



CELLCENTRIC | EXTERNAL AFFAIRS AND H2 TECHNOLOGY

Synchronizing Fuel Cells, Industrialization, and Infrastructure for Heavy-Duty Long-Haul Applications

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„Trucks are bought with a calculator, not the heart.“

Andreas Gorbach, Daimler Truck



There is no single technology to de-carbonize commercial vehicles

Commercial Vehicles like trucks are investment goods: they **fulfill a mission and have to be profitable** - regardless of propulsion technology.

For trucks, technology selection will be driven by

- fit of technical capabilities to the mission
- availability of re-fueling/charging infrastructure
- **total cost of ownership (TCO)**

Long-haul trucks are ideal to benefit from the strengths of **fuel cell** technology:

- **High efficiency** of H₂ usage
- **Long range** >1,000 km with today's technology
- **Flexibility**: long range, short refueling, and lean H₂ infrastructure buildup



BZA150 - a major milestone for heavy-duty FUEL CELL trucks

- Up to 300 kW of fuel cell power for HD trucks (twin system)
→ 145 kW net power (BOL; single system)
- 25.000 h lifetime/10 years
- Compact packaging
- Robustness for demanding conditions
- H₂ fuel consumption (year 2023)
→ 7,5 kg H₂ / 100 km (@Gross Combined Weight: 42 tons)
- High vehicle efficiency & range
→ ~ 1100 km range with one fill of 80 kg H₂ at 40 tons and refilling times of 10-15 min



Product outlook: A heavy-duty long-haul game changer

Concept

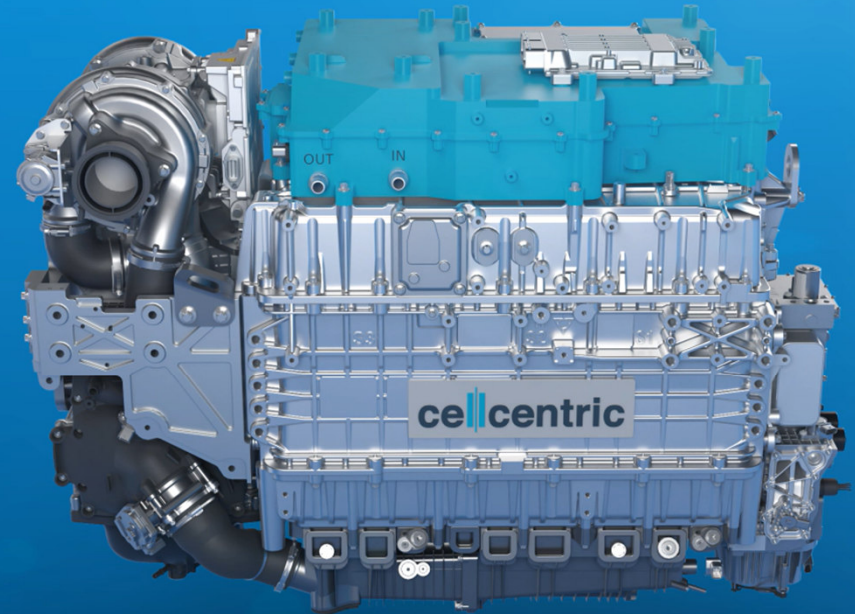
- Single system packaging
- Maximized cell “footprint” & active area
- Higher cell performance
- Optimized operating conditions

Performance

- Up to 375 kW (>500 horse power) continuous
- - 20% fuel consumption*
- - 40% waste heat at 300 kW net power*
- + 40% power density*

