DAIMLER TRUCK

Hydrogen infrastructure for Heavy Duty Trucks – an industry perspective

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Truly CO_2-neutral transport works only on the basis of CO_2-neutral drives –

we're focusing on **electric batteries and hydrogen**

Deep Dive: Why serving our customers with one technology in the CO_2-neutral future is not an option

SYSTEM VIEW: The best vehicles are no good without sufficient propulsion energy and infrastructure

PRODUCT VIEW: One-technology-approach technically feasible – depending on specific use cases, BEV or H2 can be the better customer fit

	Range	Recharging speed	Energy efficiency	Energy price	Scalable and cost-efficient infrastructure	Flexible carrier for global energy trade
🔋	+	+	++	?	+	
H_2	++	++	+	?	++	++

ONLY COMBINATION OF BATTERY-ELECTRIC AND HYDROGEN-BASED DRIVE TECHNOLOGIES ENSURES THE FUTURE OF TRANSPORTATION AND OPTIMAL CUSTOMER SOLUTIONS

Our strategy: We will bring **two technologies** to series production that lead to a CO_2-neutral future – **batteries and fuel cells**

eActros ***eActros LongHaul*** ***GenH2 Truck***

- Heavy-Duty Regional Delivery
- Range: 200 - 400 km
- [illegible]
- 2021

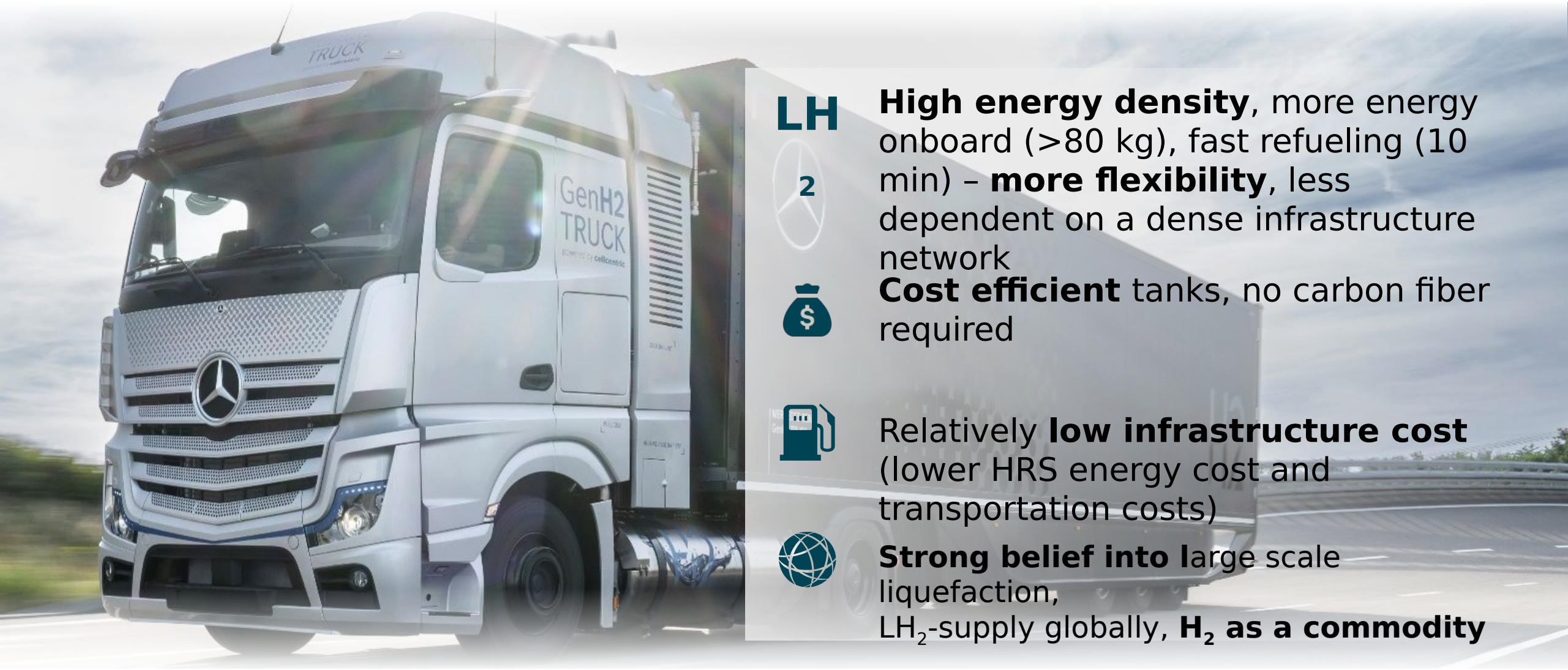
- Heavy-Duty long-distance
- Range: 500 kilometers
- Series production starts 2024

