

Hydrogen's Potential to Achieving a Carbon-Neutral Future ECCK Webinar



H2: Key Element towards a Zero Emission Road Freight Transport - A Truck OEM Perspective -

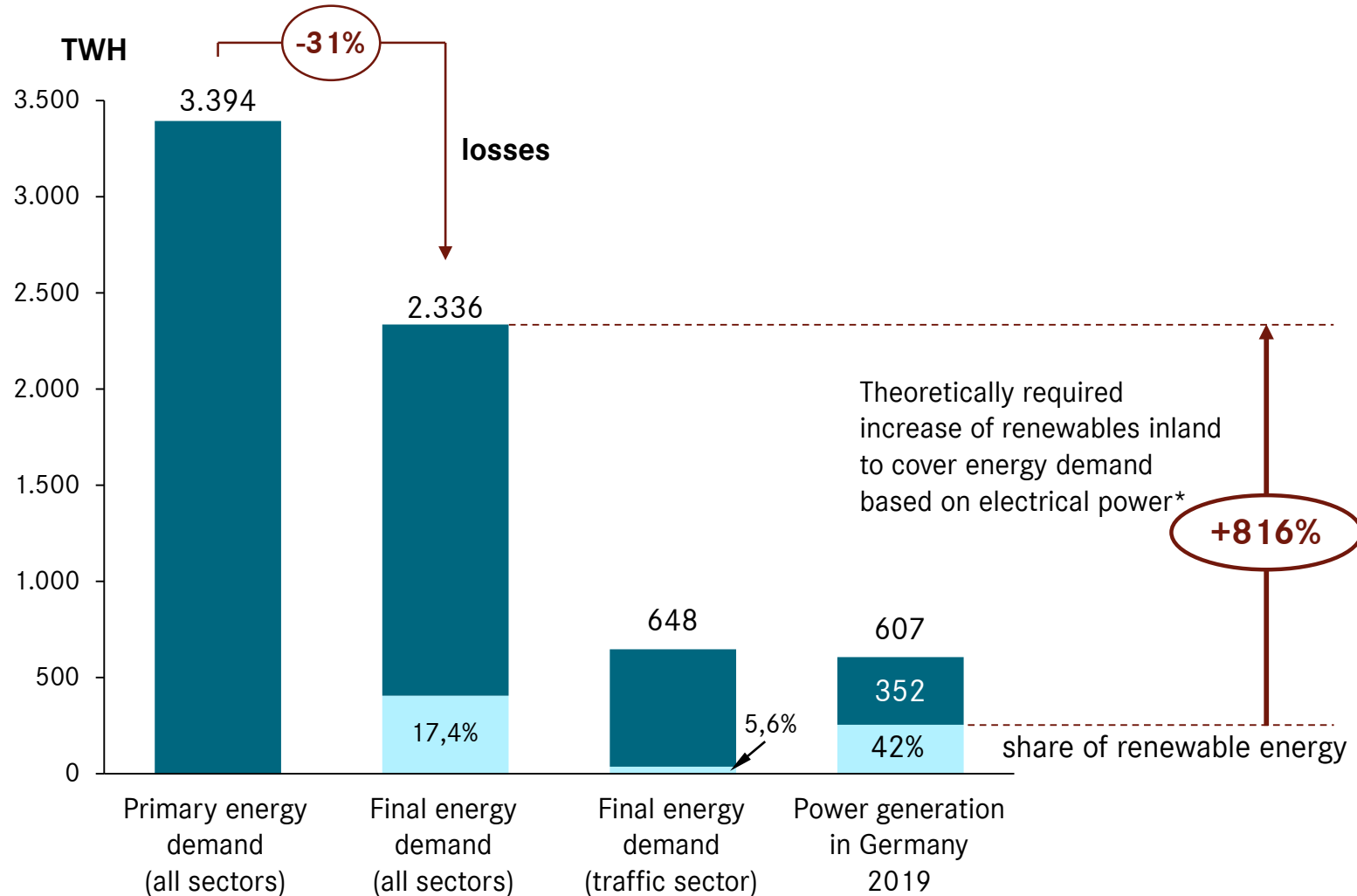
Volker Hasenberg
23 March 2021

DAIMLER

What you can expect the next 20 minutes...