Fuel consumption

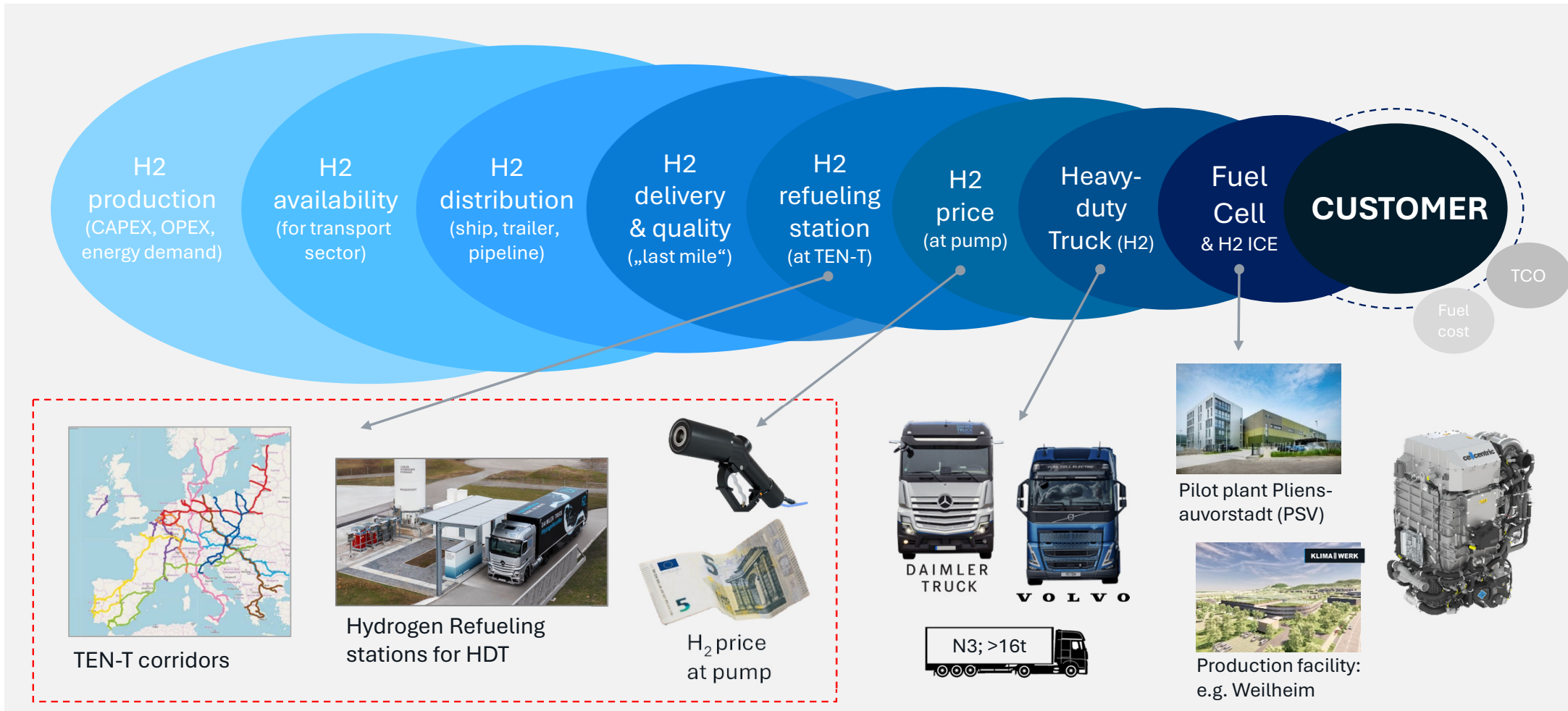
< 6 kg H₂ per 100 km (@GCW: 42 tons)



*vs. benchmark fuel cell system BZA150

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H2 ecosystem dependencies for Heavy-Duty Trucking: H2 fuel volume (tons per year), H2 price at pump and supply to scale technology are the real technology enabler.

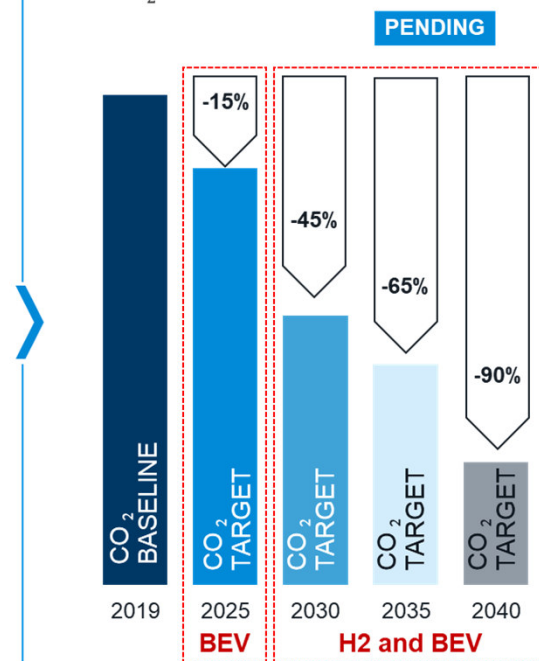


European Green Deal set some of the most challenging CO₂ regulations for HDVs worldwide: -45% by 2030 & -90% by 2040

