

Keeping on trucking in a net-zero future



Mike Scott reports on how incentives in the U.S. Inflation Reduction Act will speed uptake of low-carbon heavy-goods vehicles

Medium and heavy trucks were responsible for 22% of emissions from the global transportation sector in 2020.





MICHELE TANTUSSI/REUTERS

As the focus of decarbonisation efforts switches from power generation to transportation, on the roads one sector stands out as needing urgent action.

Trucks make up a tiny proportion of vehicles. In the UK market, for example, they make up just 1% of vehicles. Yet in 2020, medium and heavy trucks were responsible for 22% of emissions from the global transportation sector.



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CDP

This means tackling emissions from trucking is both a huge challenge and a significant opportunity to cut emissions rapidly. Pressure is growing on the industry to act, both from regulators and hauliers' customers, which have their own net-zero targets to meet and are starting to focus on their Scope 3 emissions, including those in their supply chains.

The European Commission this month announced that heavy-duty vehicles will have to reduce their emissions by 45% by 2030 and 90% by 2040, while the U.S. will see diesel truck sales banned from 2040 at the latest, the same as for the UK.

Yet, according to Amir Sokolowski, global director for climate at CDP, the sector is not well-prepared for the change that is coming. A 2021 CDP assessment found that almost 40% of road logistics companies "face serious risks that could undermine their profitability and ability to successfully implement a low-carbon transition plan".

However, more than a third of companies had not set any target to reduce emissions, and 41% were members of trade associations that hold positions >

A hydrogen filling station for trucks and cars in Berlin, Germany, in January 2023.

on legislation that could hinder progress towards a low-carbon economy, CDP said. "This suggests that not only are many road logistics companies failing to transition to a low-carbon future, they are also supporting organisations actively working against it."

In the long run, zero-emission trucks will be powered either by batteries (the most likely option) or, in certain niche applications, hydrogen, either used in fuel cells or burnt in a combustion engine.

But getting to that point will require huge investment in the trucks themselves, and also in the accompanying infrastructure and component parts, such as batteries and recharging facilities, or hydrogen fuelling stations.

Zero-emissions trucks are significantly more expensive than their diesel counterparts currently, and the freight industry runs on extremely tight profit margins, so incentives for operators will be important for the early years of the sector's development.

In the United States, for example, the Inflation Reduction Act includes tax credits of up to \$7,500 for light- and medium-duty vehicles, while for heavy-duty vehicles, the credit is \$40,000. And unlike for passenger vehicles, there is no requirement for battery components or minerals to be sourced from particular sources.



Low-hanging fruit includes fitting low rolling resistance tyres, using more aerodynamic trailers and eco driver training

CHRIS DE SAXE,
Centre for Sustainable Road Freight

Think-tank Energy Innovation estimates that the credits will mean that 38% of light and medium trucks will be electric by 2030, more than double the 17% if the act had not been passed. And 27% of heavy-duty trucks will run on batteries, almost triple the pre-IRA forecast for 2030.

LOW-HANGING FRUIT

There are a number of "no-regrets" short-term options freight operators can take to reduce their emissions, says Chris de Saxe, senior research associate at Cambridge University's Centre for Sustainable Road Freight. "Low-hanging fruit includes fitting low rolling resistance tyres, which can save 1-5% of CO2 equivalent (CO2e) emissions, using



MARK ESLICK/FLICKR

more aerodynamic trailers (6-9%) and eco driver training (about 7%)."

Giving drivers better information about the upcoming topography of the road will also help them to use coasting where appropriate to reduce fuel use, he adds.

Another no-regrets move would be to start upgrading electricity grids now to make them better equipped to accommodate the recharging requirements of large vehicles, says Lauren Pamma, director of the Green Finance Institute's Coalition for the Decarbonisation of Road Transport.

Almost 35% of all heavy truckload miles in the U.S. are driven empty, with trucks dropping off deliveries but not restocking for the next portion of their route, or running empty on the journey to pick up materials, according to research by Convoy, a company that reduces inefficiency in trucking by digitally connecting shippers and carriers.

"Eliminating empty miles could thus reduce a significant portion of freight emissions," says Will Diebel, a researcher on supply chain emissions at Ivey Business School in Canada. This is becoming increasingly possible with the rise of the digital economy, but progress is hampered by the fragmentation of the transport and logistics sector: there are one million carriers in the U.S., 90% of which have six trucks or fewer. In addition, manufacturers and retailers make shipping decisions in isolation, not just from other companies but even with their own operations.