- Heavy-Duty Long-Haul
- Range: 1,000 km and more
- Series production 2027+

Lighter load, shorter distance

Heavier load, longer distance

Advantages of LH_2 as preferred storage technology.



LH 2

High energy density, more energy onboard (>80 kg), fast refueling (10 min) – **more flexibility**, less dependent on a dense infrastructure network

Cost efficient tanks, no carbon fiber required

Relatively **low infrastructure cost** (lower HRS energy cost and transportation costs)

Strong belief into large scale liquefaction,
LH_2-supply globally, **H_2 as a commodity**

We are **kick-starting hydrogen-based Fuel Cell technology**
with key initiatives and strategic partners.

cellcentric

Develop, produce acnd commercialize **Fuel Cell systems** in joint venture with Volvo Group

H2MOBILITY

Establish hydrogen **infrastructure** in central Europe

Linde

Develop technology for **liquid hydrogen refueling**

H2Accelerate

Accelerate **mass market adoption of Fuel Cell trucks** in Europe

NEXTera ENERGY BLACKROCK

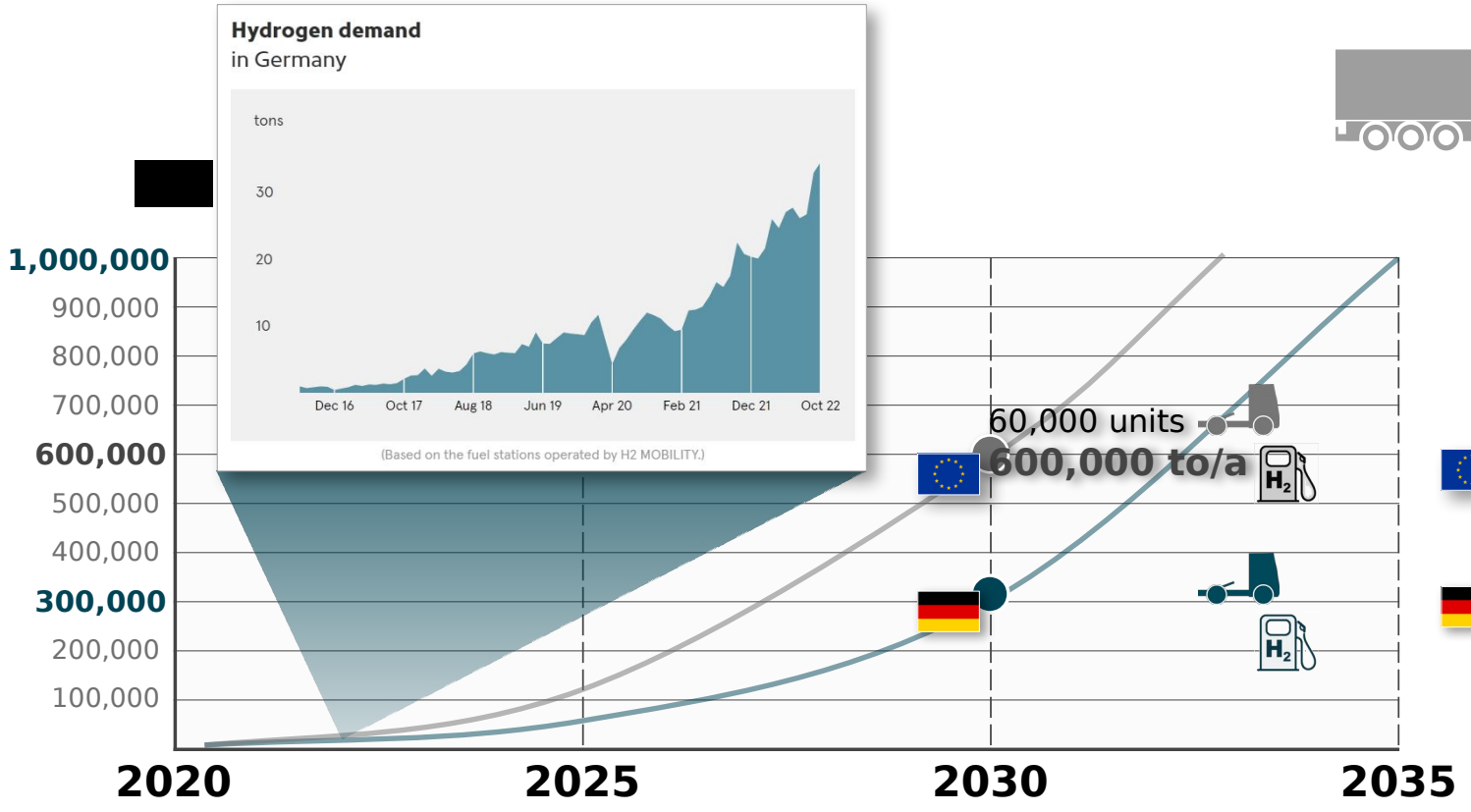
Start **public infrastruc-ture** across the U.S. for battery electric & Fuel Cell vehicles