REDUCTION TARGETS BY VECTO CLASS*

Reduction targets relative to baseline	2025
5t-7.4t	0%
7.4t-16t	0%
4x2 and 6x2 trucks >16t	15%
6x4 and 8x4 trucks All weights	0%
>8 seats	0%
>3.5t	0%

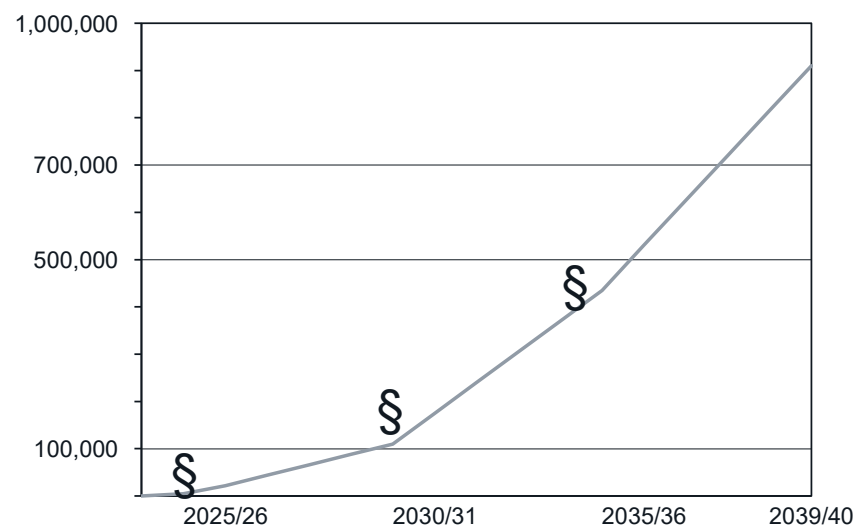
CO₂ TARGETS FOR TRUCKS



Legislative triggered ZEV 4x2 long-haul trucks* in EU

VECTO class 5 (LH) only, others not considered

HD trucks (#)



~200.000 trucks

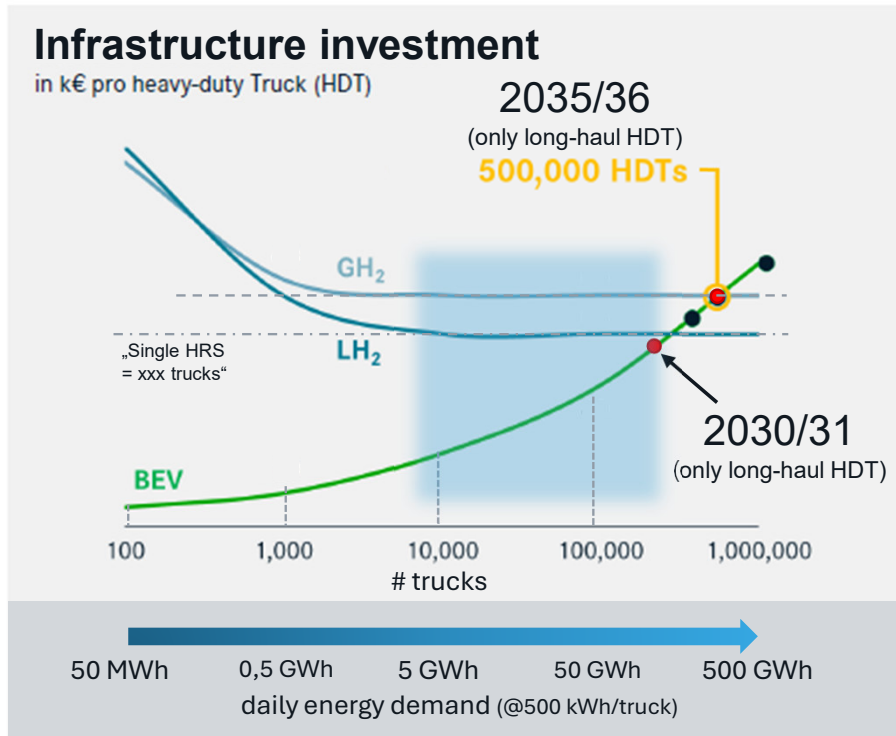
~500.000 trucks

Legislation triggered VECTO class 5-LH ZEV trucks only in EU:
from 2025 ~ 22k p.a., from 2030 65k p.a, from 2035 ~95k p.a.