- 1. Carbon Neutrality – we all are committed but still at the beginning (example Germany)**
- 2. Policy Framework as Game Changer – what is in place, what is still missing?**
- 3. Strategy without bridge technologies: DAIMLER TRUCKS way to zero**

Target 100% Zero-Emission in 2050 – we are just at the beginning!



* sources: Eurostat, BCG/Prognos 2018/2019



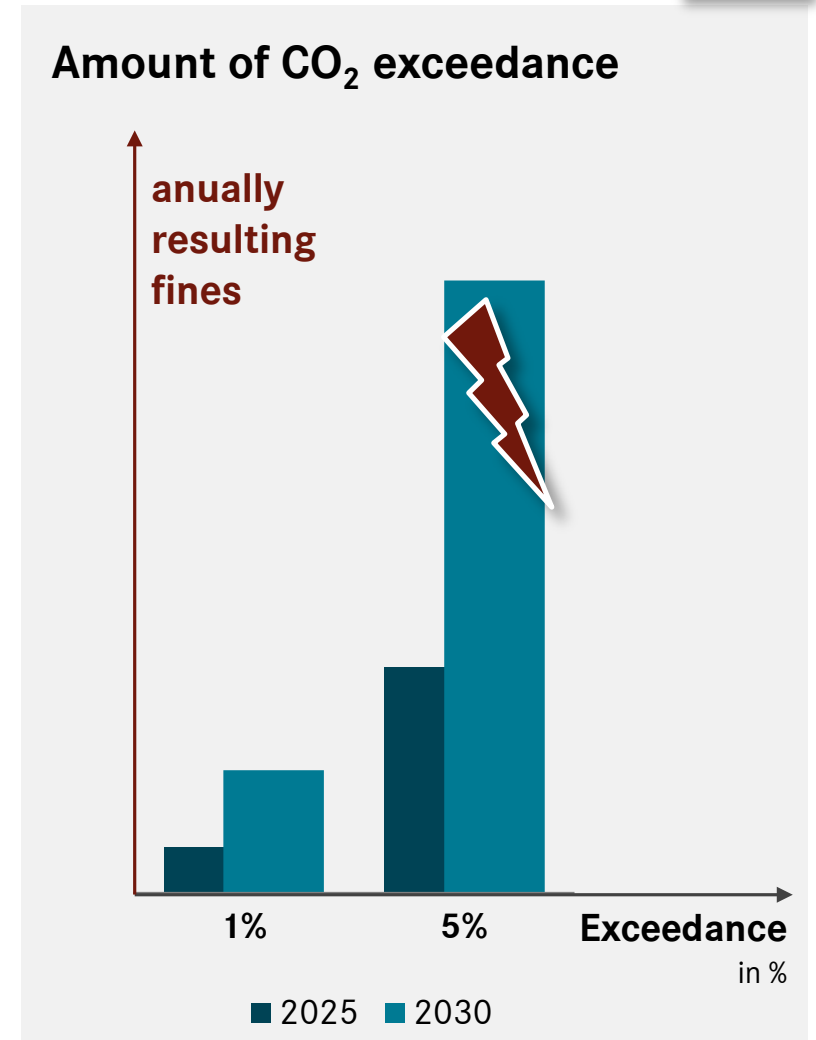
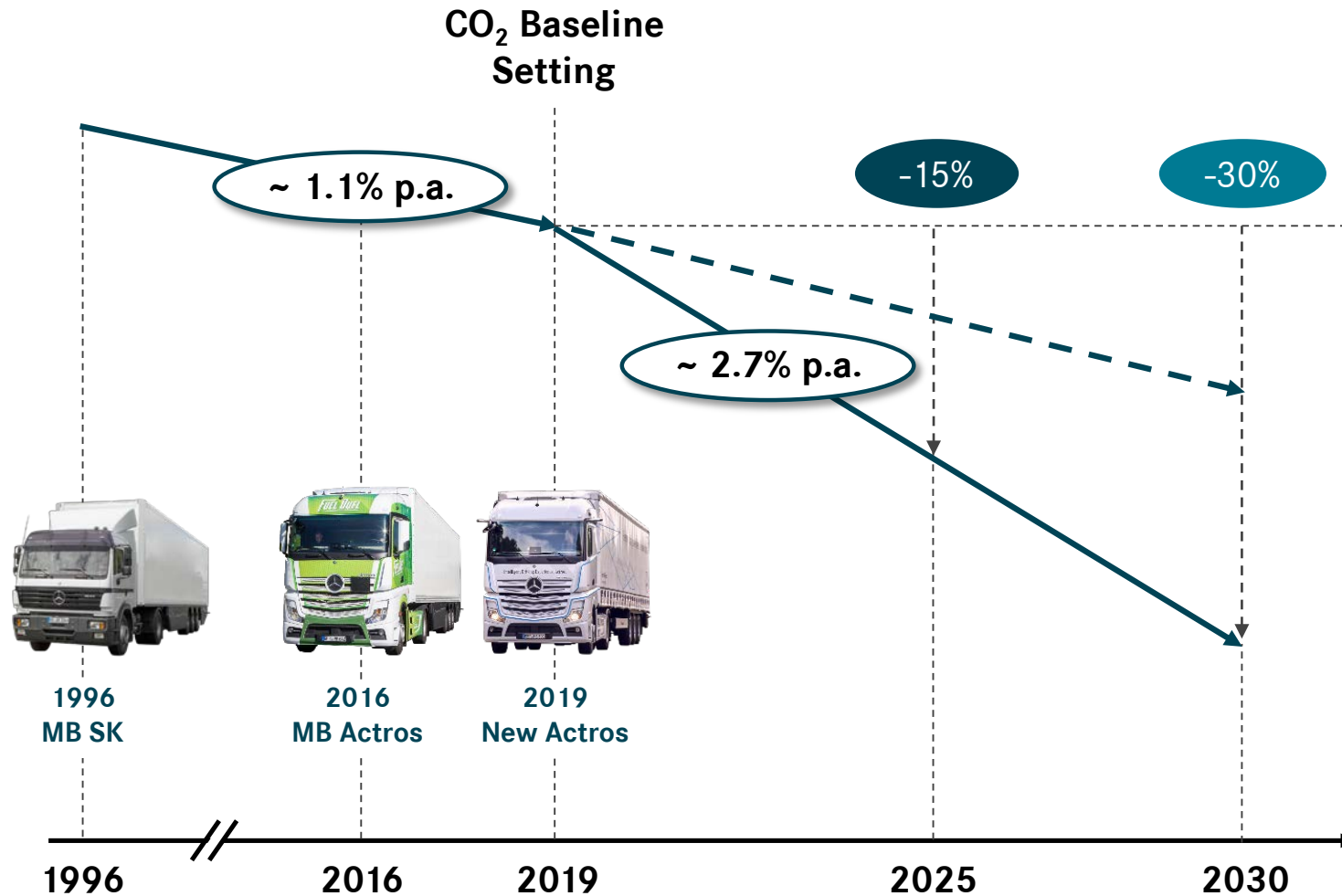
Today, renewable energy covers a share of appr. 17% of the final energy demand in Germany

