

Total Cost of Ownership for Rigid Electric Freight Trucks



Purpose

This factsheet provides a TCO (total cost of ownership) comparison between an electric freight truck and a conventional freight truck. The TCO is one of the most important factors in the procurement phase.

Context

One of the most important considerations in purchasing freight vehicles is the Total Cost of Ownership (TCO) comparison between a conventional freight vehicle (CFV) and an electric freight vehicle (EFV). As was experienced during the procurement decisions for some of the EFVs in FREVUE, a similar TCO (including subsidies) for an EFV, compared to a CFV, is often a minimum requirement.

The aim of the TCO comparison we provide is to assess which factors influence the TCO, based on generalised data from operators in FREVUE.

The TCO comparison's results differ according to vehicle type and usage, as well as other elements that can be country or even company specific.

Evaluation

This TCO comparison is based on data from FREVUE operators, and is intended to assess the factors that contribute to the TCO.

Conclusion

The purchase price for the individually retrofitted large EFV is currently much higher than for the OEMs' conventional trucks. The advantages resulting from lower operational costs do not compensate for the high purchase price (i.e. additional to a conventional truck, the conversion- and battery costs), so there is not yet a positive business case for the rigid electric truck.

Economics

We make a distinction between small rigid vehicles (12 tonne and 13 tonne vehicles) and medium-sized rigid vehicles (18 tonne and 19 tonne vehicles) in this large vehicle category. Vehicle manufacturers do not yet produce large EFVs, so these EFVs are retrofitted vehicles. The overall vehicle price, which is made up by the cost of the conventional vehicle, the conversion and the battery, is by far the largest cost-driver for an EFV.

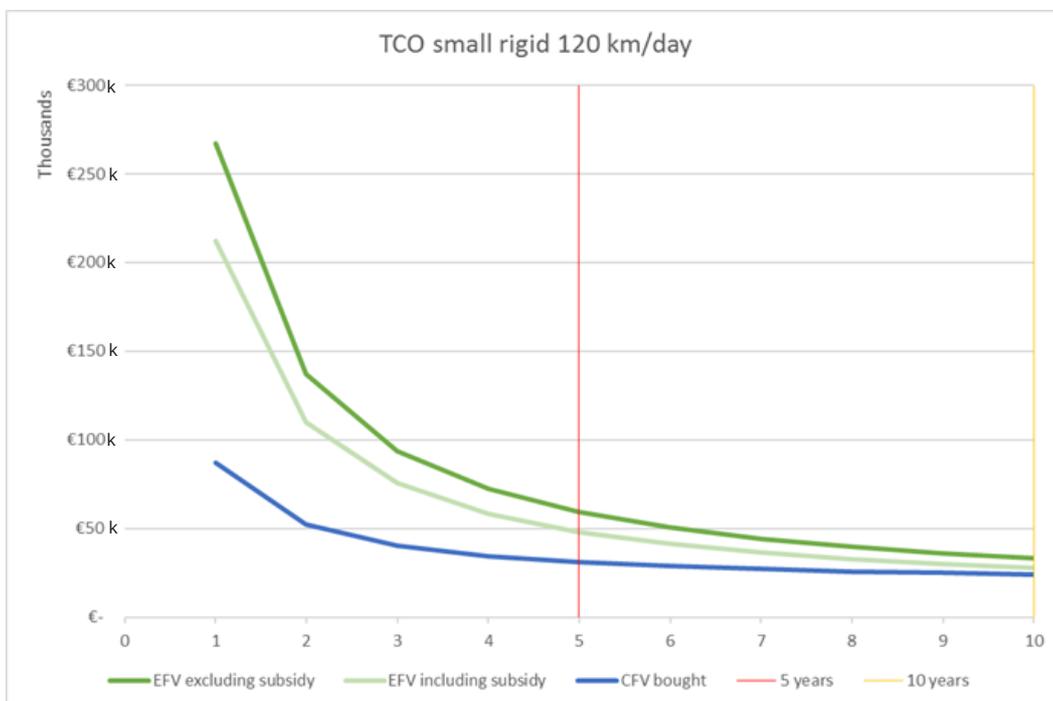


Figure 1. Development of yearly TCO per year-operated small rigid truck (average 120 km per day)

