Task force 41
Electric Freight Vehicles

Webinar

Electrification of Heavy-Duty Vehicles in Long Haul Transport

International Energy Agency
Hybrid & Electric Vehicle - Technology Collaboration Programme

Task 41 "Electric Freight vehicles"

The IEA-HEV Task41 aims to monitor progress and review the relevant aspect for a successful introduction of Electric Freight Vehicles (EFV) into the market. The electrification of freight is a direct response to the requirement to reduce the GHG emissions from road transport. The challenge has been to introduce electrification whilst continuing to meet the user requirements. This has given rise to numerous activities in the different vehicle segments of the freight sector with some uncertainty as to which solutions will be adopted in the longer term. Users are now urgently looking for information how to navigate through the present, uncertain situation with a view to minimising risk of stranded investments when envisaging extended operations with electric drive and especially looking to long haul applications. In response to the challenge as outlined above, on September 29th 2020, the Task41 team hosted a webinar on "Electrification of Heavy-Duty Vehicles in Long Haul Transport". In three sessions experts shared and discussed the present state of technologies, experiences and best practices – covering alternatives including fuel cell electric, battery-electric and catenary electric freight vehicles. In total, thirty four attendants from industry, research, logistics and governmental organization joined the webinar.

Essential for the implementation of electric freight vehicles in long-haul transport are the new developments in battery and fuel cell technology. Mr Eberleh from the Akasol AG, took to the floor and as part of his presentation he predicted that in the next four years the energy density of their high energy batteries for commercial vehicle applications would likely increase from 140 Wh/Kg today to 240 Wh/kg – a near 100% increase. For their high power batteries, which are especially suitable for fast charge and hybrid power applications, Akasol expect the charge capacity to increase from 500 W/kg today to 800 W/kg in 2024 – an increase of over 50%. Besides, cost reduction, there is also an expectation of an increase in the cycle life for both types of Li-ion batteries at Akasol.

It is expected that the high energy batteries will become more attractive over time due to the low initial price. Mr Rodrigues from the International Council on Clean Transportation (ICCT) calculates a value of 176 EUR/kWh for the traction battery today and expects a further reduction in the next few years. Mr Rodrigus also noted that the battery prices for truck applications are dropping with two to three years delay to car applications – hence the reduction in price observed in the passenger car market can be expected to be seen in the freight sector. Nevertheless, many manufacturers and vehicle retrofitters such as the Quantron AG criticize the present limited availability of battery cells. Mr Flaschenträger from the Quantron AG proposed that the European market needs a commitment for battery supply of five to ten years before. As an alternative, or as an adjunct to the battery for energy storage there is also the option of a fuel cell. This is viewed as attractive for the long haul freight sector. However, there is a cost issue to overcome. Mr Flaschenträger stated that 1 kWh of fuel cells today costs five to six times more than one kWh of battery. Further, he described that in addition to cost the issue around fuel cell and battery was wider than how you specified the vehicle. To be successful with deployment of any alterative it is essential for the vehicle operation that infrastructure and to align that infrastructure to the specific tour (profile use case) is essential i.e. you need to have the energy available where the vehicle is being used.

The MAN Truck and Bus SE, together with logisticians from the Council for Sustainable Logistics, has been testing nine electric MAN-CNL trucks on Austrian roads since 2018. In the field test, all vehicles were tracked and the data from this activity was collected and analyzed. Mr Radix from MAN summarized that electric mobility with truck works and it is today more sufficient for the range in urban delivery. He expects that customers might be required to change their habits with the transition, but the extent of that change woud be limited to certain cases. Mr Radix also highlighted that the charging process and communication will become standardised and made mandatory acriss the different charging station operators around Europe (making cross-boarder freight movement easier). For long-haul transport, he expects that with the next battery generation the capacity will allow long-haul related ranges in tractor trucks.

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Another best practice example for long-haul applications is the eHighways from the Siemens AG. Mr Akerman from Siemens described that in general heavy-duty vehicles drive long distances and are often away from their base. Their transport tasks are highly concentrated to the highway network. Therefore, Mr Akerman recommends using a dynamic charging approach, in this case catenary, on highways when this is possible and move to battery on the distributor routes (from the highway to the depot or delivery point). Other dynamic charging approaches, for example infrastructure embedded in the highway, may also be possible and are under consideration. The development of the eHighways vehicle´s technology is today in the 3rd generation, which stands for field trials (1st generation: Proof-of-concept, 2nd Swedish and US demonstration projects). There are three field trials in Germany with each around five km track length and five trucks in operation. The powertrain of the catenary truck is either battery-electric or hybrid-electric designed.

In addition to pilot projects on battery electric trucks in inner-city delivery and on ehighways, Mr Uhl of Clean Logistics GmbH from Germany presented their first Fuel Cell Electric Vehicle prototype on the webinar, which they call Hybat-Truck. Clean logistics is planning to set up their own hydrogen supply network in the upcoming years to be able to tank and operate their Hybat-Truck emission-free with hydrogen. The green hydrogen will be produced using the energy generated by wind turbines, which will be disconnected from the grid at suitable times.

Regarding the question about the total cost of ownership (TCO) parity of Electric Freight Vehicle from the audience, Mr Flaschenträger from Quantron AG answered that he does not expect that the purchase price of fuel cell electric vehicle (FCEV) will get below diesel trucks in the next ten years. However, there should be business cases for customers during this time depending on their specific transport task. Nevertheless, Mr Rodrigues from ICCT stated that access to capital is one of the key barriers they have seen in the past for fleets to invest in efficiency technologies. Thus, it will require innovative financing solutions to ensure that the barrier of upfront cost and the access to capital can be overcome and depreciate over the vehicle operation time. Mrs Holtslag from the Transport Decarbonisation Alliance (TDA) said that customers are also willing to pay for transportation and not only for the TCO. This requires new business models such as transport as services or leasing options. Nevertheless, there must be some frontrunner who are willing to pay a little extra for the TCO of electric freight vehicles. She criticized that the strong demand ordering of big amount of vehicles is still missing for the heavy-duty segment. Mrs Holtslag illustrated the transition process towards Zero-Emission Freight Vehicles in waives. The first waves will focus on urban and regional delivery, then medium freight, followed by heavy regional freight and corridor long haul. Besides, she is seeing cities as powerful ecosystems for this transition since they can push multiple local actors collaborations.

Results of this webinar will feed into the discussion at the HEV-TCP on pre-competitive research and policy measures.

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