Why haven’t electric HGVs and clean hydrogen technology taken off yet?

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BeyondWords

Dr Christopher de Saxe, Head of Sustainability at Zeus, asks why haven’t electric HGVs and clean hydrogen technology haven’t become widely adopted yet.

Since 1950, global carbon emissions have increased by almost eightfold, while nearly doubling since just 1980. This climate emergency shows no sign of abating, with nine out of the ten warmest years on record having been in the last nine years and June 2023 was marked by NASA’s global temperature analysis as the hottest June since records began.

Supply chains, which generate around 60% of all carbon emissions globally, are under more pressure than ever to act. However, the industry has a notoriously stubborn reliance on fossil energy sources, making it difficult to achieve any meaningful sustainability targets on a coordinated industry-wide scale.

While improved energy and transport efficiency can help reduce these emission levels, the goal of net zero supply chains must be to incorporate a complete substitution of fossil fuels with clean alternatives. Biofuels also have an important role to play in the transition, and possibly for some use cases well into the future, but more on this later.

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In recent years, we have seen increased discussion in both industry and government circles about what the dominant net zero solution will be for heavy goods vehicles: battery electric or hydrogen fuel cell electric. Another possibility is that it will be a homogenous mix of these technologies, however, experience suggests that this is an economically sub-optimal solution and an unlikely outcome with one solution dominating just as diesel has for the last 100 years.

Ultimately both technologies offer a feasible pathway to net zero emission road freight, assuming that the carbon intensity of the electricity grid also tends towards zero in the same timeframe and that the hydrogen is “clean” hydrogen (i.e., produced via electrolysis using 100% renewable energy). There are of course significant barriers to overcome for either of these solutions.

Commercial application at scale is dependent on the effective development and adoption of charging/refuelling infrastructure, as well as the acquisition of completely new vehicles at what is currently a significant price premium. This feels particularly challenging in these times of increased austerity and ongoing geopolitical instability.

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Of the two technologies, battery electric vehicles are increasingly looking like the de facto solution given the higher maturity of the technology and the inherent inefficiencies and hence the costs associated with the production of true clean hydrogen. We should, however, not ignore the embodied carbon inherent in the production of large battery packs and limited recycling capabilities at present, as well as the additional weight penalty imposed on some vehicles by these batteries.

This is a small consideration relative to the total in-use emission savings relative to diesel, and this margin is increasing with each passing year. Additionally, there remains a significant opportunity for the industry to optimise its transport operations and charging infrastructure so not all HGVs require 500+ kWh battery packs.

Dynamic charging solutions such as Electric Road Systems offer another attractive possibility to substantially reduce the necessary battery sizes needed for future eHGVs and actively recharge vehicles while they are on the roads.

There is, however, an impactful mid-term or “transition” solution that has already shown significant results – and one that even the European Union (EU) admits holds the key to achieving climate goals. This is the use of renewable fuels such as waste-oil-derived hydro-treated vegetable oil (HVO100) and biomethane (bio-CNG and bio-LNG).

Both of these fuels can reduce greenhouse gas and particulate emissions by up to 90% relative to diesel, while HVO has the added benefit of being a “drop-in” solution compatible with existing diesel vehicles. Mainland Europe, where HVO is actively manufactured, has already benefitted from faster adoption and application of this fuel with sales growing significantly over the last six months.

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However, we do need to remember that it’s not only the technology itself that is holding back climate-positive freight developments. It’s also the willingness of shippers to help cover the increased costs associated with new fuels, assets and infrastructure.

Zeus recently conducted a study of 310 large shippers (with revenues over £1bn) across UK and Europe and found that nearly a third were not willing to pay a premium for zero-emission freight, while those that were willing to pay were only willing to pay a small premium of no more than 10%. This was echoed in a recent BCG survey on green maritime shipping, which showed that most respondents would not pay more than a 5% premium.

Any new technology relies on collaboration, coordination and, most importantly, the willpower to create change to deliver strong and effective results. The creation of bodies such as the Sustainable Freight Buyers Alliance and the Global Logistics Emissions Council, which

helped deliver the latest ISO 14083 on universal reporting of freight emissions, are important steps in the right direction. But, if we are to truly reach our net-zero and decarbonisation targets quickly, we all need to recognise that we have a part to play and a small price to pay.

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