DAIMLER

Daimler Truck

Hydrogen and Fuel Cell Heavy-Duty Vehicles
- The Next Dimension -

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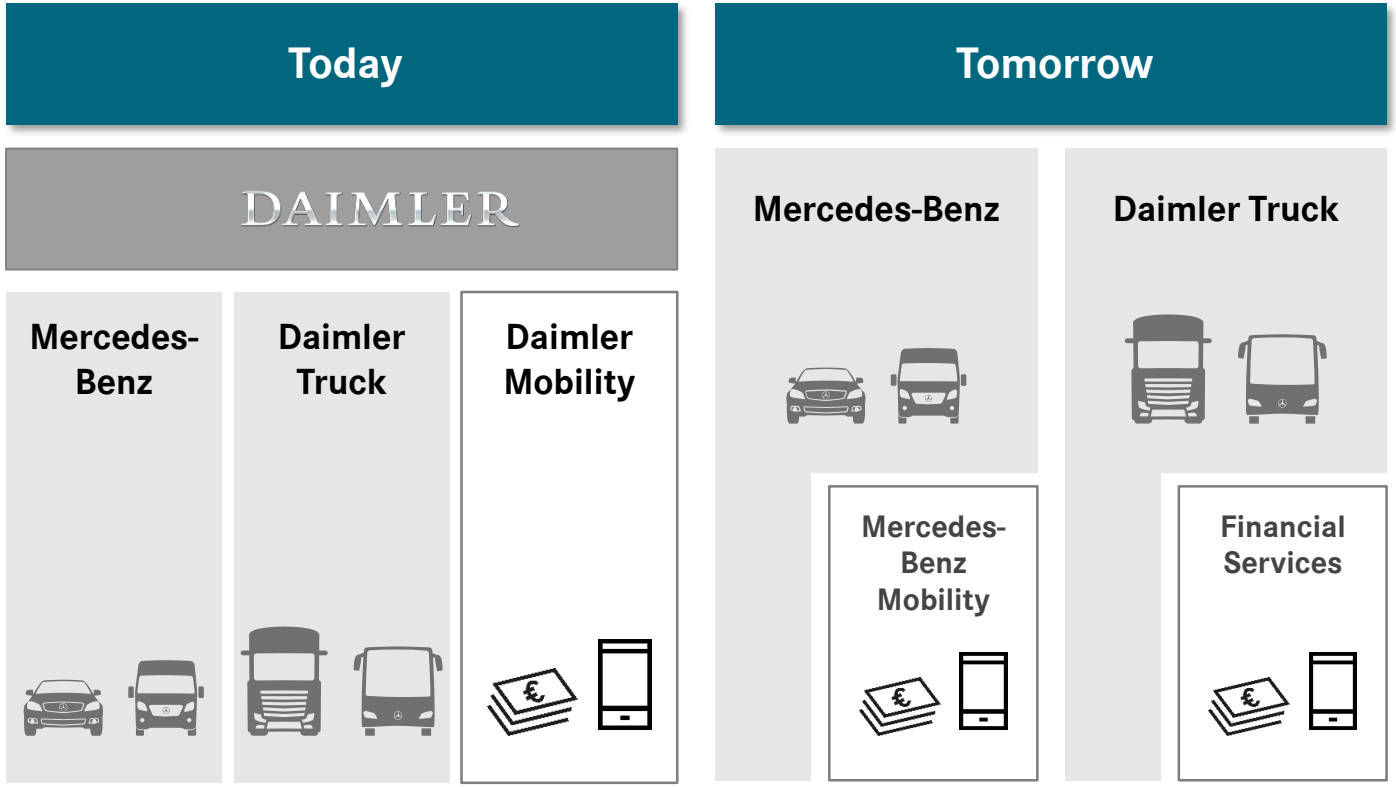
Separation of Daimler into two pure-play companies

Driving value creation, greater focus and financial discipline



Schematic representation

Daimler Truck AG - Ready for independence

On track with transactional and operational separation

Truly independent	Attractive financial profile	Prime listing
Spin-off of 65% stake	€46bn[1] revenue business	Frankfurt listing targeted end 2021
Independent governance	Solid investment grade rating	Dax qualification expected in 2022
High calibre and diverse supervisory board	Clear financial ambitions	

[1] *Actual 2019 - last year without COVID-19 impact*

Stronger as an independent company

Focused on maximizing our potential

Increased agility and focus
leads to faster decision making

Execution of
truck specific strategic plans

Increased focus on profitability:
pivot towards heavy duty and
product range streamlining