Figure 1 shows the total yearly costs of both an EFV and a CFV up to ten years. The steep slope in the first years of the EFV graph (compared to the CFV graph) can be explained by the relatively high investment costs (i.e. purchase price and charging infrastructure) for EFVs. The high purchase price is partly due to the fact that a new CFV truck is retrofitted into an EFV. The diesel engine is often sold for a low price, then an electric drive line and a large battery pack have to be added to the vehicle. Over a longer lifetime, these investment costs are spread out over more years, which decreases yearly costs. The gap in the TCO comparison between a small rigid CFV and equivalent EFV is large. The EFV does not break even with the comparable CFV within 10 years, not even with the FREVUE subsidy contribution.

For a medium rigid, the TCO gap is even bigger than for a small rigid truck due to the higher EFV purchase price. Figure 2 shows the subdivision of cost elements for a lifetime of 5 years, the cross-section depicted by the red line in Figure 1. Note that the purchase price of an EFV after subsidy is still higher than the total costs of operating a CFV for 5 years.

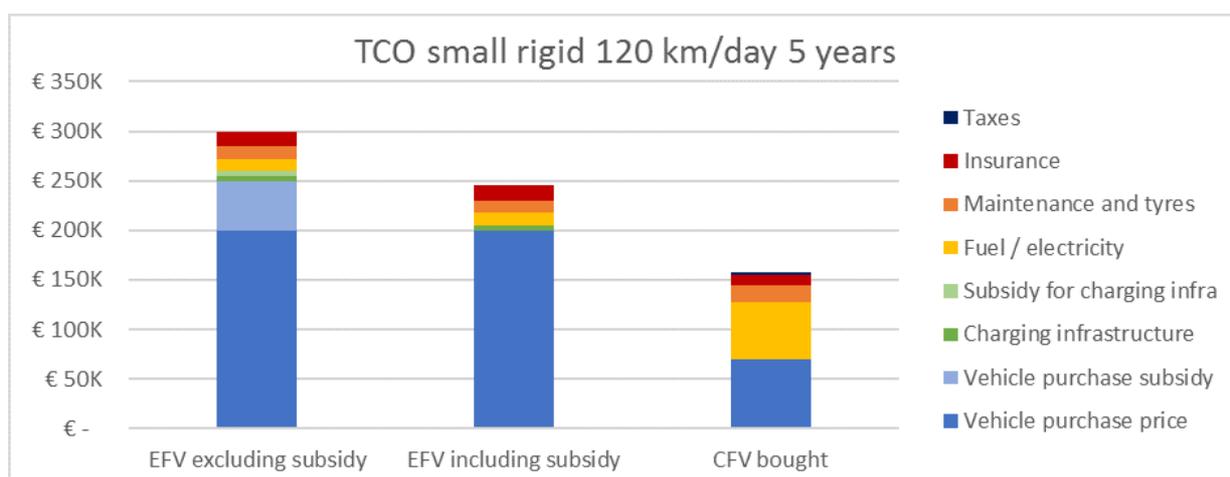


Figure 2. TCO small rigid truck (5-year cross-section – 120 km per day)

For the adverse effects on the EFV's TCO of additional grid investments and the positive effect of congestion charge exemptions for EFVs, we refer to FREVUE deliverable 3.2 and the factsheet on the TCO comparison of medium-sized vehicles.

The residual value of the vehicle was not included in the presented figures, neither for the EFV nor for the CFV. The residual value of an EFV is one of the main uncertainties operators currently face. What the second-hand market will be for EFVs or for the battery is unknown at present. Adding residual value to the comparison shows that if there is a value for the vehicle and the battery after 5 or 10 years, the TCO gap between EFVs and CFVs will become smaller.

The large battery pack is one of the main cost components in the high EFV purchase price, therefore it makes sense to look at a case in which the battery pack is used frequently. Driving 180 kilometres per day is close to the maximum range of the vehicles, but is still feasible. Figure 3 shows a TCO comparison of a medium rigid EFV and CFV driving 180 kilometres per day. It shows that a break-even point is reached in 10 years. If the medium rigid is used for 180 kilometres per day, the battery lasts 10 years and an initial purchase subsidy is available.

