



cellcentric Brennstoffzellen: Pioniere sauberer Energieerzeugung für den Langstrecken-Schwerlastverkehr

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AEN Business Frühstück
21.09.2023





What is the “Trucks Share” of CO₂ emissions?

12 000 000 000 000

12 trillion ton-kilometers p.a.

2 000 000 000

2 billion tons CO₂ p.a.

7%

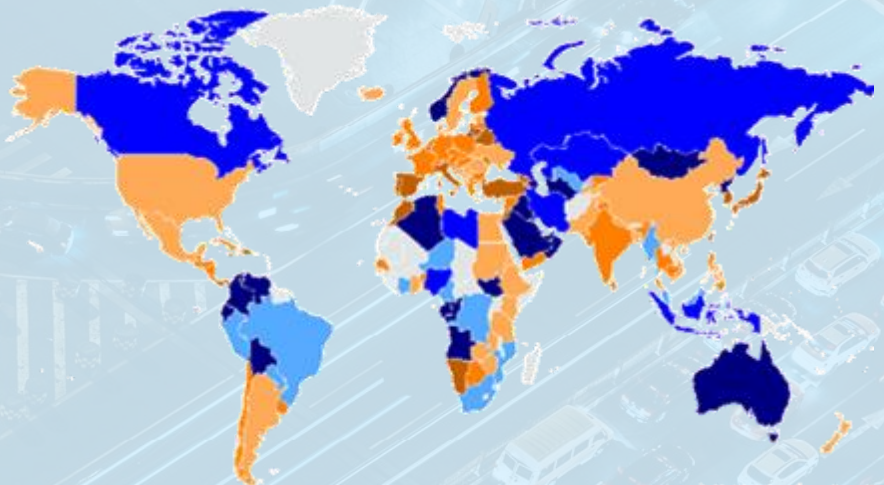
of global anthropogenic CO₂ emissions

A CO₂ neutral world in 2050 can only be achieved with green electricity and green hydrogen in combination

IMPORT DEPENDENCY OF ENERGY



Overall energy self sufficiency (2016):

