2. TIME TO MARKET

Facts about climate-friendly road freight transportation

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

In this article we want to talk about how quickly different solutions will be ready for the market and able to generate impact.

This is of high importance, as we need to act fast to avoid exceeding the limited amount of greenhouse gas emissions we can emit before risking global warming of 2°C. Recently Germany has tightened its CO_2 reduction target for 2030 to -65%, and studies find this means 70% of all new truck sales in 2030 need to be zero emission trucks (Overhead Contact Lines, Battery Electric Vehicles or Fuel-Cell Electric Vehicles). Reaching those goals requires putting in place the necessary supporting infrastructure.

So let's look at how the four technologies compare in terms of how soon all pieces will be in place for the infrastructure, vehicles and renewable fuel/electricity production.

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The **Overhead Contact Line (OCL)** solution is based on mature infrastructure technology with more than 100 years of successful application. It enjoys established and deep supply chains and open standards. Its specific application to motorway trucking has been tested and proven since 2016. OCL technology has shown itself easily integrable in tractor trucks, and vehicle production is ready for industrialization and can be scaled up to match the roll-out of OCL infrastructure.

OCL thus has all the technical pieces in place to start scaling it up. Scalability is an issue in its own right and we are excited to present more to you next week. The roll-out of the OCL infrastructure[1] can start now and a network large enough to contribute significantly to achieving the climate goals can be in operation by 2030.

Battery Electric Vehicles (BEVs) with increasing tonnage are already entering the market, but these are so far not able to charge very quickly (typically max. 350kW) nor able to drive longer than 500km (see article “Operating Range”). The most likely development to address this is by pushing for faster charging of trucks.
For megawatt-level charging the trucks need to be able to handle higher voltages (1,500V) and currents. Such trucks can be expected to come but are likely contingent on a standard for such charging being agreed upon.

Current expectations are that the standard for megawatt-charging infrastructure will be available in 2023. Such high power is only possible through higher currents and/or voltages than currently used[2]. Robot-supported systems are likely to become necessary for handling these chargers[3]. Assuming existing technology can be used for this purpose, the first long-range trucks with megawatt charging may be expected after 2023. BEVs with megawatt charging can then start to contribute as a piece of the puzzle of sustainable road freight in long haul.

For **Fuel Cell Electric Vehicles (FCEVs)** the technology for making green hydrogen exist, even if it is only a very small part of global hydrogen production. The technology to transport it across oceans is currently being tested with a vessel carrying 9,000kg of hydrogen, whereas a much larger vessel capable of carrying 11,000 tonnes of hydrogen is planned for introduction in 2025. The pipeline technology for mass transport on land is available.