Transport and logistics brokers are starting to amass huge quantities of data from shippers, carriers and receivers of freight and use it to >



increase operational transparency, enable the co-ordination of shipments and demonstrate the economic value in eliminating empty miles.

For example, CHEP, a transport and logistics broker, used a “transport matching tool” to facilitate partnerships with about 30 companies, identifying overlapping routes between retailers and manufacturers and removing 2.5 million empty miles from the system – and with it approximately 4,000 metric tons of CO2 emissions.

Progress on zero-emissions trucks has been slow to date, in part because freight operators, manufacturers and governments have been unsure about which technology will prevail: battery electric vehicles (BEVs) or hydrogen. EVs are starting to become mainstream for passenger vehicles as costs come down and the range of batteries extends, and they are seen as the clear winner for deliveries in urban areas, where trip distances are limited and vehicles can recharge overnight at depots.

For longer distances the jury is still out, though many observers believe BEVs will dominate. “At the heavier end of the spectrum, things are a bit more complicated, but I think electric is the way forward,” says de Saxe. “With electric trucks, you transmit the electricity over wires directly into batteries or an overhead charging system – but it stays electricity and the losses are quite small. About 70-80% of that electricity is delivered to the wheels of the truck.

“If you use green hydrogen, you use renewable

Amazon Rivian Electric trucks on charge in California. EVs are seen as the clear winner for deliveries in urban areas.



With electric trucks, about 70%-80% of the electricity is delivered to the wheels of the truck; with green hydrogen you only get 25% of that energy at the wheel

CHRIS DE SAXE

electricity and electrolysis to create hydrogen, then you transport the hydrogen to where it is needed and run that through a fuel cell. That means that you only get about 25% of that energy at the wheel. It seems that it will always be significantly more expensive, so it’s hard to see how it will be sustainable,” he adds.

A scale-up of BEV trucks will place a lot of strain on the transmission network, he adds, but the challenges are smaller than for hydrogen, where there is virtually no infrastructure currently. Hydrogen may find some niche applications, for example if hydrogen is readily available as a by-product of a chemical process or on remote routes without good electricity infrastructure. >



One solution that reduces the requirements on the grid is “electric road systems”. These allow trucks to charge while on the move, reducing the strains on the transmission system at any one time and also allowing trucks to have smaller batteries, reducing their weight and helping to improve efficiency.

The charging can be through either overhead catenary charging systems or induction systems embedded in roads. Catenary systems are much cheaper than induction, so any electric road systems are likely to involve these. However, they are still expensive, says Nadine Mingers, clean trucks officer at Brussels-based campaign group Transport & Environment, so they are likely only to be used on specific routes with a high density of heavy trucks, such as between ports and logistics centres.

Elsewhere, BEV trucks will still require a lot of charging infrastructure to be built, she adds. Much of this will be built by private companies in sectors such as logistics, utilities and retailers, but there is also a need for a network of public chargers so that trucks can recharge while travelling across country.

Increasingly, truck manufacturers are taking it upon themselves to build facilities themselves. In Europe, for example, Milence, a joint venture between Volvo, Daimler and Traton, aims to install at least 1,700 charging points across Europe by

Electric road systems allow trucks to charge while on the move.

2025 that are capable of charging a truck during a driver’s 45-minute break.

However, given that there are very few zero emission trucks on the market, they are currently significantly more expensive than diesel vehicles and the infrastructure remains to be built. Yet operators are under pressure to start to decarbonise now.

One solution is biomethane made from waste feedstocks such as sewage and slurry, which is both cheaper and more readily available than biodiesel, according to Philip Fjeld, chief executive of CNG Fuels. “Biomethane gives you a 30-40% saving on fuel costs and cuts greenhouse gas emissions by about 90%,” he claims. Although CNG trucks are more expensive than diesel, the difference is paid back in one to two years.

“We have customers with decarbonisation targets that are far more ambitious than the government targets,” Fjeld says. “They can’t just sit around and wait for something else to come along.” ●



Mike Scott is a former Financial Times journalist who is now a freelance writer specialising in business and sustainability. He has written for The Guardian, the Daily Telegraph, The Times, Forbes, Fortune and Bloomberg.