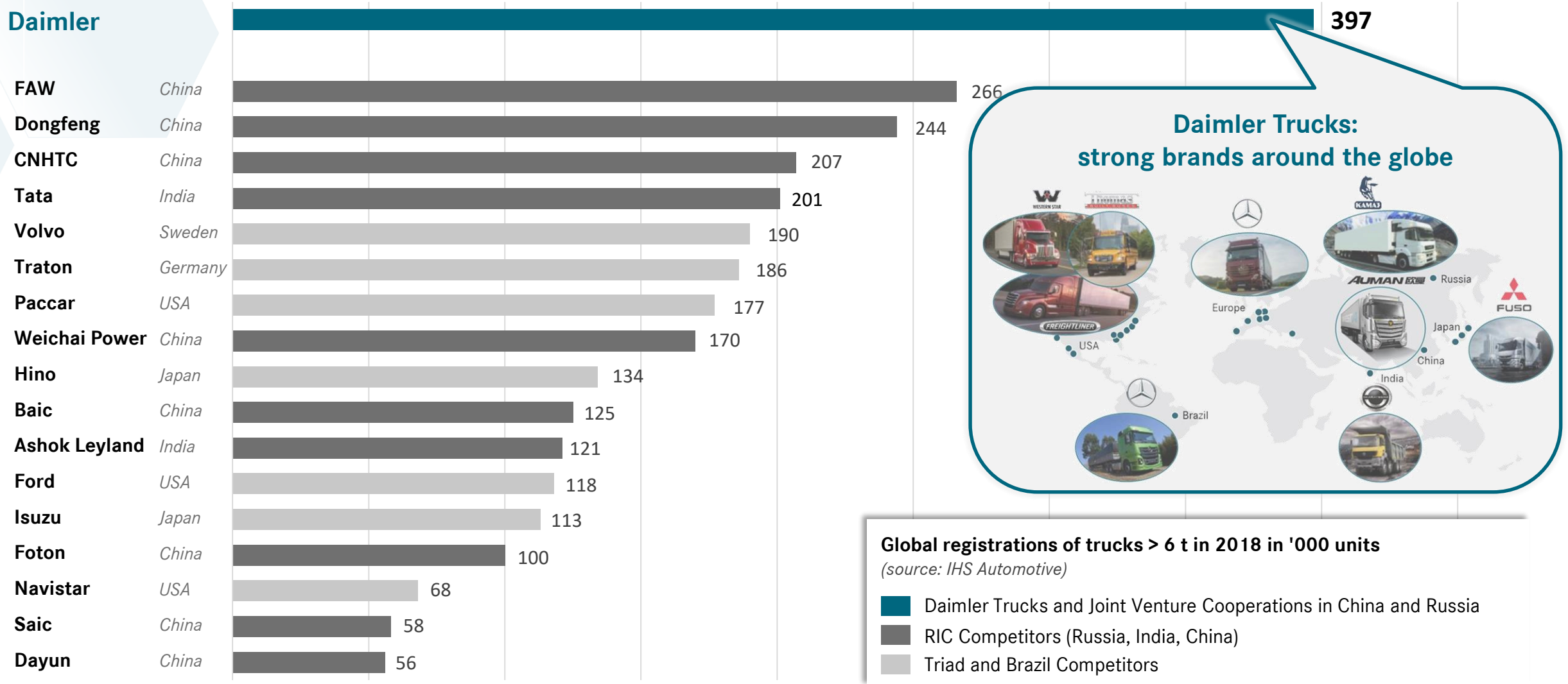
Targeted investments in
truck industry specific innovations

Dedicated partnerships to successfully
address shift in technology

Direct access and
accountability to the capital markets

Daimler Truck AG – brands and comparison to other truck manufacturers

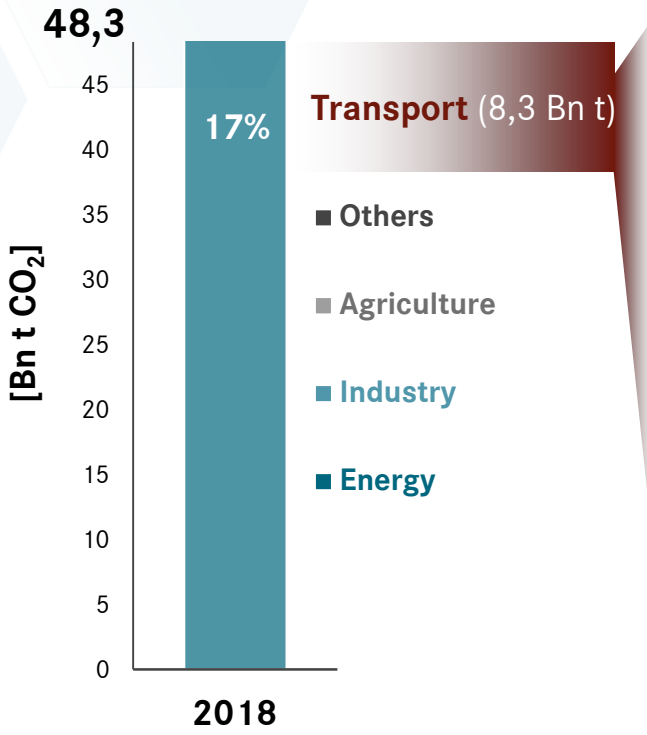
(only trucks > 6 t GCW) – 2018, 2019 very similar



