Zemo Partnership response to: "Consultation on when to phase out the sale of new, non-zero emission heavy goods vehicles"

Zemo Partnership (previously the Low Carbon Vehicle Partnership) is a public-private partnership established in 2003 by UK Government. Our original mission was to accelerate the shift to lower carbon vehicles and fuels within the road sector, and to create opportunities for UK business. With the Net Zero target now legislated in UK our revised focus is on clear steps to accelerate the move to zero emission mobility in the UK, whilst continuing to focus on UK business opportunities. From personal transport to freight, fleet and fuels, we are determined to create a shift in the way people think about mobility — and steer them towards a future of zero emissions, sustainable transport that's better for all, whilst minimising the impact of the existing vehicles and fuels.

Around 230 organisations are engaged from diverse backgrounds including automotive and fuel supply chains, vehicle users, academics, environment groups and others. Zemo is a not-for-profit, independent partnership, jointly funded by government and our members, whose breadth of backgrounds and perspectives make us unique.

A workshop for members to discuss this consultation and its proposals was held on 12th August 2021. The workshop sought to draw out the key barriers and opportunities to setting end dates to the sale of new, non-zero emission HGVs as well as achieving a fully decarbonised HGV fleet. This submission draws on many of the member contributions to that workshop, and was reviewed by a select group of key industry expert members, but is from the Zemo Partnership secretariat alone - it does not necessarily represent the specific positions of any one member or group of members given the diverse views articulated within the workshop.

The MIRO board and comments made (unattributed) can be made available for review and discussion with the DfT team should this be of benefit.

Executive Summary

We firmly support the ambition to move away, in a carefully planned and measured manner, from conventional, combustion-engine HGVs, with all their attendant energy inefficiencies and tailpipe pollutant emissions. We must emphasise, however, that simply being of zero tailpipe emissions is no guarantee of being net zero greenhouse gas (GHG) emissions and, conversely, a combustion-engine vehicle using fully

renewable fuel can already be close to net zero (or even net negative GHG emissions). The transition must, therefore, consider where the fuels and energy for HGVs come from, and all the emissions associated with their production, storage and distribution – i.e. Well-to-Wheel (WTW), not just Tank-to-Wheel (tailpipe) emissions impacts and ultimately life cycle and resource impact considerations.

For so called "Zero-Emission HGVs", commonly and currently understood to mean either with fully battery electric or hydrogen fuel cell propulsion systems, this means DfT must remain mindful of where the electricity and/or hydrogen come from. Particularly in the case of "grey" or "blue" hydrogen, Zemo's own research and those of others shows clearly that in some cases overall WTW GHG emissions impacts can be greater than the diesel HGVs being replaced. Even with "green" hydrogen, although GHG impacts can be eliminated, substantial impacts are likely for our renewable energy generation and distribution systems, potentially two to three times over and above those needed for fully electric HGVs, by virtue of the inherent and substantial energy efficiency penalties in hydrogen production, distribution and use on the vehicle (in either combustion or fuel cell powertrains).

While setting long-term goals for their phase out from new vehicles is welcome, combustion engines are the mainstay of almost all current road freight activity in the UK. Even with these goals, such vehicles will still be supplied and used in very great numbers from now until well into the 2040s, if not beyond. We must also therefore emphasise the crucial transitionary role of renewable liquid and gaseous combustion fuels in decarbonising the many billions of non-zero HGV kilometres that will be driven over the next two or three decades. This is not in any way flagged up as a reason not to pursue the most rapid transition to net zero WTW and zero tailpipe emission vehicles feasible. Rather, it should be seen as a highly effective complementary measure to quickly decarbonise the road freight sector while simultaneously building net zero fuel supply capacity for other (hard to electrify) sectors in the longer term.