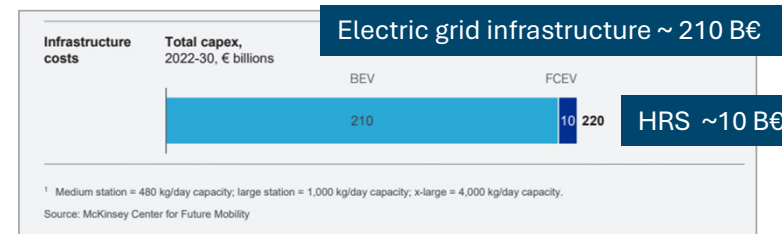
Denkendorf service station @ A8 motorway near Stuttgart, Germany



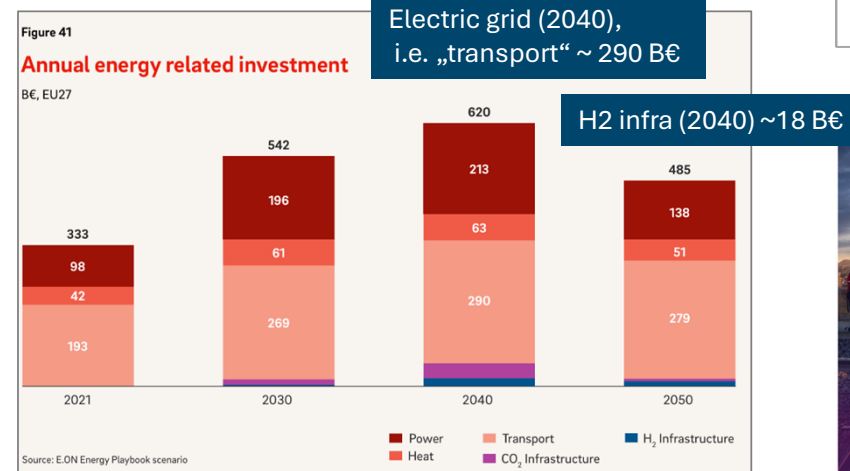
Counter-intuitive: Establishing two infrastructures for zero emission trucks with H2 as a fuel is less capital intensive and faster than one.



Source: Daimler Truck AG, illustrative representation by cc

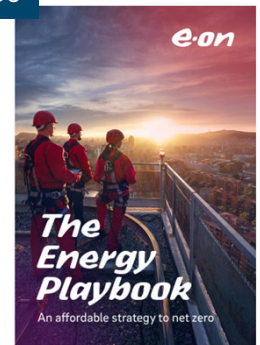
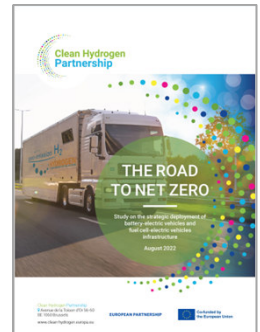


Source: McKinsey Center for Future Mobility



Source: E.ON - The Energy Playbook

<https://www.eon.com/content/dam/eon/eon-com/eon-com-assets/documents/politics/en/eon-the-energy-playbook.pdf>



Hydrogen as fuel – in addition to the battery - will enable the fast transition of the transportation sector to Zero-Emission.

Case study China: execution of holistic, synchronized H2 ecosystem ramp-up.

Target: scaling local champions to global players

China completely dominates global battery/BEV industry, so why hydrogen?

Over **50%** BEV Manufacturing in China



Global BEV battery Market share in 2024

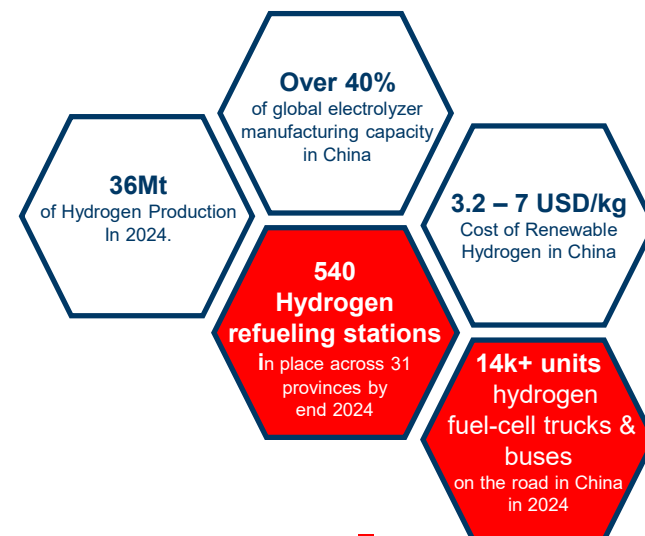


H2 is clear strategic pillar to establish new energy ecosystem, nationally and globally