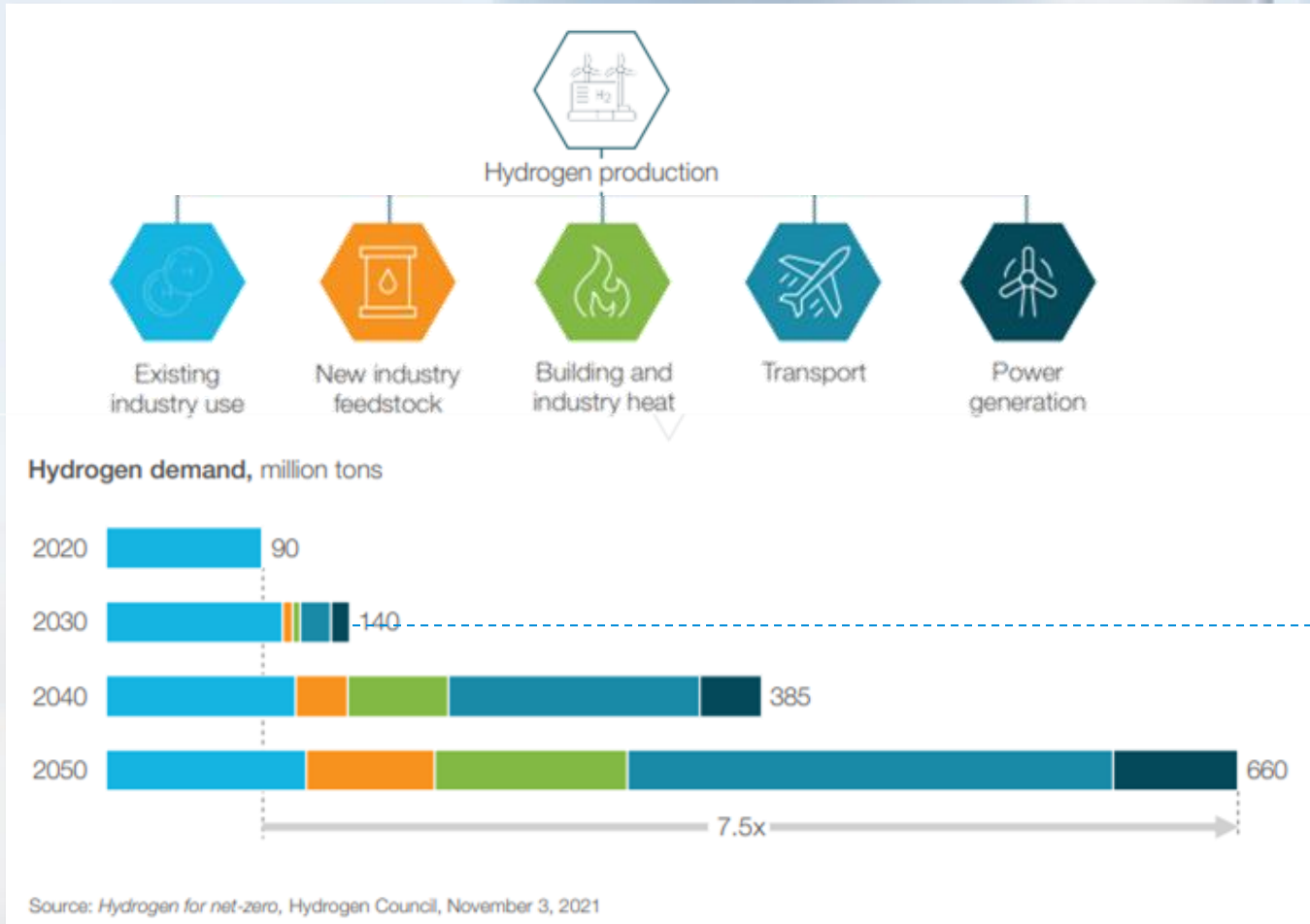


KEY STATEMENTS

- Many of the countries supporting the Paris Agreement are **dependent on energy imports**.
- Even if all local energy in Germany (Europe) can be produced green, **70% (55%) still needs to be imported**.
- In a possible CO₂-neutral future, the same or even more energy will be needed.
- The required energy (over long distances) can only be imported in **chemically bound form**, i.e., today: oil, gas, coal.
- A CO₂ neutral EU in 2050 will therefore need to **import significant amounts of H₂** (or derivatives).