Finally, we must also highlight that the technologies and supporting infrastructure to achieve these goals, particularly for long haul freight movements, are still very much in their infancy. The planned (and very welcome) Zero Emission Road Freight Trials (ZERFT) will, hopefully, provide some greater degree of certainty but substantial further technological advances and disruptions are quite likely in the years that follow. We therefore recommend that the phase out dates, the vehicle categories they apply to, and the preferred mix of technologies (e.g. between fully electric and hydrogen fuel cell vehicles) be kept under regular review, together with ongoing review of international (particularly EU) developments, given the global nature of the truck supply industry.

Responses to individual questions

Q1: Do you agree or disagree that introducing a phase out date for the sale of new non-zero emission HGVs will help us meet our legally binding net zero target?

Yes, we broadly support this approach, but only if attention is paid to where the energy comes from, i.e. zero tailpipe is not sufficient, Well-to-Tank (WTT) emissions must be net zero, too and a full Well-to-Wheel approach should be taken to minimise GHG in the transition to fully Net zero solutions.

Net zero can be achieved in several ways, including BEV, FCEV and ICE. HGVs should aim to be as close to absolute zero Well-to Wheel (WTW) emissions as possible so complementary policies are needed to ensure use of renewable, sustainable fuels and pathways. Close attention should also be paid to wider, life-cycle impacts to ensure, for example, that renewable energy is widely used in vehicle and battery production, that precious metal and other resource impacts are managed sustainably and that end-of-life recycling and disposal options are in place.

Zero tailpipe emission technologies, however, especially full electrification, should be favoured, on grounds of air quality, cost minimization, energy efficiency and resource use. This is an opportunity to be seized, for a step change improvement in road freight sustainability.

If hydrogen has a significant role to play in future HGV propulsion, “green” hydrogen (from electrolysis of water using renewable electricity) should be favoured over “blue” hydrogen (from fossil fuels with varying degrees of carbon capture and storage). Any use of “grey” hydrogen (from unabated fossil fuels) in road transport should be prohibited immediately as overall GHG emissions will be greater than equivalent conventional diesel vehicles.

Some members also favour an interim approach of what might be termed “near zero” emissions with Net Zero GHG, eg Green Hydrogen combustion technology or indeed next generation conventional combustion using biomethane or HVO. Some early incentives to stimulate the supply of these fuels whilst maximising the air quality reduction capabilities, may help accelerate and support the transition to the true zero tailpipe emission solutions (and zero GHG energy system) in the timelines proposed.

Q2: Do you agree or disagree with our approach to split the phase out dates for new non-zero emission HGVs into two weight categories? and

Q3: Do you agree or disagree that 26 tonnes and under, and more than 26 tonnes are the right categories?

No, we do not agree with these suggestions and believe a more nuanced/sophisticated approach would be better given the complexity of the market. We advocate an approach that more closely matches vehicle categories to typical duty cycles according to their likely readiness for ZEV technologies.

Following the HGV categories already in place in UK law, courtesy of the UK's adoption of the EU Heavy-Duty Vehicle (VECTO) regulations, would seem to make much more sense. It would allow effective distinction between rigid HGVs and articulated HGVs with very similar gross vehicle weights. It would also make use of a regulatory framework already in place and widely understood and used by vehicle manufacturers.

Furthermore, we suggest that following the light duty vehicle example by adding earlier dates for "significant zero emission capability" would also be useful, particularly at the boundary between light duty (N1 vans) and smaller (N2) HGVs.

The Table presents our initial ideas for a potentially more appropriate categorisation system. We would welcome opportunity to engage with DfT in developing these ideas.

Vehicle Description	HDV (VECTO) Groupings	Significant ZE Capability Date	ZE only date	Notes
N2 large vans and rigid HGVs up to 12t gvw.	0, 1 & 2	2030	2035	As per N1 vans
Most common N3 rigid HGVs	3, 4, 6, 7, 9, 11, 15 & 16	2033	2035	Includes general haulage rigid HGVs, RCVs and 8x4 tippers, typically used in city/urban/regional applications well suited to electrification.
All other HGVs	5, 8, 10, 12, 13, 14 & 17	2038	2040	All articulated HGVs and other rigids, typically used in applications more challenging to electrify.