bp TOTAL Shell Hydrogen

Establish **hydrogen infrastructure** in Europe and an open standard for refueling

European Trucks could be **lead application for hydrogen**: High quantities and higher willingness to pay – **Green Deal**

Hydrogen demand per year



H_2 demand per year:
HD truck vs. passenger car

***ACEA** expects 60,000 FCEV in 2030 (EU)*

***Nationaler Wasserstoffrat (NWR)** expects 30,000 FCEV (DE)*

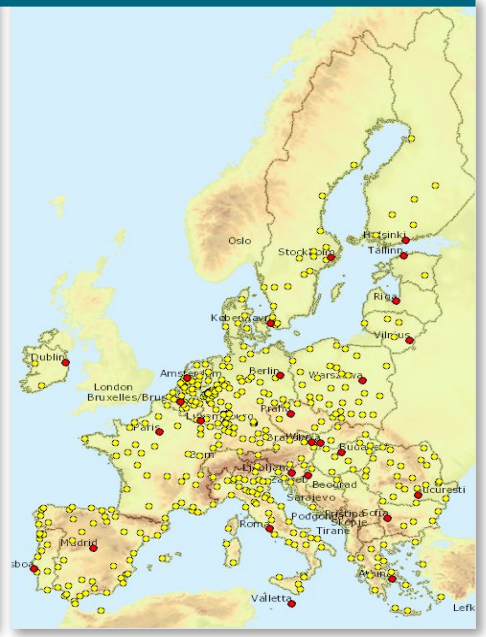
- **Starting around 2025, dynamic uptake of hydrogen by the heavy duty industry could take place**

AFIR: Infrastructure regulation will set minimum targets but positions are widely apart and not sufficient