In November 2024, hydrogen was officially incorporated into the National Energy Law



Scaling H2 ecosystem, from production to truck: securing future profits margins for China

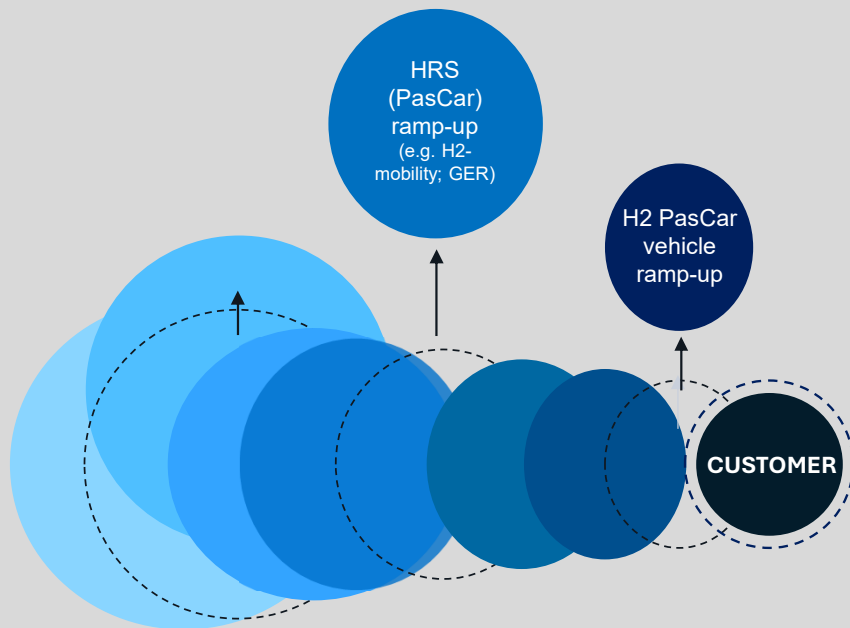


China strategy: recreating the battery electric playbook, to secure future industry business!

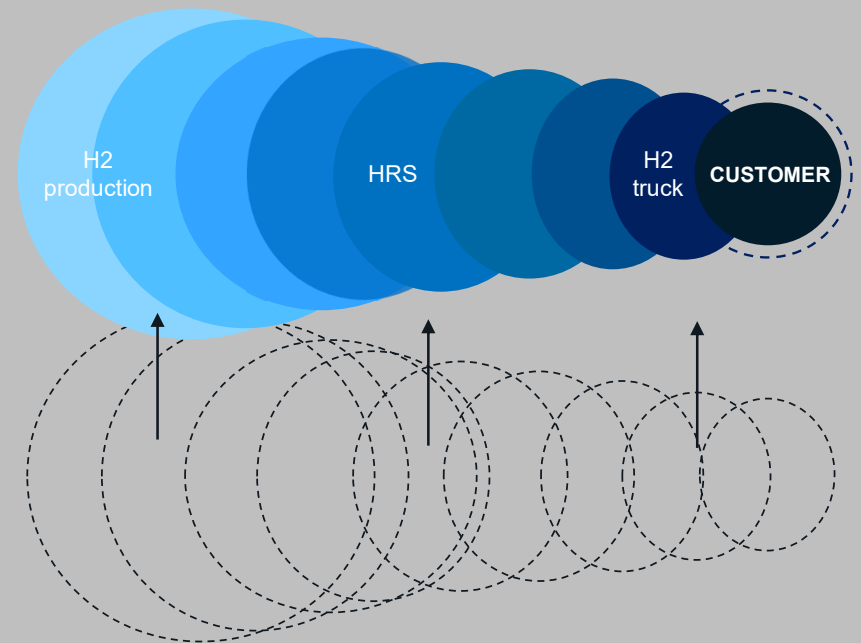
We need to act now before loosing another future technology.