There is also a good case for interim milestone targets to be set to ensure product availability for early adopters, cost saving innovations to be developed and a phased roll-out of charging/fuelling infrastructure, for each vehicle category, e.g. 10% by 202x, 50% by 203x.

Q4 & Q7: Do you agree or disagree with our proposal to end the sale of new non-zero emission HGVs, for vehicles weighing up to 26 tonnes by 2035 and more than 26 tonnes by 2040? and

Q5, Q6, Q8 & Q9: What do you consider the main challenges and barriers to meeting these targets? How can these be addressed?

Yes, we believe the 2035-2040 timeframe for all new HGVs to be zero tailpipe emissions is ambitious but achievable, and desirable for both net zero and air quality goals. The immediate challenges are largely around kick-starting the early-adopter market and, in the longer-term, the timely roll-out of energy supply infrastructure, developing the second-hand market for ZE vehicles and ensuring the UK remains an attractive market for (predominantly EU-based) HGV manufacturers.

The BEV car market has led the way and set an example – going from near zero sales to 10% in less than a decade and likely set to reach very close to 100% in the next decade. The urban bus market is perhaps an even better exemplar for the HGV sector which, with effective (and generous) incentive mechanisms, is also seeing rapid uptake of ZE technologies and is well placed to achieve 100% ZE new vehicle sales by 2030 or earlier.

Charging infrastructure, battery technologies, funding/financing mechanisms and vehicle availability are all developing at pace in the bus sector and can provide useful lessons for the following (N1/N2 first, then N3 HGV) sectors. The specific needs of HGVs need urgently to be factored into the development of infrastructure plans, standards and policy support mechanisms – focusing too heavily on car charging needs, risks missing important overall system efficiency and cost minimisation opportunities.

This timeframe aligns with our high-blend biofuels modelling work (published in March 2021), which had 2035 and 2040 as the "fast" (i.e. most ambitious but still achievable) EV uptake scenario. It also aligns with the stated intentions of several of the OEM manufacturer community.

Battery supply is unlikely to be a major constraint, with new BEV HGVs implying only marginal additional demand compared to cars and vans in 2035/40.

Grid-level electricity supply is also unlikely to be an issue as BEV HGVs will need substantially less overall energy (per day) than the many millions of BEV cars and vans that will be on our roads in that timeframe, however Local charging systems with potentially multi megawatt level demands may be a significant barrier for wide scale BEV solutions in the heavier sector

It is almost certainly unrealistic to expect a similar level of per-vehicle incentives for HGVs as has been the case for ZE buses, due to their much greater prevalence and consequent impacts on public finances. Creative mechanisms will therefore need to be developed to overcome the potentially high up-front costs of moving to ZE vehicles and general industry inertia. Maximum weight allowances are potentially one such mechanism (discussed later). Another must surely be some degree of cross subsidy from conventional diesel HGV users to early ZE adopters, e.g. via fuel duties, vehicle excise duties, etc. A key priority should be developing ways to more fairly and affordably apportion the costs of depot-based charging infrastructure development. Current work within EVET highlights the challenge of (and some solutions to) the current grid connection cost inconsistencies Smart infrastructure technologies will need to play an important role in helping to manage the cost of getting energy to an electric HGV fleet particularly in depot based operations. There is thus a need (and opportunity) for government to stand behind this new market. Another priority is ensuring a proportion of ultra high-power chargers for cars can also be accessed by HGVs, especially on the Strategic Road Network.

Q10: Do you agree or disagree that these phase-out dates should be extended to all non-zero emission HGVs, including those using low carbon fuels, in their respective weight categories?

Our high-blend biofuel study, and other research, firmly suggests there is a clear, urgent and significant interim role for renewable, sustainable combustion fuels in replacing what would otherwise be fossil diesel/gas in 2020s-40s and (in other sectors) beyond.