HRS # are based on TEN-T and urban nodes

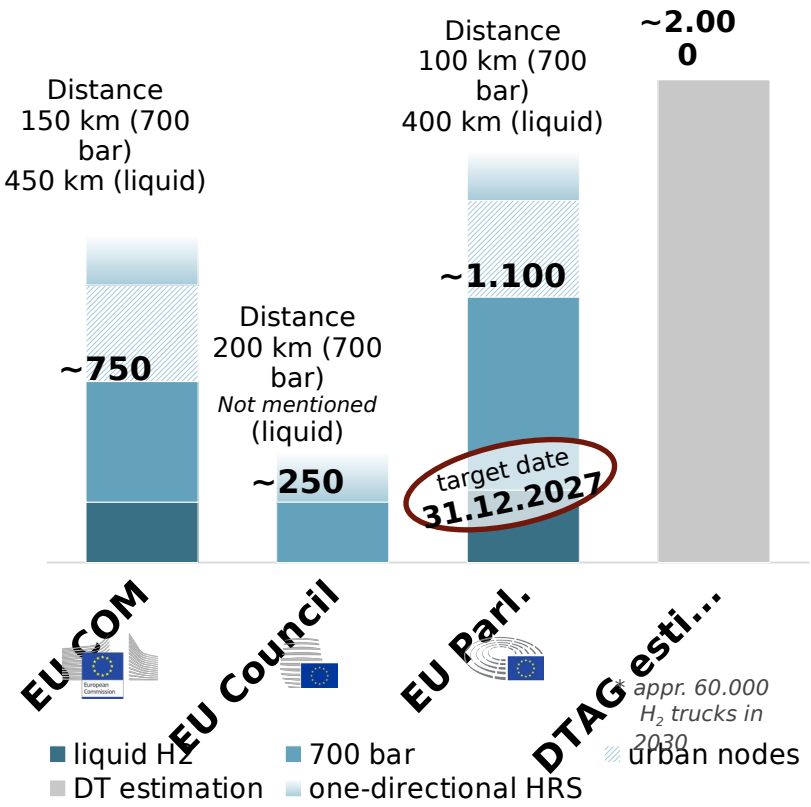
Core network:
~50.000 km

Comprehensive network:
~60.000 km



Most important urban areas and cities across all European regions:
~400 *(draft)*