Relevance of the road transport sector

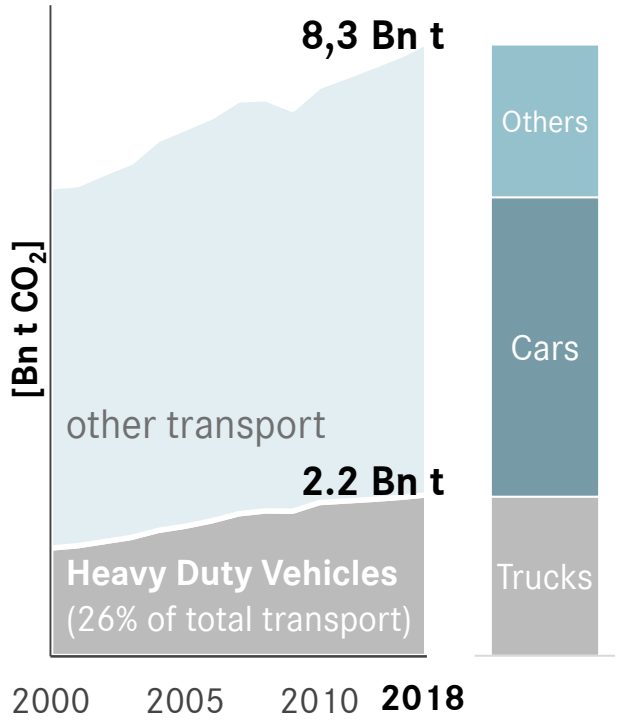
In the context of overall CO_2 emissions

Global anthropogenic CO_2 emissions



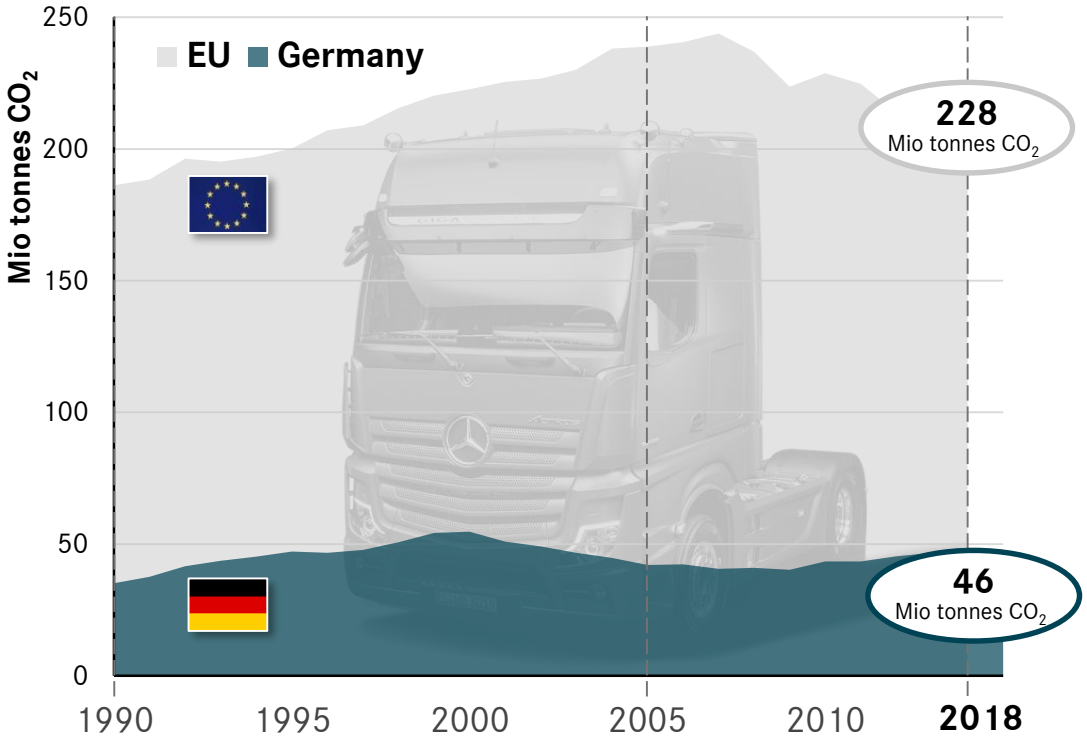
Source: WIR 2021 all greenhouse gases considered*

Share of transport emissions increases



Source: WRI 2019, ICCT 2017

CO_2 emissions from heavy duty vehicles – a diverse picture throughout Europe



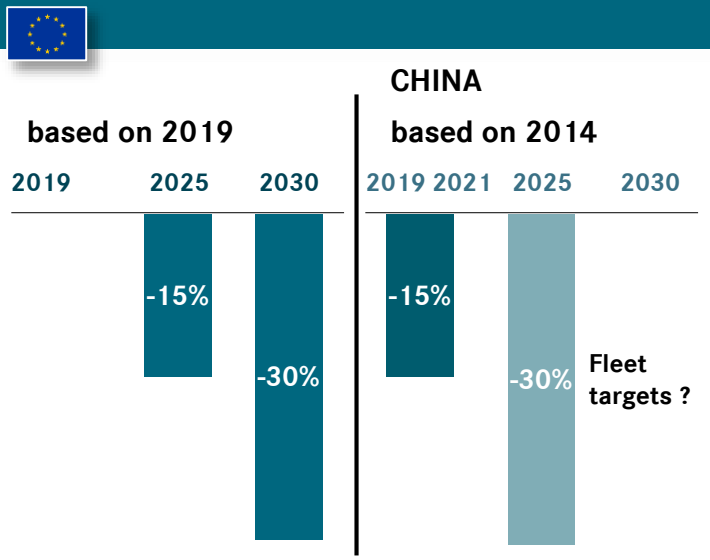
- **Globally, 17% of CO_2 emissions are allocated to the transport sector but share is significantly higher in triad**

Very stringent targets for HDV CO_2 regulation worldwide for 2025/2030

Already looking towards 2040 (close to zero ?)