Synchronized ramp-up of all H2 elements is key to success („no hen-and-egg“).

- Isolated ramp-up („European approach“; last 15 years)



- Synchronized approach („China way“)

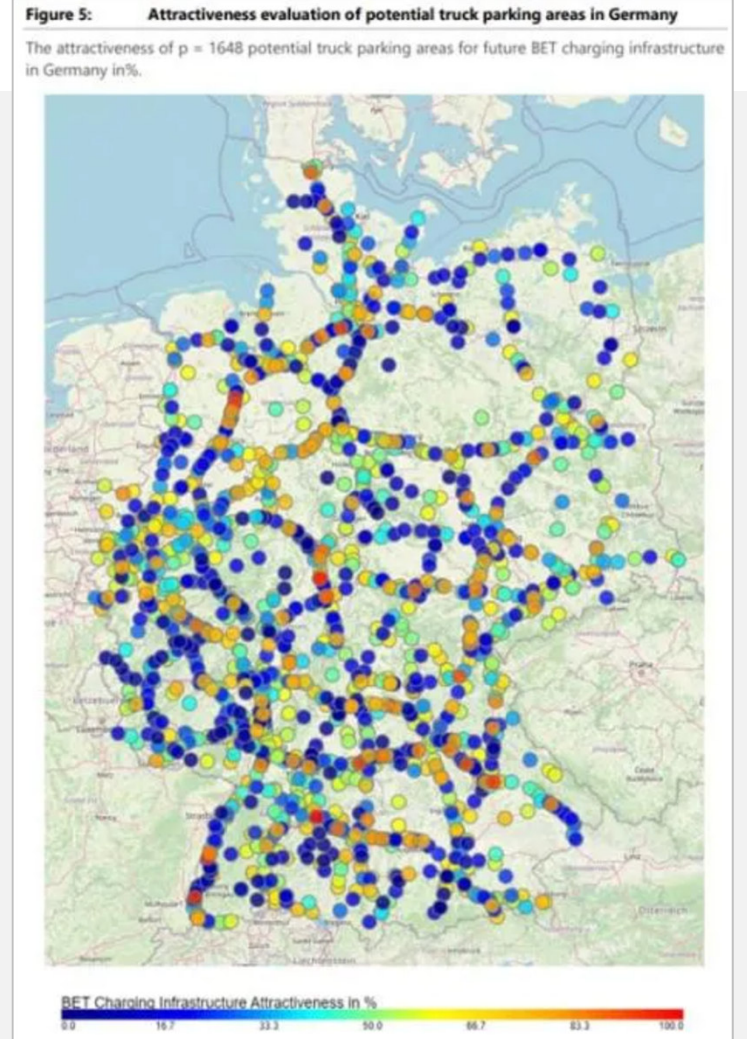
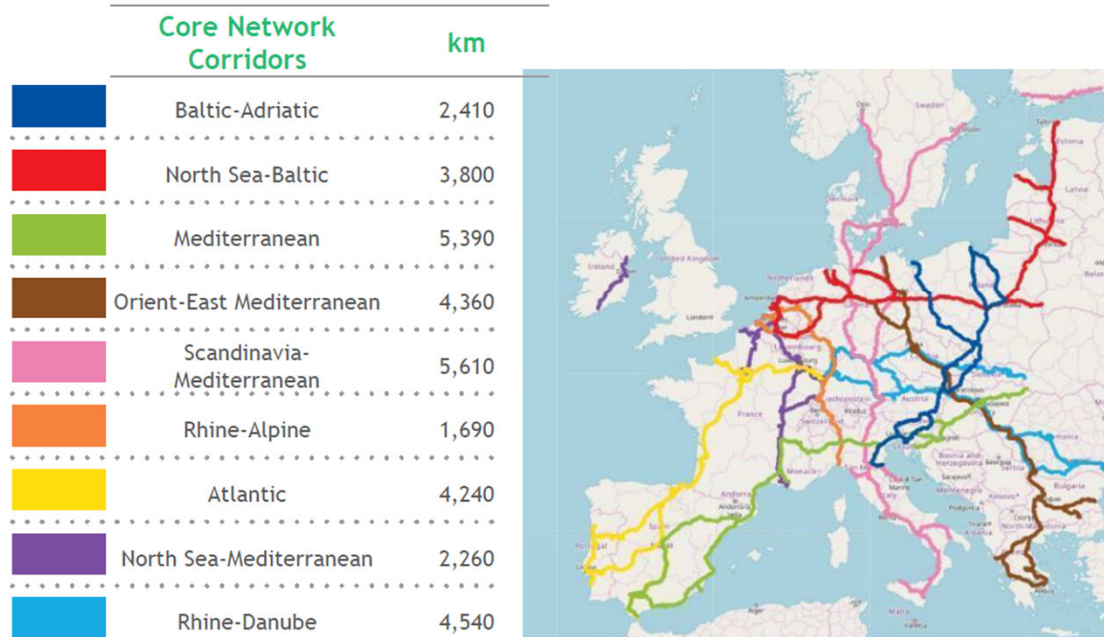


