



# The big picture of vehicle decarbonisation

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LowCVP is multi-stakeholder organisation tasked with accelerating the sustainable transition to clean, low carbon vehicles and fuels



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## **UK Greenhouse Gas (GHG) Emissions**



The UK's binding GHG reduction targets under the Climate Change Act dictate the rapid development and implementation of low emission technologies and fuels for the UK commercial vehicle, freight transport and logistics sectors

#### **UK GHG Emissions**

- Transport accounts for around 34% of all UK Greenhouse Gas emissions, the largest single sector (91% from road transport)
- Commercial vehicles (vans and HGVs) account for about a third of domestic transport emissions
- Emissions from commercial vehicles are rising in both absolute and relative terms
- This trend has to be halted and reversed for the road freight sector to make its contribution to the UK's binding 2050 GHG reduction targets (now 100%, "net zero", by 2050)
- Developing alternative fuels and clean vehicle technologies will be crucial to this decarbonisation effort

#### UK Transport GHG emissions by mode, 1990 and 2018



## **Freight sustainability hierarchy**



### "Avoid": Unnecessary journeys or freight movements "Shift": To more sustainable modes, e.g. rail "Improve": By deploying more sustainable vehicle technologies and fuels





What if the vast majority of urban deliveries were completed by plug-in vehicles?

What if many long haul trucks were supplied with energy on the move and were optimally sized?

What if there were a range of renewable and sustainable fuels available for combustion engines?

All would cut GHG emissions (gCO2e/tkm) and would often have wider, air quality benefits, too





## Low Emissions Freight Trials (LEFT)



LEFT involved various alternative fuels and technologies, combining in-service trials with lab-based emissions testing

- **Results will be published by LowCVP very soon** (webinars from July 2020 available to LowCVP members now)
- Technologies can be categorized in three ways, reflecting their decarbonisation and air quality improvement potential:

#### **Revolution Technologies**

- Can, in a wide range of suitable applications, help make substantial savings in diesel fuel consumption, energy use, tailpipe and WTW GHG emissions, even using current pump/grid average factors (typically 50-80% WTW)
- They have substantial air quality benefits, even over and above Euro VI (zero exhaust emission vehicles)
- In this category we place the Battery Electric Van and HGV

#### **Transition Technologies**

- Involve single-fuel or dual-fuel alternatives to diesel and, in the right applications with the right fuel production pathways, can help make moderate savings in GHG emissions (typically 10-40% with standard WTT factors)
- When combined with renewable energy sources, more substantial WTW savings can be unlocked (up to c.90%)
- But in the wrong applications and with higher-carbon fuel pathways, GHG WTW emissions can be no better or even higher than the diesel comparators
- They all have exhaust emissions and may only have limited complementary air quality benefits over and above the already very effective Euro VI systems
- In this category we place the range-extended electric HGV, the dedicated gas vehicles and the dual fuel vehicles (LNG-diesel and hydrogen-diesel)

#### **Evolution Technologies**

- Can be **applied to conventional, diesel-fuelled vehicles to help make small (but not insignificant) savings in diesel fuel consumption** (up to 10% or so), with consequentially similar savings in energy use and WTW GHG emissions. Logistical efficiency savings through reduced trips could also be achieved
- They will have **little or no direct air quality benefits** over and above Euro VI/6 diesel vehicles
- In this category we place the KERS trailer and various combinations of aerodynamic and/or lightweight trailers

### **Vehicle electrification**



- We are now seeing rapid market growth for electric cars (full and plug-in hybrids)
  - 10% of new sales in 2020 likely, 15% in 2021...
- Lots of new models available and more coming soon, 300-400 mile range now feasible
- UK government (and several others) looking at mandating 100% EV sales by 2030
- Van market a few years behind cars but similarly rapid growth likely, with several new models becoming available
- Growth accompanied by expansion of public charging infrastructure and improving user experience
- Electrification of HGVs well behind cars and vans, but an early-adopter market is emerging, e.g. Arrival
- Initial focus on urban/city delivery vehicles and RCVs, up to 26t 100% sales by 2035 (12t) -2040 (26t)?
- For long-haul artics, future electrification options less clear:
  - Electric Road Systems on major roads?
  - Ultra-rapid charging network?
  - Battery swapping stations?
  - Hydrogen fuel-cells?
  - 100% by 2040-2050?