Regulatory environment still getting tighter

- EU: National reduction actions likely to push for new technologies
- China:
  - Still with the single vehicle targets
  - Aim: to be on international level by 2025 (e.g. possibly 1st fleet targets in Stage IV)
  - Zero Emission Quota for HDV ?
- California: ZEV-mandate decided (ACT)



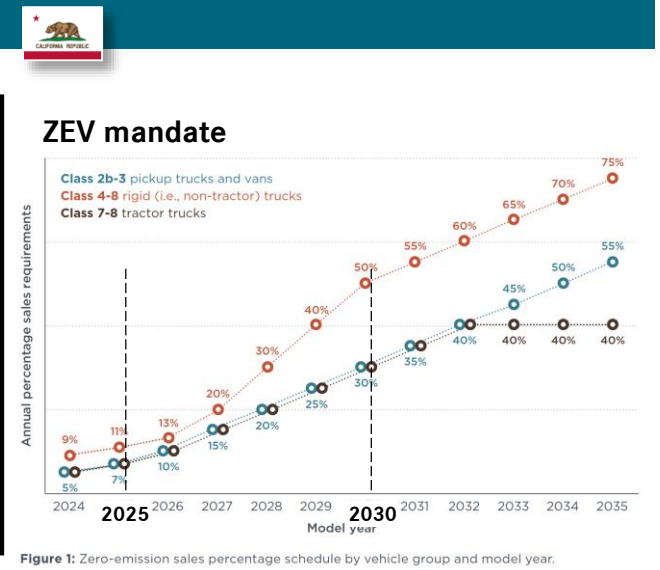
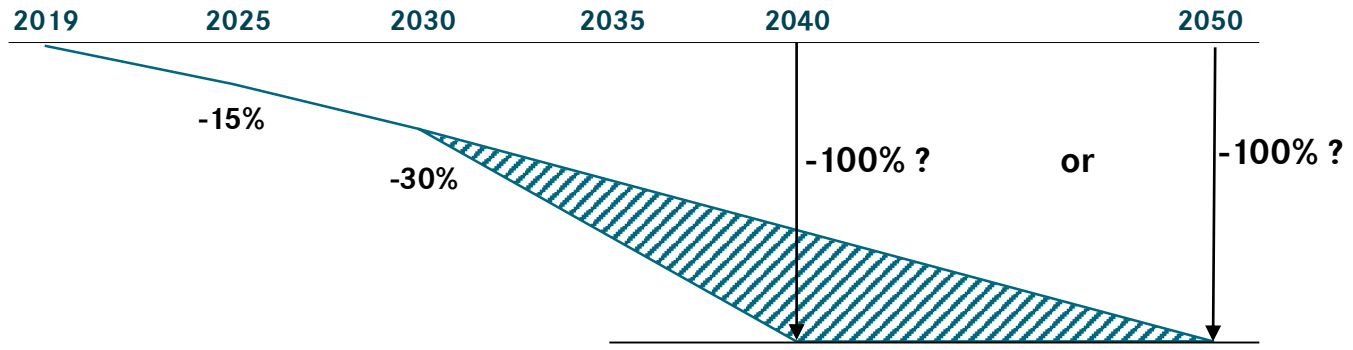


Figure 1: Zero-emission sales percentage schedule by vehicle group and model year.

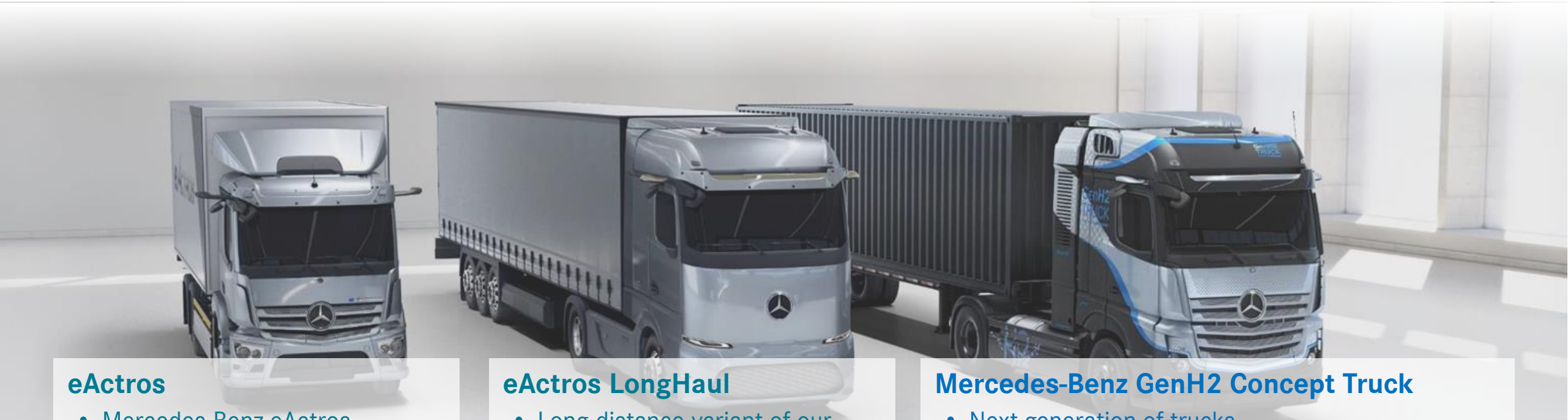
EU pushing for long-term targets 2035/2040