For synchronization, one has to consider the entire H2 production chain, and align all partners along the chain. **H2 vehicles will only become a commercial success, if all subsequent elements of the chain are operational.**

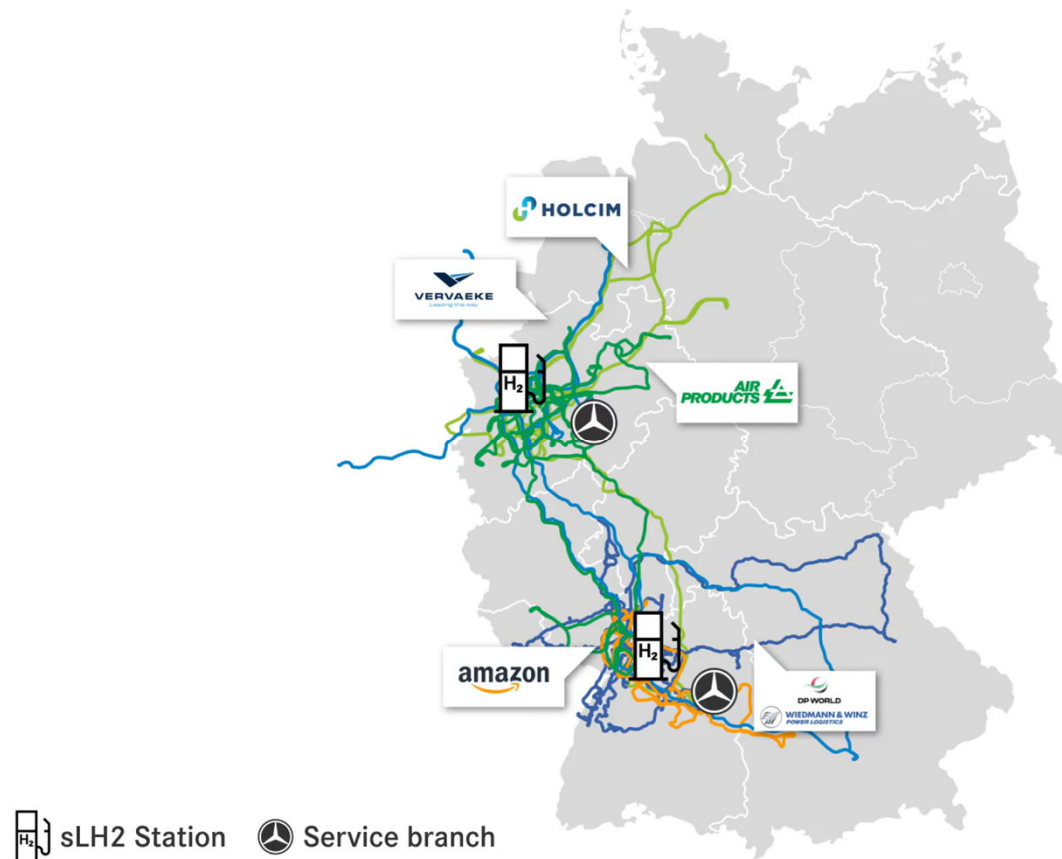
Trucking and use case: TEN-T transport corridors & Refueling/Charging station locations

Long-haul heavy duty trucks drive along the TEN-T corridors, using key infrastructure along these routes. This leads to more „popular“ service station locations („attractiveness“).