(solar heat, biomass, biofuels, renewable electricity)

A renewable energy system of the future will mainly be based on electricity and hydrogen in all sectors.

Energy demand cannot be based on national power generation only.

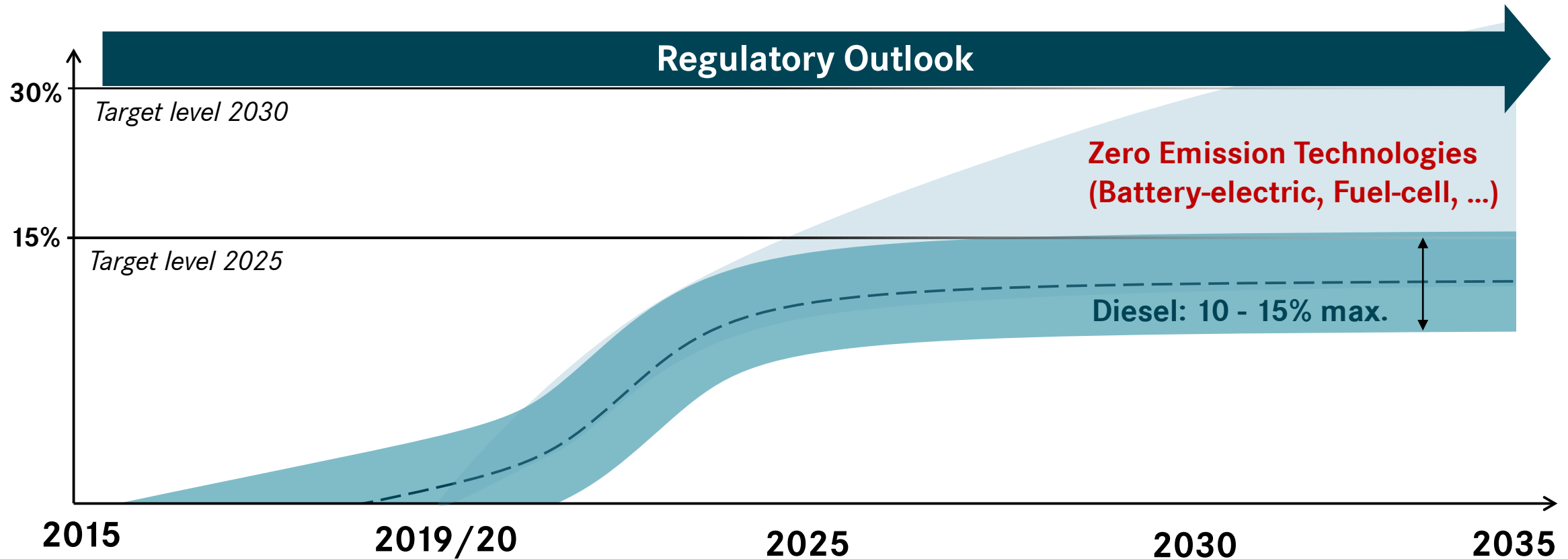
The EU CO₂ penalties are so high that missing CO₂ targets would put an EU truck company in serious danger – we have to fulfill them!



Technology strategy: Conventional measures are not sufficient to achieve 2030 target