The pace and scale of technological development and infrastructure roll-out over the next two decades cannot be predicted with certainty. The continued use of net zero combustion fuels in new vehicles after 2040 may remain necessary in a few niche applications. On ongoing process of review is needed to inform long-term target setting.

Note “zero tailpipe emissions” does not, we assume, include water vapour (which will be produced by fuel cells) nor does it necessarily exclude ICE with full exhaust emissions capture or after-treatment of all toxic pollutants. Technology neutrality should be maintained given the view of some members that hydrogen combustion may be able to deliver zero emission equivalence with similar efficiency to fuel cell but lower technology and resource costs.

Formal plans to eliminate the use of all fossil fuels in road transport (and the energy generation to power it) by 2050 at the very latest would be appropriate to set the ultimate net zero backstop and send a clear signal to industry.

A core challenge to the development and uptake of lower carbon solutions has been the lack of robust quantitative data on freight efficiency or intervention impacts. With highly sophisticated telematics now ubiquitous and "big data" capabilities in place, urgent work to establish, embed and monitor the most effective freight metrics, would be highly beneficial in recording and stimulating progress and policies to deliver the GHG reductions. The LEFT trials and data delivered provide a template for robust monitoring and dissemination to hep industry engage with the decarbonisation agenda

In the timeframe under discussion, metrics on full life cycle GHG will be common place and Net Zero assessment will incorporate consumption emissions. Hence LCA aspects should be considered within the freight sector during the ZERF trial period. Early investigation of these factors is a necessary aspect of technology assessment prior to selecting the preferred mass uptake technology solution

Q11: Do you agree or disagree that maximum permissible weights for certain zero emission vehicles should increase by up to 2 tonnes (without exceeding 44 tonnes)?

Q12: Do you agree or disagree that weight limits should increase by up to a maximum of 1 tonne for certain alternatively fuelled HGVs (without exceeding 44 tonnes)? and

Q13: Do you agree or disagree that weight limit increases should only offset any additional weight due to the alternatively fuelled or zero emissions technology?

Additional weight allowances, while retaining existing maximum permitted axle-loads, could be used to provide some additional productivity incentives to operators, in suitable applications (especially for early-adopters). Such incentives should be targeted at zero emission vehicles only and options for vehicles operating at over 44t should be seriously considered in specific defined situations (alongside wider freight efficiency opportunities including modal shift to electrified rail).

The scope for such incentives to be used, however, is likely to be quite limited as many hauliers do not routinely operate at close to maximum permitted mass and, even if they do, accommodating additional payload within axle-load and (for artics) fifth wheel loading constraints may not always be possible. Ongoing engineering innovations in light-weighting of chassis and body materials are also very likely to assist in the general productivity of HGVs, while any weight penalties from ZE technology deployment (especially batteries) look set to diminish or vanish entirely over the course of the next two or three decades as new technologies are developed and mature.

Existing axle load limits should be maintained to protect road/bridge infrastructure etc, but, as the highly successful Longer Semi-Trailer trials have clearly demonstrated, measures that fundamentally improve the efficiency of freight activities help to reduce overall vehicle numbers, distances travelled and congestion, minimise emissions and optimise energy efficiency, too.

Providing meaningful freight-efficiency improvement opportunities, particularly to the early-adopter community of ZE HGV operators, would, we believe, be a good way of supporting the business case and thus accelerating uptake.

Further references/evidence base:

http://zemo-ebooks.org.uk/2021/Hydrogen-WTT-Pathways-Study-Summary/#p=1

https://www.zemo.org.uk/work-with-us/fuels/the-renewable-fuels-assurance-scheme.htm

https://www.zemo.org.uk/assets/lowcvpreports/Market_opportunities_decarb_HDVs%20using%20HBRF_2021_.pdf

https://www.zemo.org.uk/assets/reports/LowCVP-LEFT_Dissemination_Report-2020.pdf

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