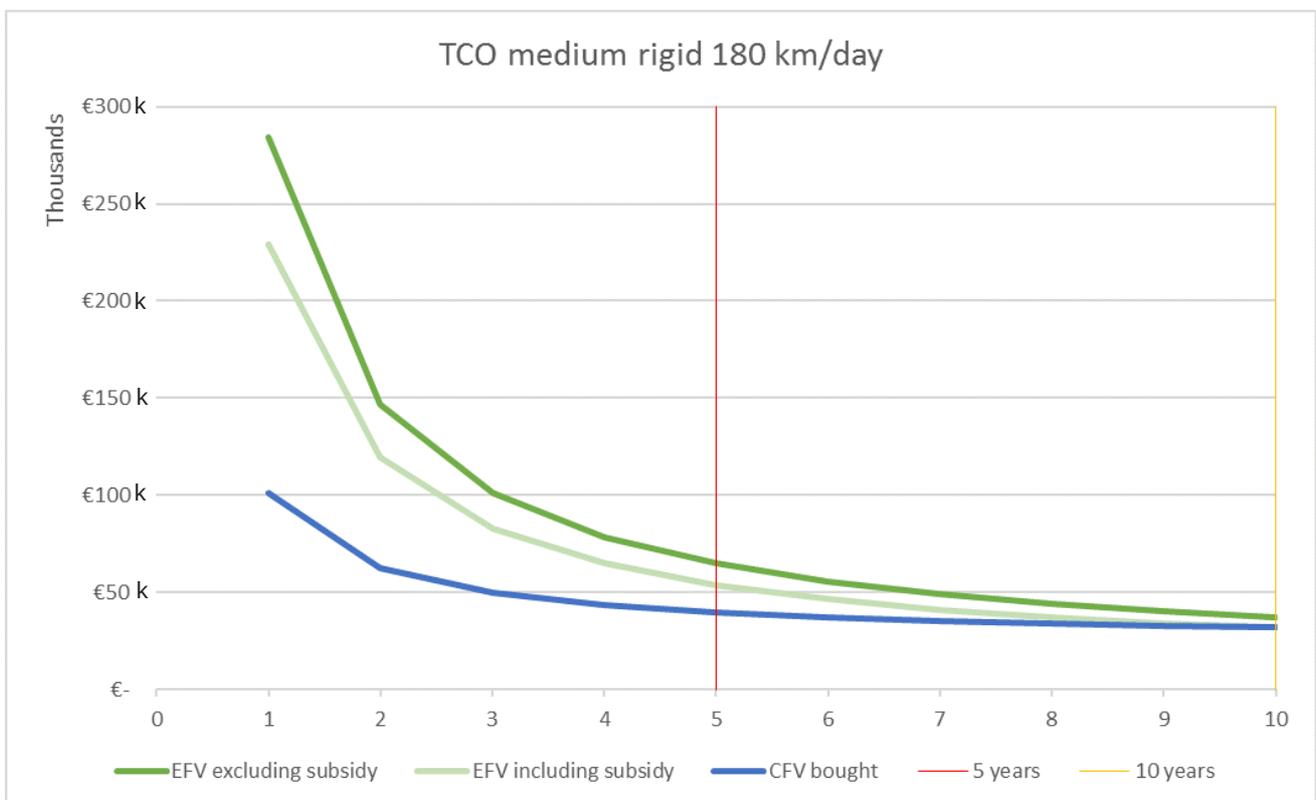


Figure 3. Development of yearly TCO per year-operated medium rigid truck (average 180km per day)

Conclusion

For large EFVs (i.e. small rigids and medium rigids), the TCO of a CFV is lower than that of an EFV. The purchase price for the individually retrofitted large EFV is currently so much higher than a vehicle manufacturers' conventional truck that advantages due to lower operational costs do not result in a positive business case for the large EFV. Even a depreciation time of ten years and a purchase subsidy do not allow for a cost-neutral business case for a logistics operator at present. By driving the maximum number of kilometres the battery allows, about 180km per day, and a purchase subsidy together can almost result in a cost-neutral business case in 10 years, assuming that the lifetime of the EFV and its battery lasts at least 10 years.

Further information

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