- 2022 review calls for binding targets for 2035 and 2040
- To reach the “nearly climate neutral” target by 2050
- New initiative by the New EU-COM President (v.d.Leyen): Green Deal



Customers have the choice

Whether battery or fuel cell is more suitable for their operation



eActros

- Mercedes-Benz eActros in customer tests since 2018
- Range: 200 - 400 km
- Series started in 2021

eActros LongHaul

- Long-distance variant of our distribution transport eActros
- Range of about 500 kilometers
- Series-production ready in 2024

Mercedes-Benz GenH2 Concept Truck

- Next generation of trucks based on fuel cells and hydrogen
- Range: 1,000 km and more
- Series production in the second half of this decade

Lighter load, shorter distance

Heavier load, longer distance

The Mercedes-Benz GenH2 Truck

Fully dedicated to heavy-duty long-haul transportation

Fuel-cell system	→	**2x150 kW**
HV battery	→	**400 kW** (time limited) **70 kWh**
H_2 storage	→	**80 kg (LH_2)**
Voltage level	→	**800V**
eMotor power	→	**2 x 230 kW** (cont.) **2 x 330 kW** (peak)
eMotor torque	→	**2 x 1,577 Nm** (cont.) **2 x 2,071 Nm** (peak)

Performance:
300 kW FCS,
HV-battery,
eAxle w/ 2x230 kW (cont.)

CO_2 Impact:
Locally emission free

Refueling time:
~ 10 minutes

Heavy-duty long-haul trucks with a range of around 1000km/day

(w/o refueling) and a superior fuel economy require a powerful fuel cell system

Use of H_2 in HDV

Fuel Cell Technology

cellcentric

A Daimler Truck & Volvo Group Company

- Fuel Cell power 150kW
- HV voltage range: 650-850V
- Compact packaging
- High lifetime and durability
- High level of efficiency
- Robustness for demanding conditions

- **The Cellcentric Fuel Cell System will be designed especially for the needs of the heavy-duty industry**
- **The heavy-duty truck industry is large enough to provide economies of scale**

National Hydrogen Council (NWR) – H2-Consumption of Trucks

Quantity structure applied* for RED II-position 2030

			Energy total			THG Value		CO_2 total	THG quota equivalent
Final energy demand road (w/ efficiency improvement, but no transition to ZE)			1.900 PJ	528 TWh					
Final Energy Demand w/o ZEV (Diesel, Petrol, Methane, biofuels)			1.498 PJ	416 TWh		94 g CO2/MJ		109 Mio t CO2	
Final energy demand ZEV w/o factor			161 PJ	45 TWh					
Final energy demand ZEV with factor			322 PJ	89 TWh					
Final energy demand road (real)			1.659 PJ	461 TWh					
Final energy demand road (reference value calculated according BImSchV)			1.820 PJ	505 TWh		94 g CO2/MJ		132 Mio t CO2	

	Fleet population	Energy Consumption	Mileage	Energy total	Utlilization	Multiplier	THG Value	CO_2 saving real	
ZEV									
BEV PV	7.000.000	20 kWh	14.000					3,0 Mio t CO2	4,5%
PHEV PV	3.000.000	20 kWh	7.000					0,6 Mio t CO2	1,0%
BEV HDV >3.5t GVW	80.000	130 kWh	60.000					1,1	1,6%
BEV Buses >3.5t GVW	12.000	110 kWh	60.000					0,1	0,2%
BEV LDV < 3.5t GVW	350.000	22 kWh	20.000					0,3	0,4%
H_2 PV	250.000	1 kg	15.000					0,3	0,4%
H_2 HDV > 16t GVW	**30.000**	**8 kg**	**120.000**					2,4	3,6%
H_2 Buses >18t GVW	4.000	8 kg	75.000					0,2	0,3%
H_2 LDV < 3.5t GVW	50.000	2 kg	20.000					0,2	0,3%

NWR estimate for Germany, 2030:

- **appr. 30,000 H_2 heavy-duty trucks** each truck using appr. 10 to/a hydrogen
- Resulting in **annual demand of 300,000 to H_2** for truck transport

NATIONALER WASSERSTOFFRAT

Refineries	Electrolyser perf. [GW]	H_2 in total	H_2 (for road fuels only)			Max. allowed share				CO_2 saving	CO_2 saving real	
H_2 gros demand		450.000 t	32,4 PJ	9,0 TWh								
H_2 net demand	0,9	171.000 t	12,3 PJ	3,4 TWh	100%		2	9,4 g CO2/MJ	90%	1,6 Mio t CO2	0,8 Mio t CO2	1,2%
upstream emission reductions					90%	1,20%				1,4	1,4	1,1%