«Wenn wir nicht 5 oder 10 Prozent der Landesfläche mit Windkraftanlagen vollstellen wollen - das halte ich auch für absurd - brauchen wir Wasserstoffimporte»,
Robert Habeck, 09.02.2022

The H₂ economy will be built up anyway **irrespective of H₂ @ Transport, driven by existing industry use cases**



Key Facts

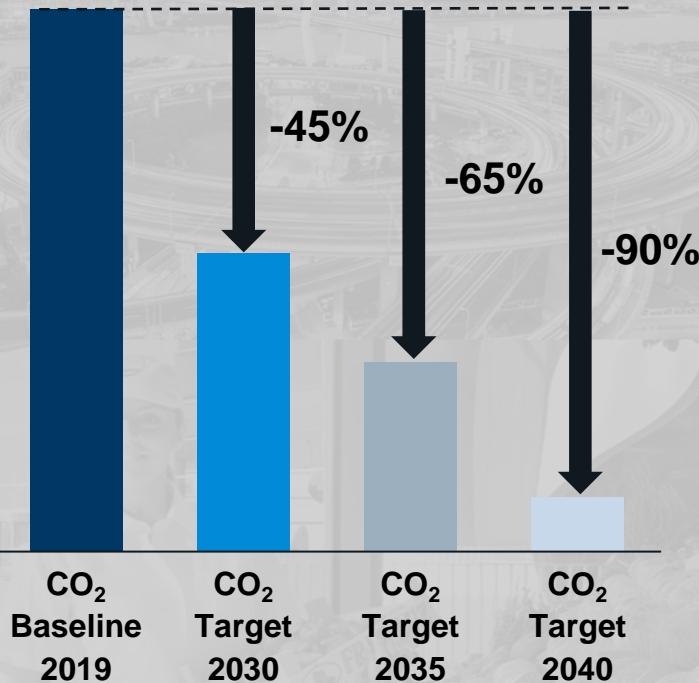
- H₂ economy will be built up and constantly growing
- Even in 2030, H₂ consumption will be driven by existing industry use-cases



