5. TOTAL COSTS OF OWNERSHIP

Facts about climate-friendly road freight transportation

What is the best strategy for realizing climate-friendly road freight transportation? Let's take a look at the facts.

Despite the important role of road freight in our economy – it transports roughly 70 percent of all goods – this has not translated into high profitability. The road freight sector is known to operate on thin margins, which means that buyers of clean-energy trucks will look closely to see if the new technologies will offer a good business case. Closely behind cost of the driver, which we can assume to be the same in all four technologies, fuel costs today make up about one-third of the total cost of ownership for trucking companies. So even if there are large differences in fuel efficiency and associated costs (see previous article), we need to consider the other factors as well, including vehicle acquisition cost and maintenance. Another important factor will be the infrastructure cost per user, which depends on its investment and operational cost, as well as its lifetime and how much it will be utilized.

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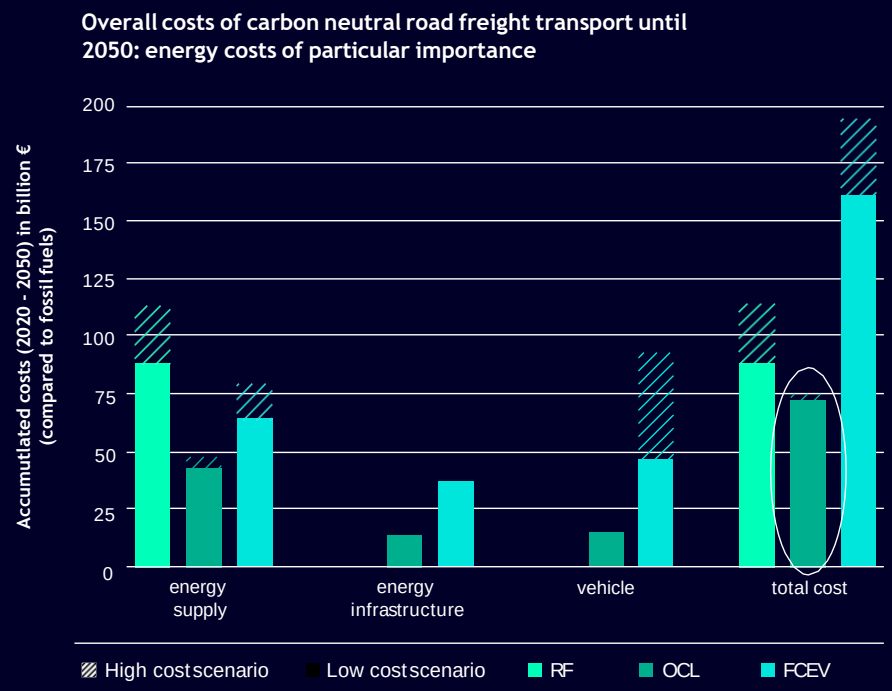
When it comes to overhead contact lines (OCL), the vehicle can be cheaper than either a battery electric vehicle (BEV) or a fuel-cell electric vehicle (FCEV). For the motorway network where most of the freight transportation (ton-km) takes place, the user's cost of infrastructure will be low enough to make it the cheapest solution.[1,2,3] For OCL, the expected utilization would be similar to that of the traffic flow already on the motorway – a fairly smooth curve throughout the day – with no behavioral changes necessary.

BEVs are the most economical for use cases where the daily mileage is short, predictable and ideally there can be a long period of standing still to charge, because this helps keep the cost of energy low. With improved battery technology the cost is coming down and ranges are going up, leading some to suggest that long-haul shuttles, in cases where the use of the infrastructure is predictable, can also be economical. A system of stationary chargers will need to rely on a reservation system in order to manage general long-haul trucking. As a rule, operators face the challenge of ensuring high availability for users vs. achieving high utilization of the charging points so they can earn a positive return.