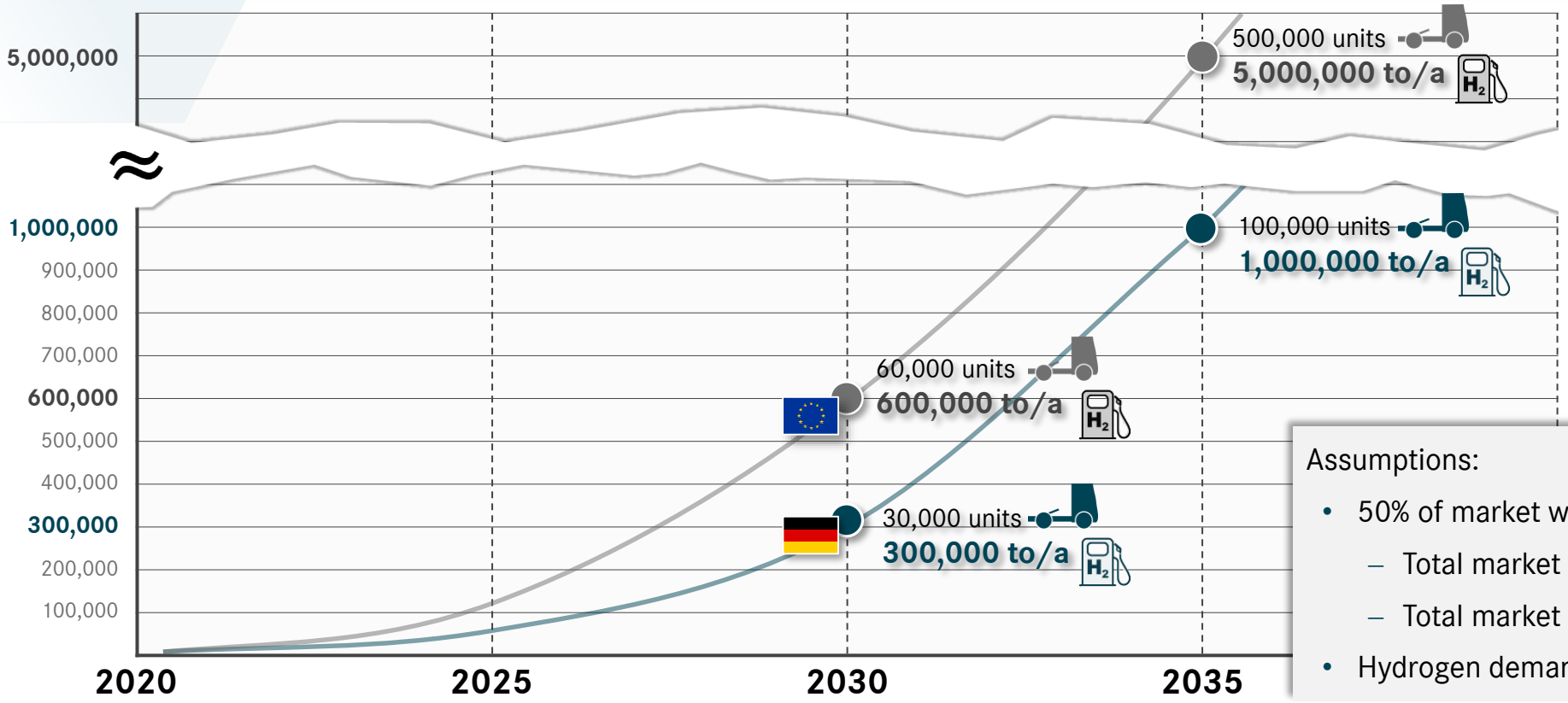
Biofuels and efuels		Energy total		Min share / targets					CO_2 saving	CO_2 saving real	
Advanced biofuels, Annex IX Teil A		1041									
Min.	0,7 Mio toe	29,0 PJ	8,1 TWh	100%	1,75%	1	18,8 g CO2/MJ	80%	1,7 Mio t CO2	1,7 Mio t CO2	1,3%
Max.(only delta to min)*	0,7 Mio toe	29,0 PJ	8,1 TWh	100%	1,75%	2	18,8 g CO2/MJ	80%	3,4 Mio t CO2	1,7	2,6%
Reststoffbasierte Kraftstoffe, Annex IX Teil B	0,8 Mio toe	31,5 PJ	8,8 TWh	100%	1,90%	1	9,4 g CO2/MJ	90%	2,1 Mio t CO2	2,1	1,6%
Conventional biofuels	1,1 Mio toe	44,8 PJ	12,4 TWh	100%	2,70%	1	28,2 g CO2/MJ	70%	2,3 Mio t CO2	2,3	1,7%
efuels	0,4 Mio toe	18,1 PJ	5,0 TWh	100%	1,09%	2	9,4 g CO2/MJ	90%	2,4 Mio t CO2	1,2	1,8%
H_2+efuels											**7,6%**
Total									**31,0 Mio t CO2**	**19,2 Mio t CO2**	**23,5%**

** applied sources of NWR: NPM AG1, different studies of MKS as well as BDI etc.*

Supply and demand have to be synchronised

Ramp-up of (green) H_2 supply has to keep pace

Strongly increasing H_2 demand from 2030: More than 10 Mio. to H_2 needed for HD trucks from 2035 on