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

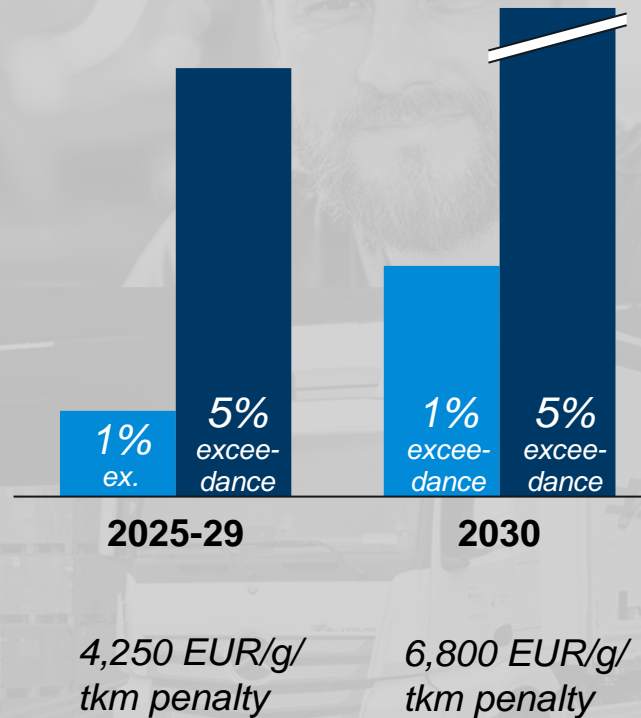
CO₂ TARGETS FOR TRUCKS

PENDING



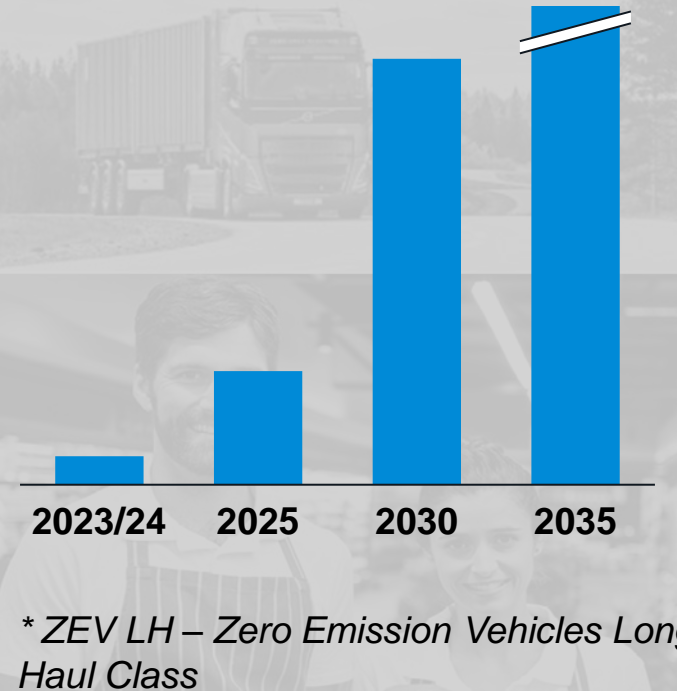
POTENTIALLY PROHIBITIVE FINES

EXAMPLARY



RESULTING ZEV LH* NUMBERS

PRELIMINARY



* ZEV LH – Zero Emission Vehicles Long Haul Class

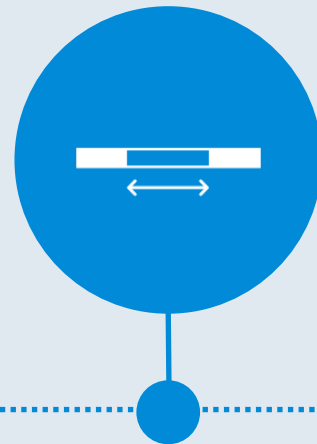


Fuel cell systems: lighter, longer range and rapid refilling and zero emissions



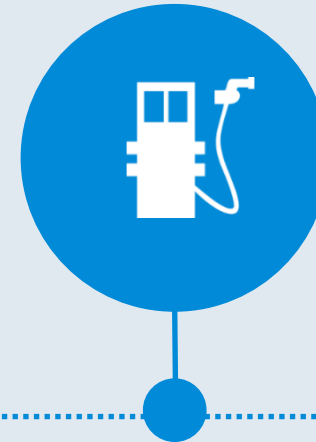
Less weight

The complete fuel cell system with its hydrogen tank and its smaller battery still allows a high payload. This is of great importance for the customer in long-haul transport.



Longer range

Two specially designed hydrogen tanks are characterized by a high storage capacity for covering long distances. These are equivalent to the combustion powertrain that is used today.



Rapid refilling

As with conventional diesel trucks, refueling at hydrogen refueling stations takes place at the same speed as refueling with diesel.



Zero emission

Emitting only water vapor. When hydrogen is used to power a fuel cell, the only by products are water vapor and heat - no pollutants or greenhouse gases.



cellcentric is the go-to Tier 1 supplier of fuel cell systems for various applications with > 30 years of experience

Daimler pre-series production

> 25 years of extensive R&D and product history



1994 - 2020

Stand alone fuel cell manufacturer

Prototype production for Daimler Truck & Volvo Group



March 2021

Stand alone fuel cell manufacturer

For various applications beyond Daimler Truck and Volvo Group



Today

cellcentric BZA150: the best possible total cost of ownership based on our CEDReC approach



CEDReC:

Cost

Efficiency

Durability

Reliability

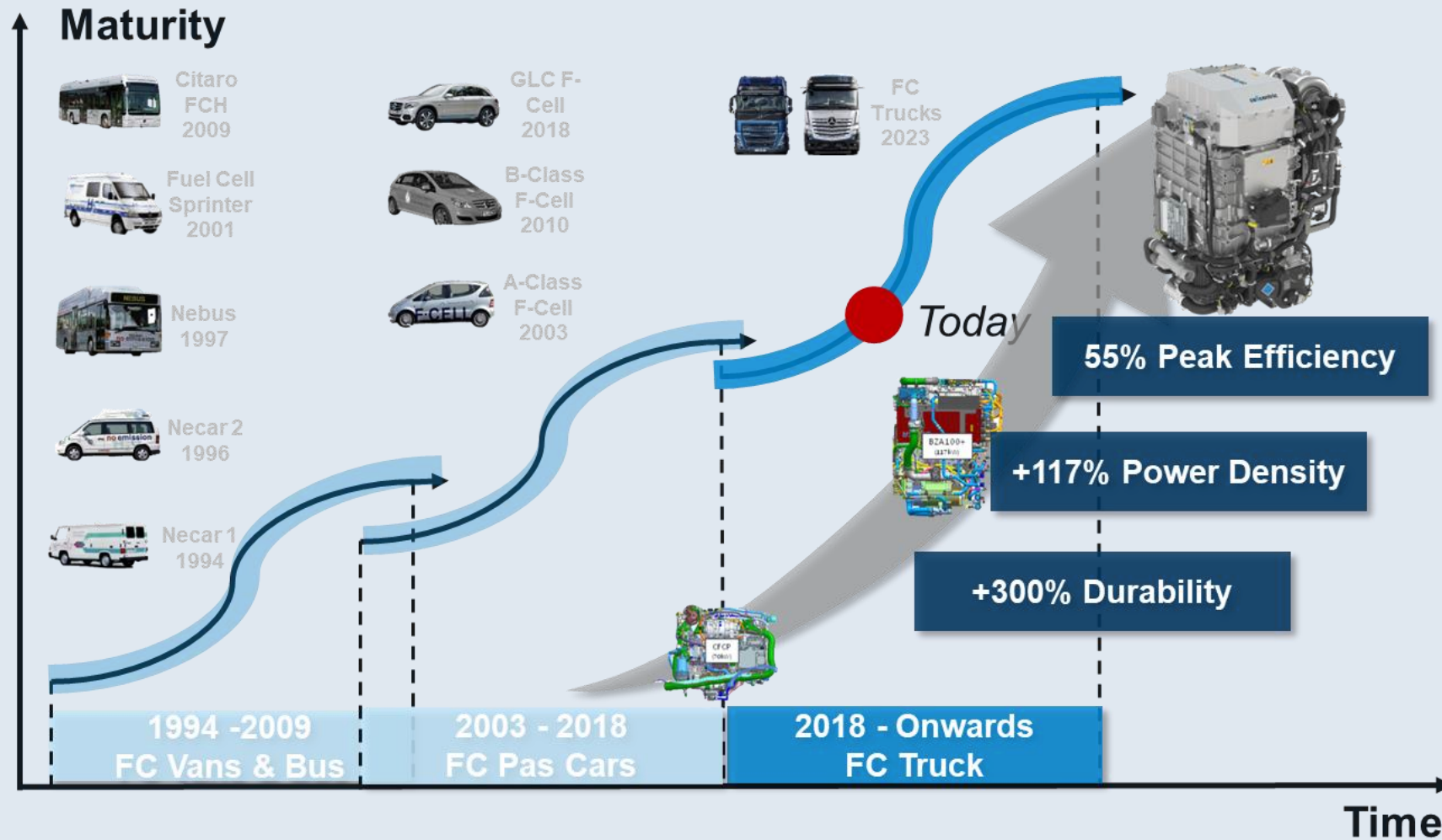
Customer Benefits

- Compact packaging
- Expected lifetime target 25.000 hours/ up to 10 years (long haul truck)
- System providing up to ~143kW net power output (BoL)
- <60 sec to full-power startup
- High level of efficiency
- Robustness for demanding conditions

- H: ≤990mm | W: ≤650mm | L: ≤660mm
- Weight ≤250kg

= TCO (total cost of ownership)

cellcentric BZA150 matured over 30 years and based on extensive practical experience





Volvo Group and Daimler Truck integrated the cellcentric fuel cell into their trucks – onroad testing will provide valuable insights for further development

Premiere: Volvo Trucks tests hydrogen-powered electric trucks on public roads



Touring the Alps with hydrogen - CO2-neutral trucks from Daimler Truck demonstrate their capabilities





cellcentric fuel cell in Mercedes-Benz GenH2 (Daimler Truck) tested at various altitudes in a demanding topography

- ✓ All Brenner testing with combined gross weight of 40 tons (maximum payload) and up to altitudes of 1560 m above sea level
- ✓ Propulsion power (prototype): 4000 Nm maximum torque / peak power: 600 to 640 kW
- ✓ Target mileage: 1.2 million kilometer
- ✓ Tank: cGH₂ and sLH₂ technology (up to 80 kilos of hydrogen) used leading into an estimated operating range beyond 1000km*

„We have shown here in Tyrol that both drive technologies can function completely reliably and effectively.“

Dalibor Dudic, Daimler Truck AG





Volvo fuel cell electric truck powered by cellcentric tested in extremely cold climate

- cellcentric fuel cell systems deployed in a Volvo Truck tested on public roads for the first time.
- To make it extra-challenging, the tests have been conducted above the Arctic Circle in the north of Sweden – in an extremely cold climate.