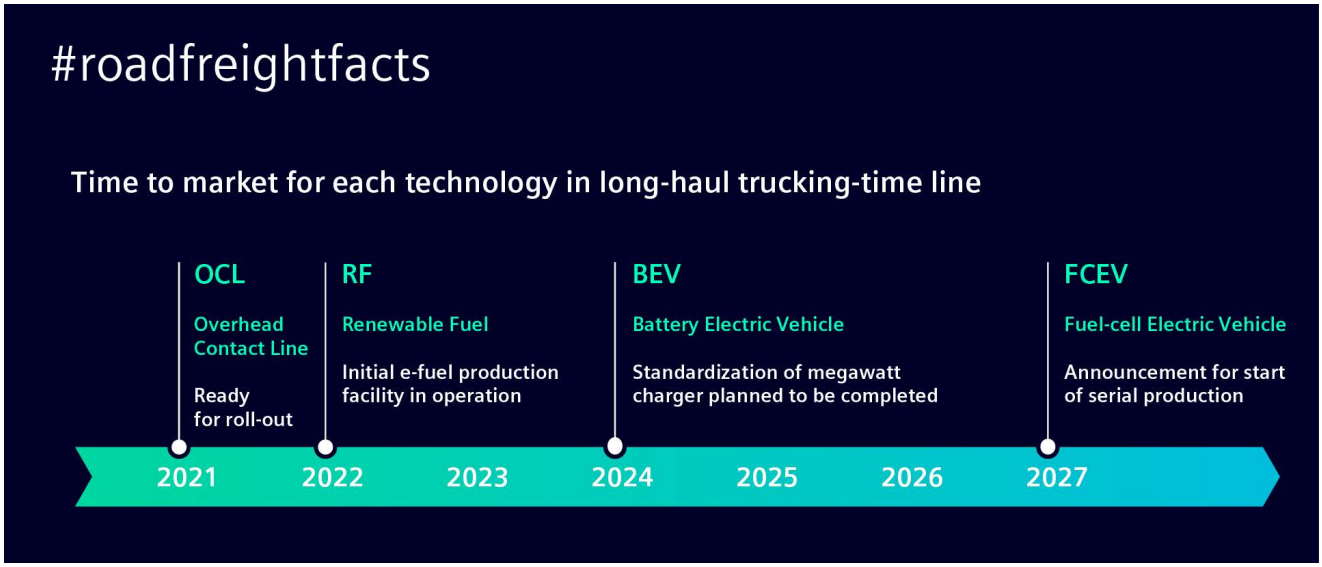
The infrastructure for refueling trucks only exists for 350 bar, which is not suitable for long-haul trucking. There is so far no agreement on a standard (liquid hydrogen or 700 bar gaseous) for this segment. A recent report noted that the hydrogen industry has a lower sense of urgency for putting in place standards and regulations for liquid hydrogen than for gaseous hydrogen.

At the same time, one large truck manufacturer argues that gaseous hydrogen would not offer some of the crucial advantages hydrogen is supposed to offer: low impact on payload, fast refueling, high range. This explains why, especially for the crucial segment of long-haul trucking, vehicles are currently not in commercial operation and only available as concepts[4] with announcements of serial production starting from 2027[5].
FCEVs would thus appear to be missing several crucial technical proofs of applicability in long-haul trucking in order to be relevant for reaching the 2030 climate goals.

The making of **Renewable Fuels (RF)** using renewable electricity, so called e-fuels, is getting under way, with the world’s first integrated and commercial facility set to start producing 130,000 litres next year in Chile.
As RF would entail the use of existing fueling infrastructure and trucks with conventional drive trains, this is an option that is technically possible already very soon.

However, this is a very energy-consuming process which will be further elaborated upon in the articles on energy efficiency and total cost of ownership.
From a purely technological perspective the above shows that today only Overhead Contact Lines, and arguably also Renewable Fuels, are implementable for long-haul trucking. Battery Electric Vehicles should become available within a few years and Fuel Cell Electric Vehicles hopefully before the end of the decade.

This is an important consideration, but not the only one, when looking at each technology’s ability to scale up and contribute to achieving the climate goals, including the crucial 2030 milestone.
That is the topic of the next article.



[1] Scania, Presentation by Magnus Höglund https://youtu.be/0bfqMjP0p80?t=1584

[2] DOE : https://www.energy.gov/sites/prod/files/2017/10/f38/XFC%20Technology%20Gap%20Assessment%20Report_FINAL_10202017.pdf

[3] Siemens White Paper on eMobility https://new.siemens.com/global/en/products/energy/medium-voltage/solutions/emobility/emobility-latest-technologies.html

[4] Daimler: https://media.daimler.com/marsMediaSite/ko/de/48289226

[5] Daimler: https://www.daimler.com/dokumente/investoren/praesentationen/daimler-ir-equityroadshowpresentation-q1-2021.pdf

[6] Siemens Energy https://press.siemens-energy.com/global/en/pressrelease/siemens-energy-and-porsche-partners-advance-climate-neutral-e-fuel-development

Published by
Siemens AG
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81739 Munich Germany

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www.siemens.com/mobility/eHighway

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