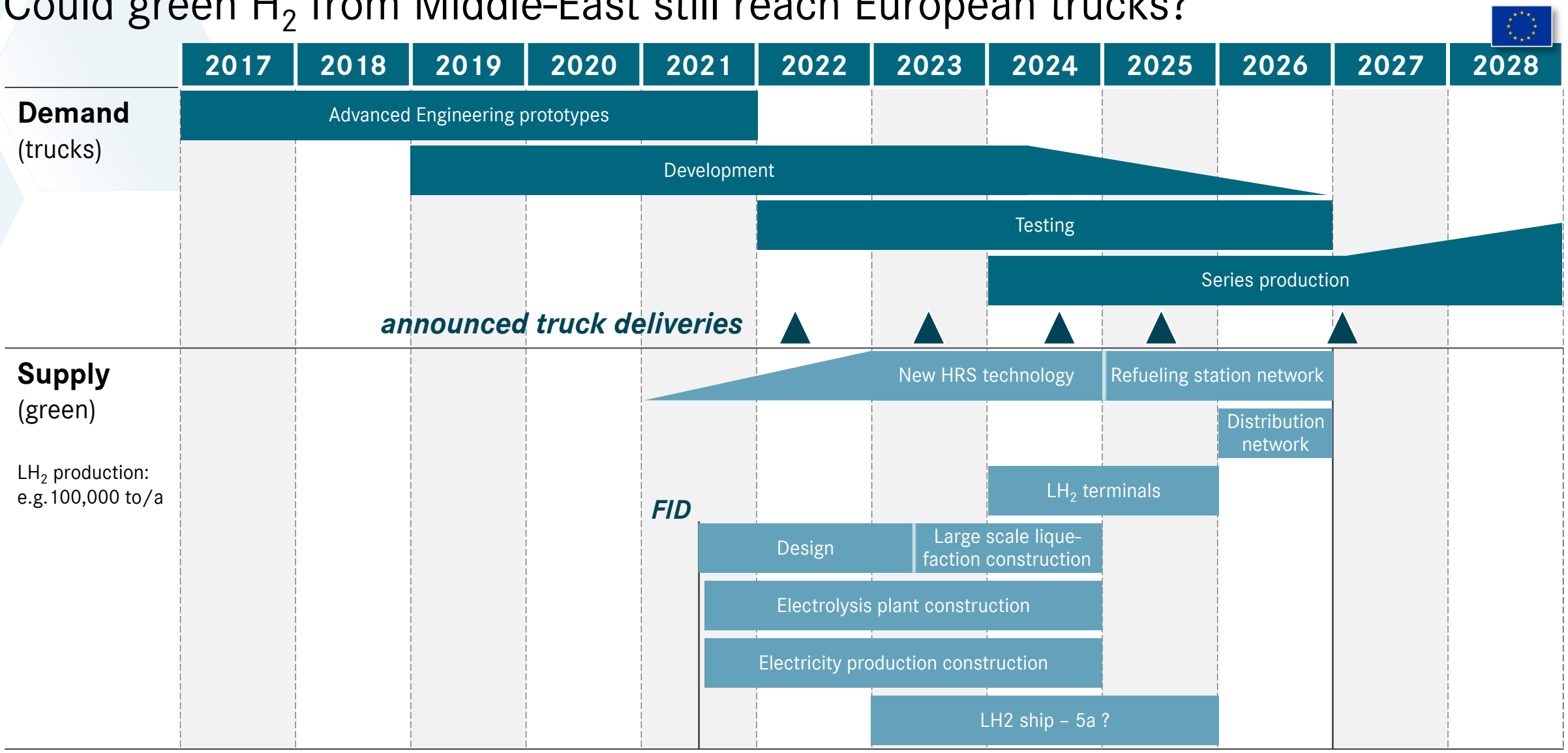
Assumptions:

- 50% of market will be H_2 HD trucks
  - Total market size EU: 1,000,000 units
  - Total market size Germany: 200,000 units
- Hydrogen demand of 10 to/a per truck

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

LH_2 supply & demand:

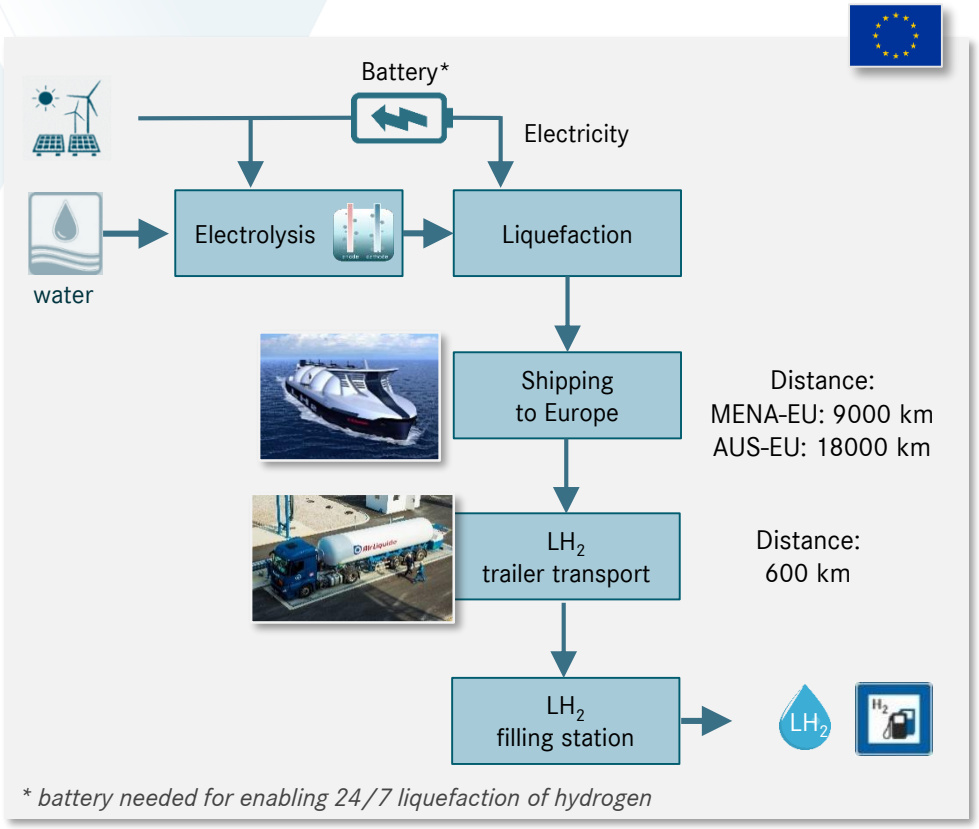
Could green H_2 from Middle-East still reach European trucks?