✓ Extreme temperatures of up to -25°C



“I am pleased to say that the tests are going well, confirming tests we carried out beforehand, both digitally and on our confined test track close to Gothenburg.”

Helena Alsiö, Volvo Trucks

Next Step low volume production – 1st all under one roof factory in Esslingen & start scaling to high volume production

Yesterday



- Manual prototype production
- In different locations

Today



- Automated low volume production
- 1st all under one roof

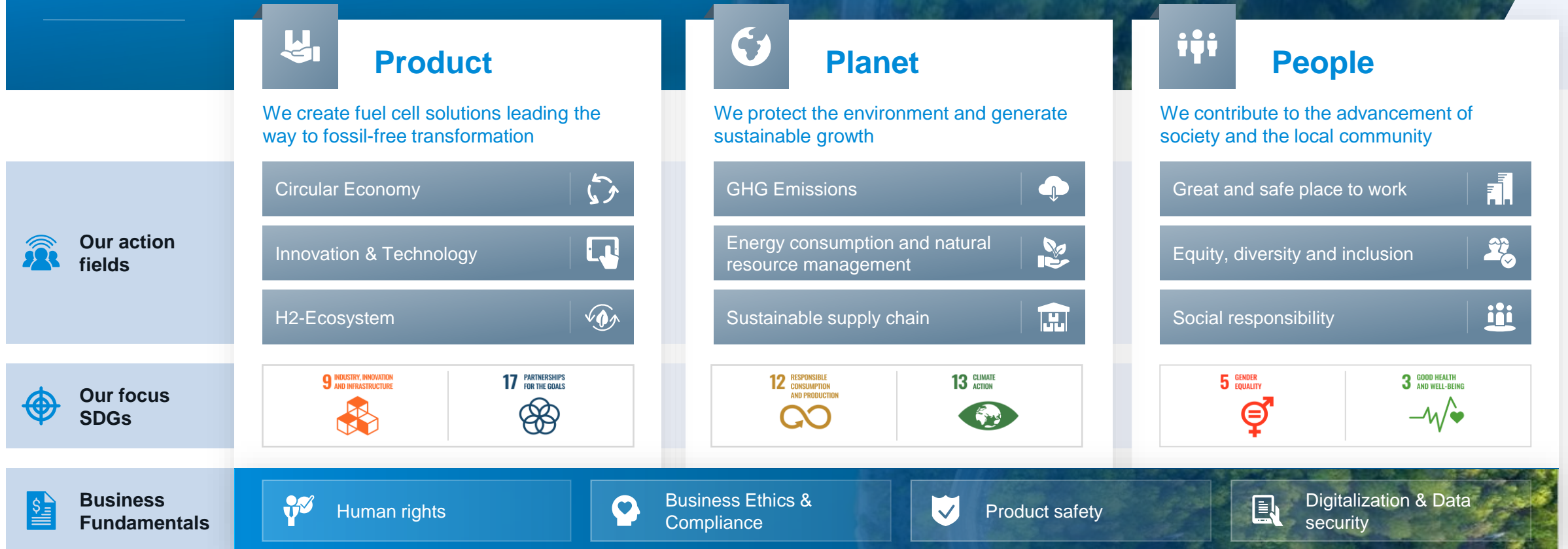
Tomorrow



- High volume production

We power sustainable life². Not only is our product sustainable. We are also beginning the transformation to a sustainable company.

We power sustainable life²





Fuel cells – full steam ahead for heavy duty



Source: Daimler Truck



Source: Volvo Group



QUESTIONS

& ANSWERS