TEN-T¹ Core Network Corridors planned for long-haul HDTs



Long-range Fuel Cell vehicle capability & HRS network coverage: Heavy-duty Truck customer fleet use case



An aerial photograph showing a vibrant blue lake on the left, a two-lane asphalt road with yellow center lines running vertically in the middle, and a dense green forest on the right. A dark grey rectangular box is overlaid on the left side of the image, containing the text 'THANK YOU' in white.

THANK YOU

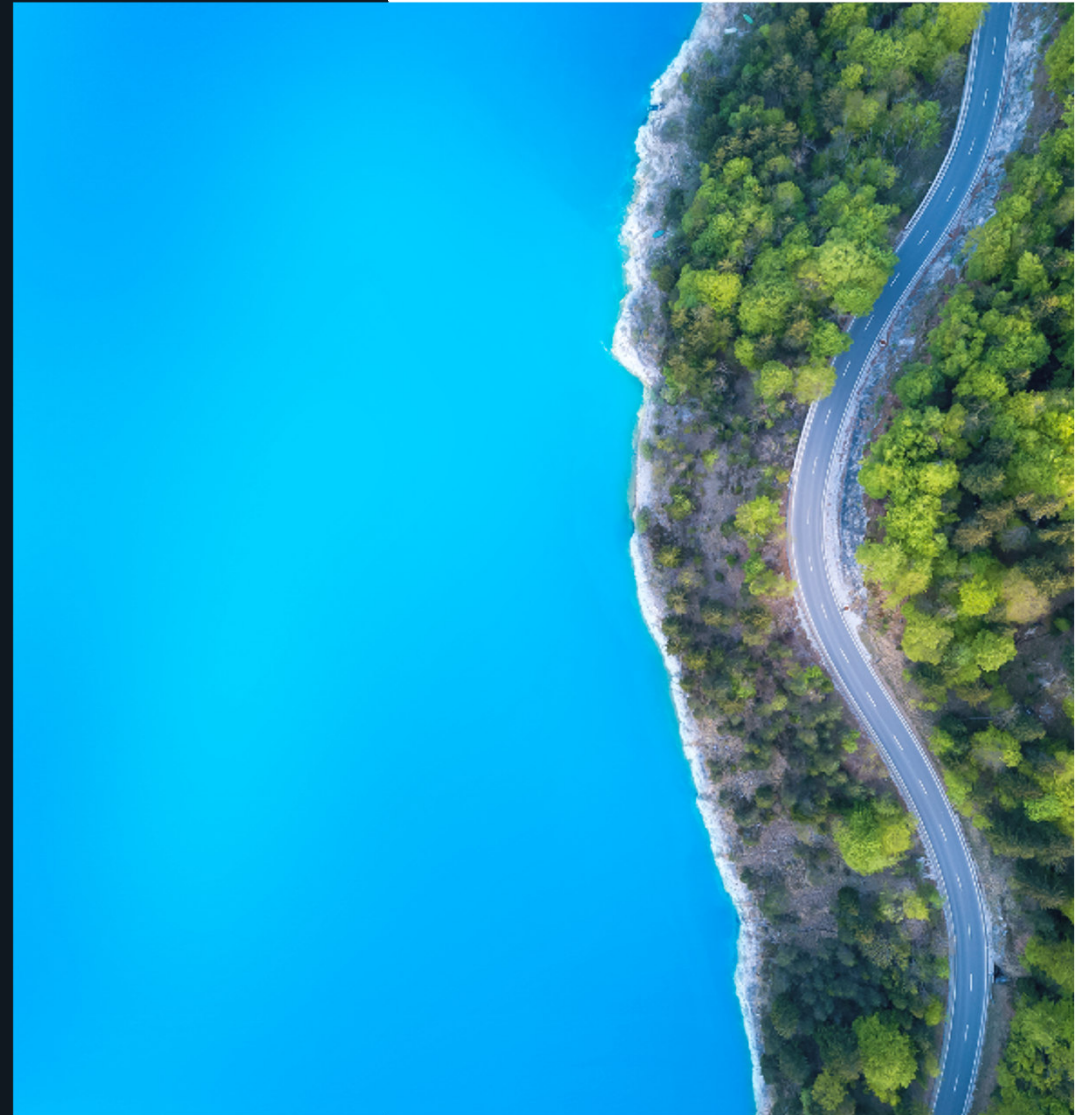
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We power sustainable life



Dr. Florian Henkel

Lead External Affairs &
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