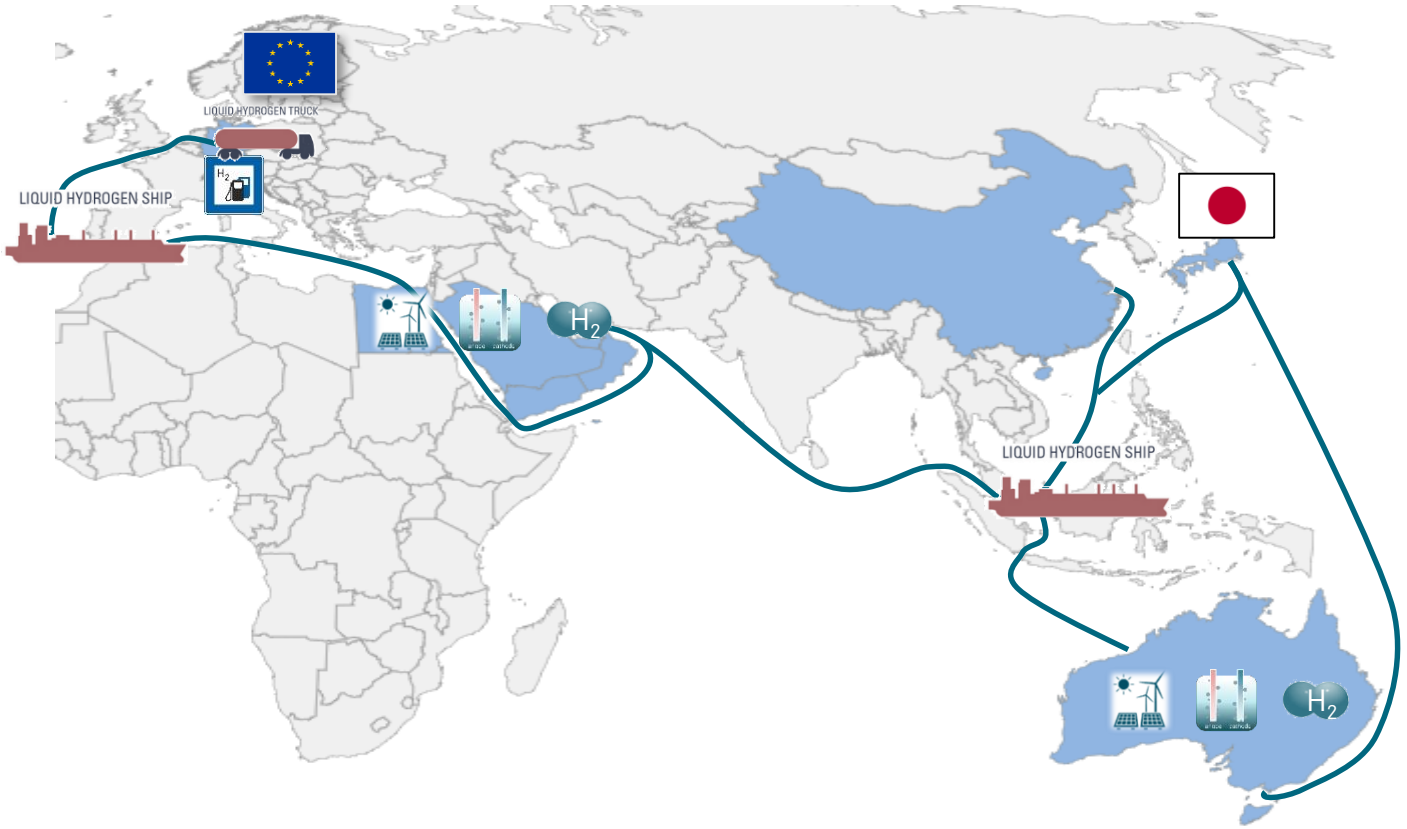
H_2 could become energy carrier of the future especially in the HDV sector

International liquefaction chain could solve the concern on green hydrogen

Supply chain



International H_2 production and shipping



Stay Tuned – More to come up

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