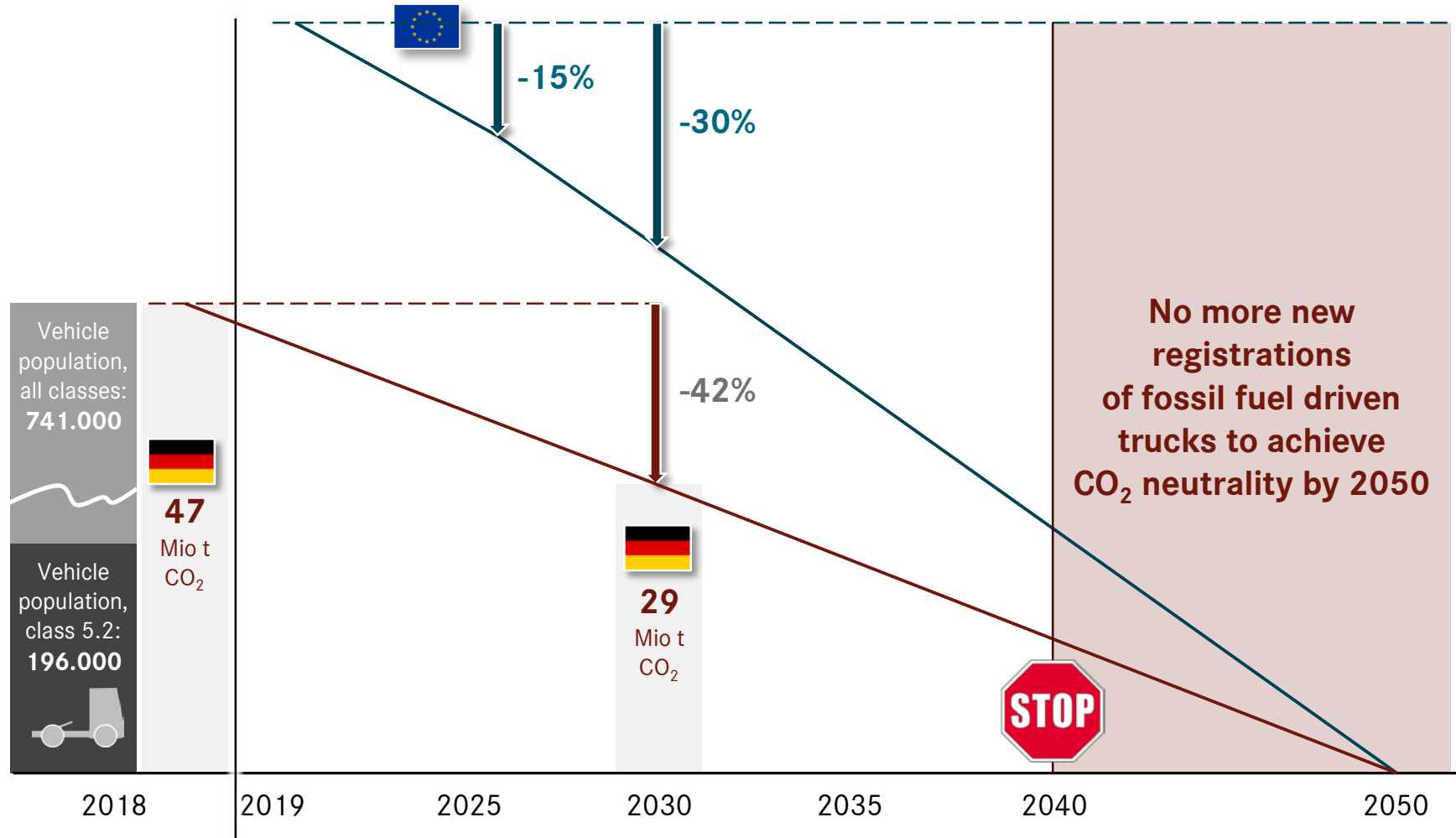


Zero/Low Emission Technologies are required to reach challenging targets



Transition towards „Zero“ in only two decades will require strong supporting political and financial framework

Setting long-term targets and the right framework



100% Tank-to-Wheel w/o synthetic fuels in 2040 require a strong supporting framework for ZEV

e.g.

- charge/fueling infrastructure
- financial instruments like taxes
- road charging
- CO₂ pricing
- procurement grants

The road to CO₂-neutral transportation – Daimler Trucks and Buses

CO₂-neutral commercial vehicle fleet by 2039



Climate protection – our vision:
We shape the future of CO₂-neutral road transportation



For our **new commercial vehicles**, it is our ambition to become **tank-to-wheel CO₂-neutral in 2039 in the triad**



By 2022, the product portfolio in the core regions will also include battery electric series production vehicles



Next steps: Customers can choose whether a battery or fuel cell best meets their needs



eActros

- Mercedes-Benz eActros in customer tests since 2018
- Range: 200 km and more
- Series production 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