Comparison of target proposals for 2030

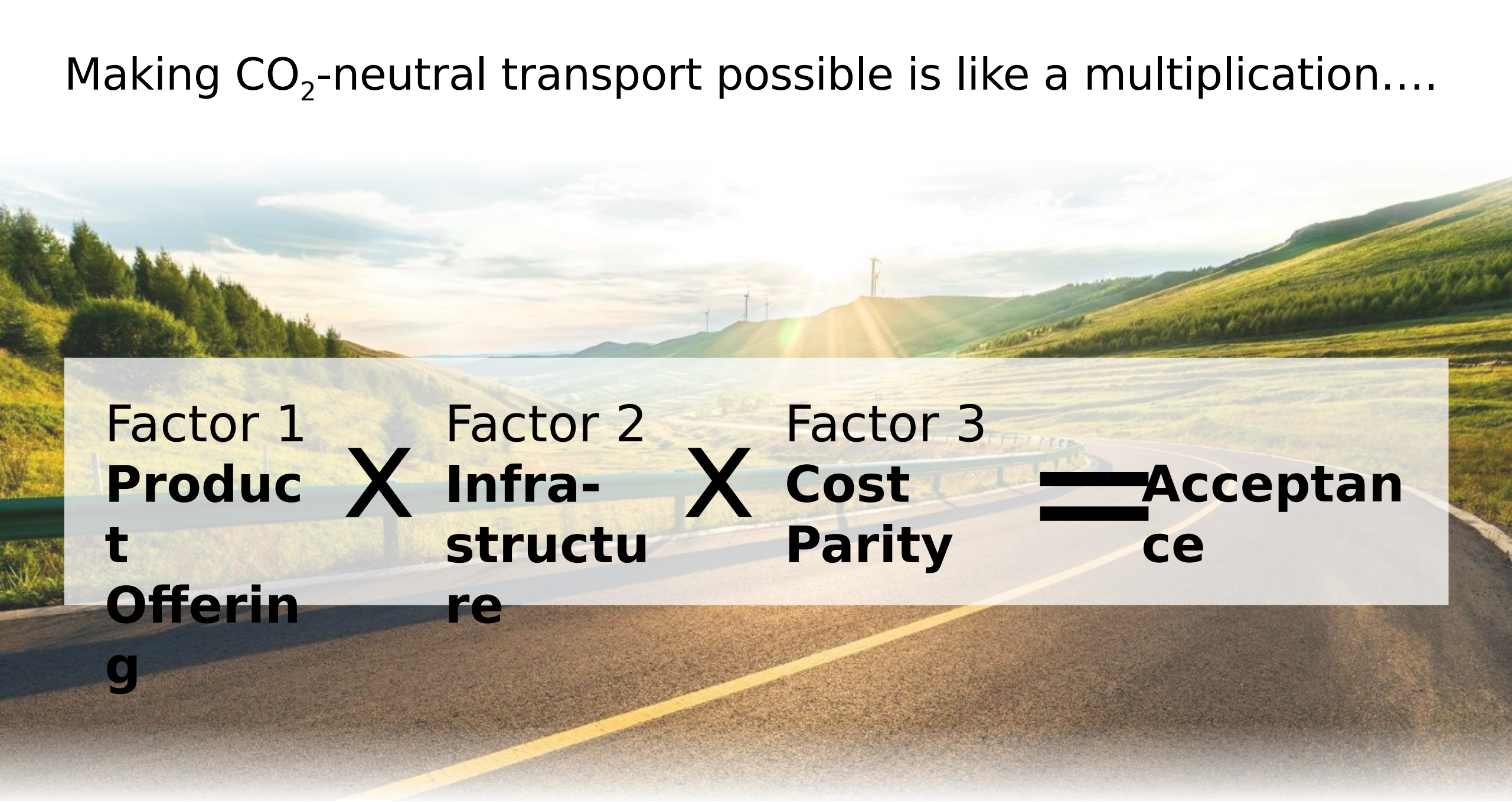


DTAG Conclusion

- **HRS requirements should define a "distance in each direction"** (likewise charging points)
- **HRS requirements for urban nodes and TEN-T roads may overlap**
- **EP target is set in the right timeframe (2027/28) and right range**

- **EU Parliament is heading in the right direction what we see as a need as of 2027/28. Final negotiation in trilogue should set definitions quite clearer.**

Making CO_2-neutral transport possible is like a multiplication….



Factor 1 **Product Offering** X Factor 2 **Infra-structure** X Factor 3 **Cost Parity** = **Acceptance**

Stay Tuned – More to come up

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AFIR: Binding 2030 targets proposed by Member States **still insufficient** for supply of HD long-haul transport with

Infrastructure targets			
target date:	**DG MOVE** July 2021 **31.12.2030**	**Council position** June 2022 **31.12.2030**	**EP position Oct** 2022 **31.12.2027**
H_2 stations			
Max. distances (in-between of stations)	**150 km** (700 bar) **450 km** (liquid)	**200 km** (700 bar) liquid not mentioned	**100 km** (700 bar) **400 km** (liquid)
Urban Nodes			**1 HRS** per Urban Node
Roads TEN-T network	**core + comprehensive**	**core**	**core + comprehensive**
Min. station capacity	**2 tonnes H_2 per day**	**-**	**2 tonnes H_2 per day**
Equal to # H_2 stations	**~750** (thereof ~250 with liquid H_2) **+400 in urban nodes**	**~ 250**	**~1,100** (thereof ~300 with liquid H_2) **+ 400 in urban nodes**

- **ACEA/DTAG estimate a need of at least 2,000 hydrogen stations with a capacity of 2t/day in 2030.**

** for the calculation of the denominator: the total length of the TEN-T network within the territory of the Member State*