Value networks and urban electric freight vehicles

Purpose

The value network of a logistics operator changes when implementing EFVs. This document provides an overview of opportunities and barriers for a transition from diesel-powered towards electrified city logistics from an operational and economic point of view.

Evaluation

Logistical organisation itself does not have to change if a logistics operator uses an EFV (electric freight vehicle) for city logistics. It is the supply of vehicles and the provision of electricity that require changes along with new relationships with different actors. These new relationships come with uncertainties, risks and additional investments in both time and money for logistics operators.

Conclusion

Uncertainty, potential risks and the extra effort and time required to become familiar with the new system are barriers that are not addressed in TCO comparisons, but are important reasons why operators may not invest in EFVs at this point in time.

Context

We cannot consider a logistics operator in isolation, but must consider the city logistics playing field and the relevant operational and economic issues if the city logistics system were to be transformed to the extensive use of electric freight vehicles (EFVs). We discuss the opportunities and barriers for a transition from diesel-powered city logistics to electrified city logistics from an operational and economic point of view.

City logistics playing field

Figure 1 shows the value network around a logistics operator using diesel vehicles. The value network consists of three main parts: the logistics organisation, the vehicle supply and the fuel supply. Other contextual factors determining the boundaries of operation for a logistics operator are discussed in more detail in FREVUE D3.5 'Policies, procurement mechanisms and governance'.

The logistics organisation

The upper right part of Figure 1 shows how the logistics network is established: goods need to be transported from a shipper to a receiver by a logistics operator. The receiver pays the shipper for the products acquired and the shipper pays the logistics operator.

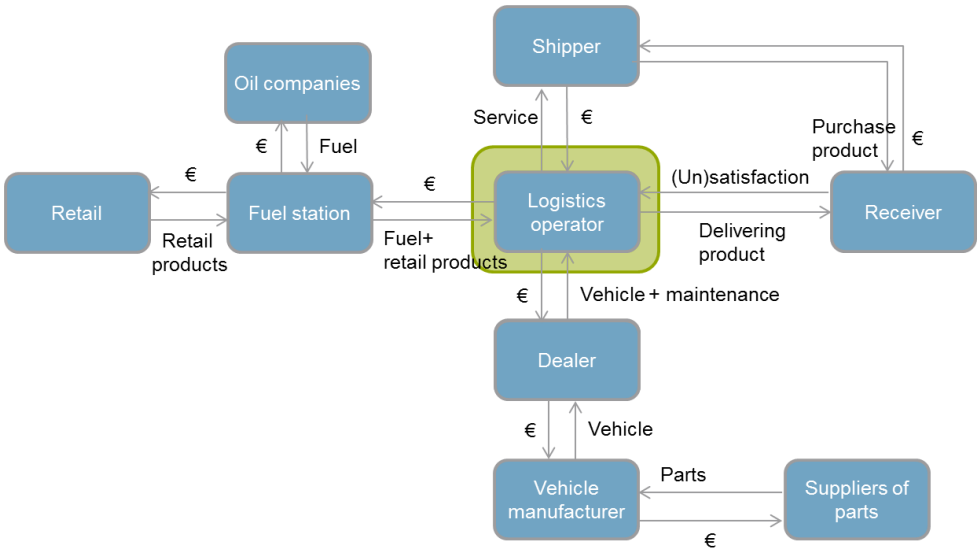

Figure 1. Value network from logistics operator's point of view (current situation, mainly CFV operated city logistics)

The vehicle supply

To provide the transport service, the logistics operators require vehicles. The vehicle supplier, shown in the bottom right corner of Figure 1, is a well-established economic entity that sells or leases a well-tested and mature product. The vehicle supplier procures the vehicles from a vehicle manufacturer (an Original Equipment Manufacturer (OEM)), that produces the vehicles on a large scale and has – very often – a very agile production process, where suppliers of parts are fully integrated and available.

The fuel supply

The left side of Figure 1 shows the industry of fuel supply. Large operators often have fuel stations at their depots to fuel their vehicles, whereas smaller operators use the available network of commercial fuel stations. Large oil and retail companies supply these fuel stations, and the density of these stations is high.

