kwh
 - RTFO: 0p/kwh
- Could supply 25% of UK liquid fuel demand



"Future Fuels"



- Hydrogen "Fuel of the future"
 - Cost/Infrastructure
- Advanced Biofuels (2nd/3rd Gen)
 - Biobutanol
 - More compatible with petrol
 - Refinery hydrogenated vegetable oils
 - More compatible with diesel
 - Advanced Processes
 - Lignocellulosic,
 - Gasification,
 - Pyrolysis,
- Algae



Conclusions



- Range of options to meet different requirements
- No silver bullet/"one size fits all" fuel
- 3 "C"s
 - Certainty
 - Legislation/Supply
 - Cost
 - Timeframe/Infrastructure v fuel
 - Critical Mass