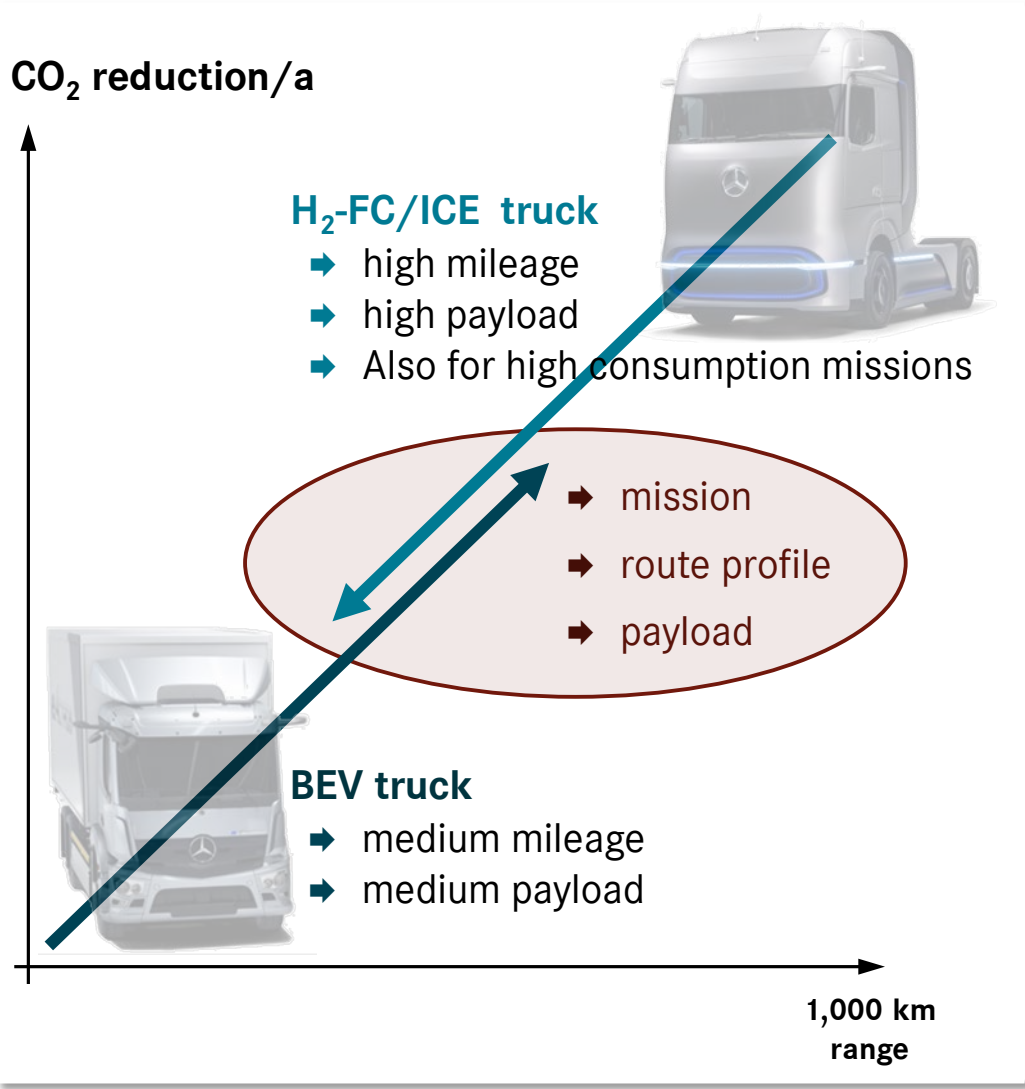


Lighter loads, shorter distances

Heavier loads, longer distances



BEV and H₂-FC/ICE powertrains can perfectly complement one another: customers can choose most cost-efficient solution for mission requirements



But ... infrastructure key:

- ! We need a powerful charging infrastructure
- ! Electric power and eTrucks must become much cheaper
- ! Long term investment stability required



Charging stations (industry) (on top of 200.000 charging stations with <100kW)

	2025	2030
DC 350 kW	11,000 public	20,000 public
DC > 500 kW	2,000 public	20,000 public

H₂ (Daimler)

LH ₂	> 50	> 1,000
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Zero CO₂ – and 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	→	2x 230 kW (cont.) 2x 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.)

**CO2 Impact:**
Locally emission
free

**Refueling time:**
~ 10 minutes

We're also relying on partnerships: joint venture with Volvo



- While we buy batteries, we're moving forward differently with fuel cells
- Together with the Volvo Group we aim to make the fuel cell ready for series production while taking advantage of volume and reduced cost
- When it comes to the application of fuel cells in vehicles we will remain competitors

Politics should set these priorities:



- **Focus on green hydrogen, not gray. We also see advantages in liquid hydrogen**
- **Promote hydrogen infrastructure, not natural gas or overhead catenary**
- **Introduce a CO₂-price and CO₂-based tolls to compensate cost disadvantage compared to diesel**