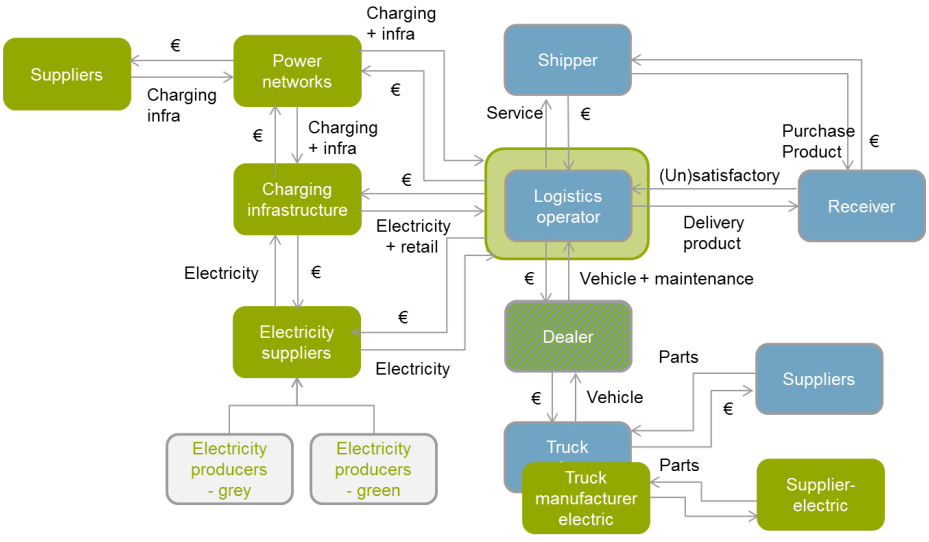

*Figure 2.*Value network from logistics operator's point of view (new situation, EFV operated city logistics)

Logistical organisation

Relationships and transactions between shipper, receiver and logistics operator are the same under an EFV system as they are for diesel vehicles. Most shippers and receivers are currently not willing to pay extra for zero emission deliveries. As Figure 2 shows, however, almost all other relationships change for the operator, which makes a smooth transition difficult.

Vehicle supply

The availability of electric vehicles is still limited, especially for medium and large vehicles. This situation is changing as more vehicle manufacturers have announced the introduction of large electric vans and trucks. This is expected to result in the better availability of EFVs, a decrease in cost due to mass production, and, most importantly, the possibility to buy or lease via existing relationships under familiar conditions and services.

Current barriers for procuring EFVs are:

• A retrofitted electric truck could have initial issues in CAN bus communications, as this is custom-made work. Despite tests by the manufacturer, in the first weeks of operations some issues often arise, but once fixed they usually no longer occur.

• Downtimes and production lead times are considerably longer for EFVs. Production of an EFV takes weeks or months, whereas for CFVs this is done in hours.

• It is difficult to finance large EFVs via commercial banks, as these vehicles are considered innovative and the risks are considered too high, partly due to the yet unanswered question of what the residual value will be.

• Retrofitting companies are relatively small and are not able to guarantee EFVs' technical performance over time (e.g. battery lifetime) in an integral way as it is done for CFVs. The logistics operator is then confronted by either higher risks, or additional costs in buying these risks off.

The electricity supply

The left part of Figure 2 shows the relationships with the electricity suppliers for a logistics operator operating an EFV. The operator can no longer use the easily accessible fuel station network and needs to have charging infrastructure for its EFVs. The major differences a logistics operator faces after procuring an EFV concern charging and electricity grid infrastructure.

Current barriers related to charging are:

• No extensive charging infrastructure is available, especially for medium and large electric trucks.
• Operators prefer overnight charging at the depot, so they have to invest in charging infrastructure.
• Public fast chargers are not often used, as their use creates planning constraints and there is the risk of waiting for another vehicle at the charger, resulting in potential problems for the rest of the journey.
• Charging is often a new knowledge domain for the logistics operator, which requires a time investment.

Conclusion

Switching from diesel vehicles to electric ones requires more than just buying new vehicles. It requires new relationships and time investments, and this is a barrier for operators in moving from CFVs to EFVs. OEMs commencing production of EFVs will remove one barrier in the transition from CFV-dominated to EFV-dominated city logistics.

At present, EFV use is mainly limited to test models in otherwise diesel fleets. If, however, an operator aims to invest in a larger EFV fleet, the operator runs the risk that the power grid does not have the capacity to charge the entire electric fleet. This implies that after overcoming all the above-mentioned challenges to make the transition towards using an EFV in city logistics, another problem lurks on the horizon.

Further information

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