Case study: Decarbonisation of German long-haul freight transport



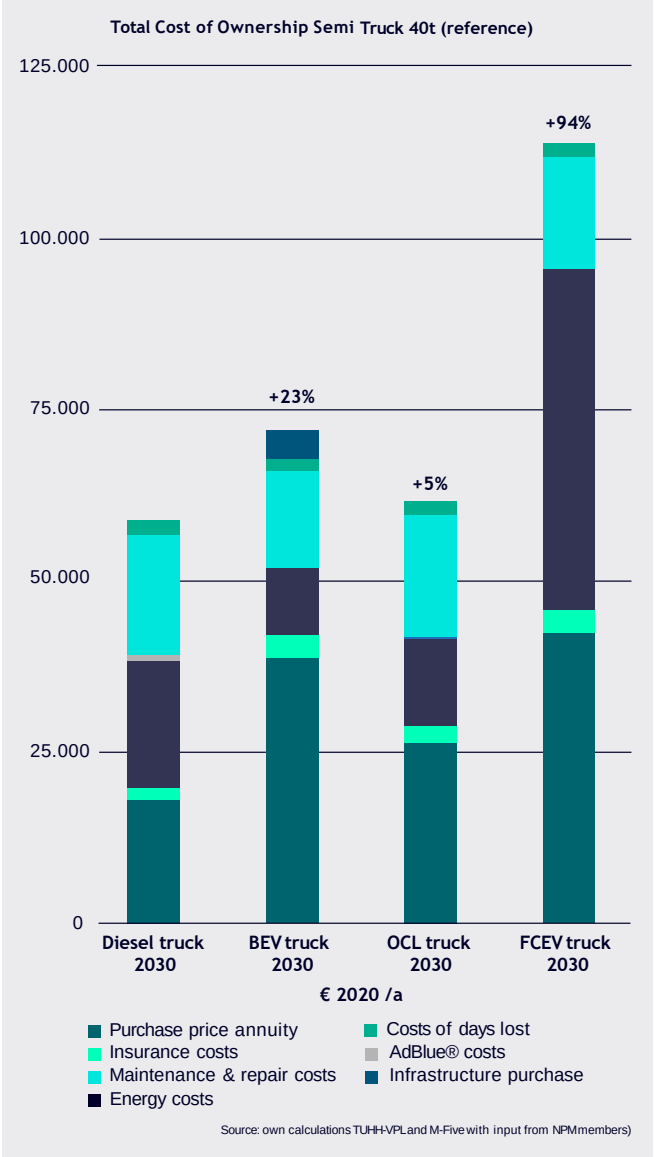
Source: https://www.transportenvironment.org/sites/te/files/Comparing%20the%20costs%20and%20benefits%20of%20different%20technologies%20A%20case%20study%20for%20Germany.pdf slide 10

FCEVs would come with both the highest vehicle cost and high energy costs,[4] even in 2030 – meaning that their role is likely to be limited to applications that require zero tail-pipe emissions and where daily mileage is high but traffic flow is too low to justify the investment in an electrical infrastructure.

For renewable fuels (RF), there is no change required in the refueling infrastructure or the vehicles themselves, so the only thing that matters is that the fuel can be made as cheap or cheaper than conventional fuels (primarily diesel). So far, studies show that the energy losses are too high to make this a realistic prospect in the near term.

In addition to the total cost of ownership (TCO), it is worthwhile to add two nuances. Some small operators are constrained from making large initial investments. This implies a premium for solutions that keep the vehicles as cheap as possible, because this is the only upfront cost when the energy is paid by use and is delivered via public infrastructure.

Second, TCO is important in helping us understand how trucking companies will be affected; however, it is also important to look at the income side. In other words, if the technology limits operations in terms of payload or distance to be driven, then revenues may be lost, and that will not compensate the cost savings. That is why our next chapter will look at operational flexibility.



Source: https://www.plattform-zukunft-mobilitaet.de/wp-content/uploads/2020/12/NPM_AG1_Werkstattbericht_Nfz.pdf page 23

[1] Fraunhofer ISI and IML et al. „Machbarkeitsstudie zur Ermittlung der Potentiale des Hybrid-Oberleitungs-Lkw." (2017): https://bmvi.de/SharedDocs/DE/Anlage/G/MKS/studie-potentiale-hybridoberleitungs-lkw.pdf?__blob=publicationFile

[2] Öko Institute. "Alternative drive trains and fuels in road freight transport – recommendations for action in Germany." (2019): https://www.oeko.de/fileadmin/oekodoc/Climate-friendly-road-freight-transport.pdf

[3] CSRF http://www.csrf.ac.uk/2020/07/white-paper-long-haul-freight-electrification/ (2020)

[4] Öko Institute: https://www.transportenvironment.org/sites/te/files/Comparing%20the%20costs%20and%20benefits%20of%20different%20technologies%20A%20case%20study%20for%20Germany.pdf

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