- Key enablers include battery development (size, weight, cost) and depot-based fleet charging infrastructure
- Need large-scale technology trials in 2020's to develop/evaluate the solutions and inform policy makers and industry

## **Renewable fuels for HGVs**



#### There are a portfolio of technology and fuel options...

Transport Energy Network has developed cross transport sector technology and fuels roadmap to 2050



Zero emission truck market in its infancy, few BEV models, no HFC on sale

Niche supply chains for sustainable hydrogen in transport, large volume supply chains unlikely before 2030

High blend biofuels (>20%) most promising solution for long-haul and regional duty cycles – new vehicles and existing fleet

95% UK HGV fleet run less than 10 vehicles, economically unviable for many to deploy back to base refuelling infrastructure. Implications on how HGV operators can decarbonise their fleet

#### **Deployment of high blend biofuels in the UK**

LowCVP estimates c1500 HGVs deploy high blend biofuels - biodiesel, HVO, biomethane

Factors influencing deployment:

- Sustainability strategy and GHG emission reduction targets
- Customer preference for sustainable and lower carbon products & services
- Company GHG reporting, Scope 1 and Scope 3
- Task Force on Climate-related Financial Disclosure
- Procurement standards, especially for local authorities
- Whole life cost vehicle and infrastructure, running cost savings
- Annual mileage, vehicle compatibility and refuelling infrastructure

#### HOWEVER - more interventions are required to accelerate market adoption

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LowCVP has produced a free <u>Renewable Fuels Guide</u> to raise awareness about the different renewable fuel options available



# There are no free rides on the road to zero



#### Electrification in some form (or forms) is probably the long-term solution, but...

EV uptake scenario	100% of new N2	100% of new N3 rigids	100% of new N3 artics
Pessimistic	2040	2045	2050
Reference	2035	2040	2045
Optimistic	2035	2035	2040

- LowCVP modelling suggests demand for combustion fuel will remain at or around 8 billion litres throughout the 2020's under all electrification scenarios
- Demand falls to < 1 billion litres equivalent in the 2040's under all scenarios
- Demand in the 2030's highly dependent on specific EV uptake scenario but is **likely to remain substantial**
- Decarbonising this residual combustion fuel demand could spread our risks, allow all HGV operators to make a contribution and help develop low carbon fuel pathways for other sectors like aviation and shipping



The key questions now are **how much of this fuel demand can be supplied by sustainable biofuels and/or e-fuels, and by when?** Ongoing LowCVP project to try to work this out!

### **Policy context**



- While the ICE phase-out date for cars tends to grab the headlines, there's plenty else going on
- The Govt's Transport Decarbonisation Plan is expected by the end of the year
  - Consultation during Summer 2020
- In 2018, the Government agreed (with RHA and Logistics UK) a voluntary, industry-supported commitment to reduce HGV GHG emissions by 15% by 2025, from 2015 levels
  - Progress being overseen by the Freight Emissions Reduction Group
  - But emissions rose by another 5% to 2018, so target effectively now a 20% reduction
  - Getting information on fuel and emissions saving measures to hauliers, especially SMEs, vital to success, e.g. by enhancing the Freight Portal website (<u>www.thefreightportal.org</u>)
- New HDV CO2 regs EU requirements for 15% improvements by 2025 and 30% by 2030, transposed into UK law
- Enhancements planned for the **plug-in grant schemes** for vans and HGVs (new LowCVP project)
- Developing a framework to define **Ultra-Low Emission Trucks** (ULET)

# The TRU challenge(s)

- The Cold Chain sector is a key component of the wider freight industry
- It shares the same pressing need to decarbonise
- Crucially, it lags behind the HGV sector in air quality improvement terms, so reducing pollutant emissions will also become increasingly important and urgent
- Alternatives do exist but need proper evaluation and supportive regulatory, market and economic environment
  - Alternator and PTO-driven TRUs (benefit from Euro VI aftertreatment systems)
  - Zero-emission solutions
  - Cleaner fuels
- LowCVP project in 2018/19 to develop a representative emissions test procedure
  - Indicates that particulate emissions from existing TRUs may be around 200 times higher per km than Euro VI HGV
  - Further work being planned to carry out more baseline testing and evaluate alternative technologies





### Takeaways...



- Deep cuts to road transport GHG emissions are necessary over the next three decades to meet the 2050 net zero target
- We shouldn't rely solely on improving vehicles and fuels; Avoid and Shift, too
- There are no free rides on the road to zero electrification can do a lot, but only in the very long term
- Sustainable renewable fuels have a critical role to play in decarbonising HGVs over the intervening period, for both new and existing vehicles
- Transport Refrigeration Units need to decarbonise, too, and get much cleaner
- Solutions are available but require proper evaluation and faster, wide-scale adoption

# **THANK YOU for listening!**

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