



CELLCENTRIC | HEAVYDUTY CONGRESS 2024

# Tailormade: Heavy-duty fuel cell systems for long-haul trucking

24.09.2024

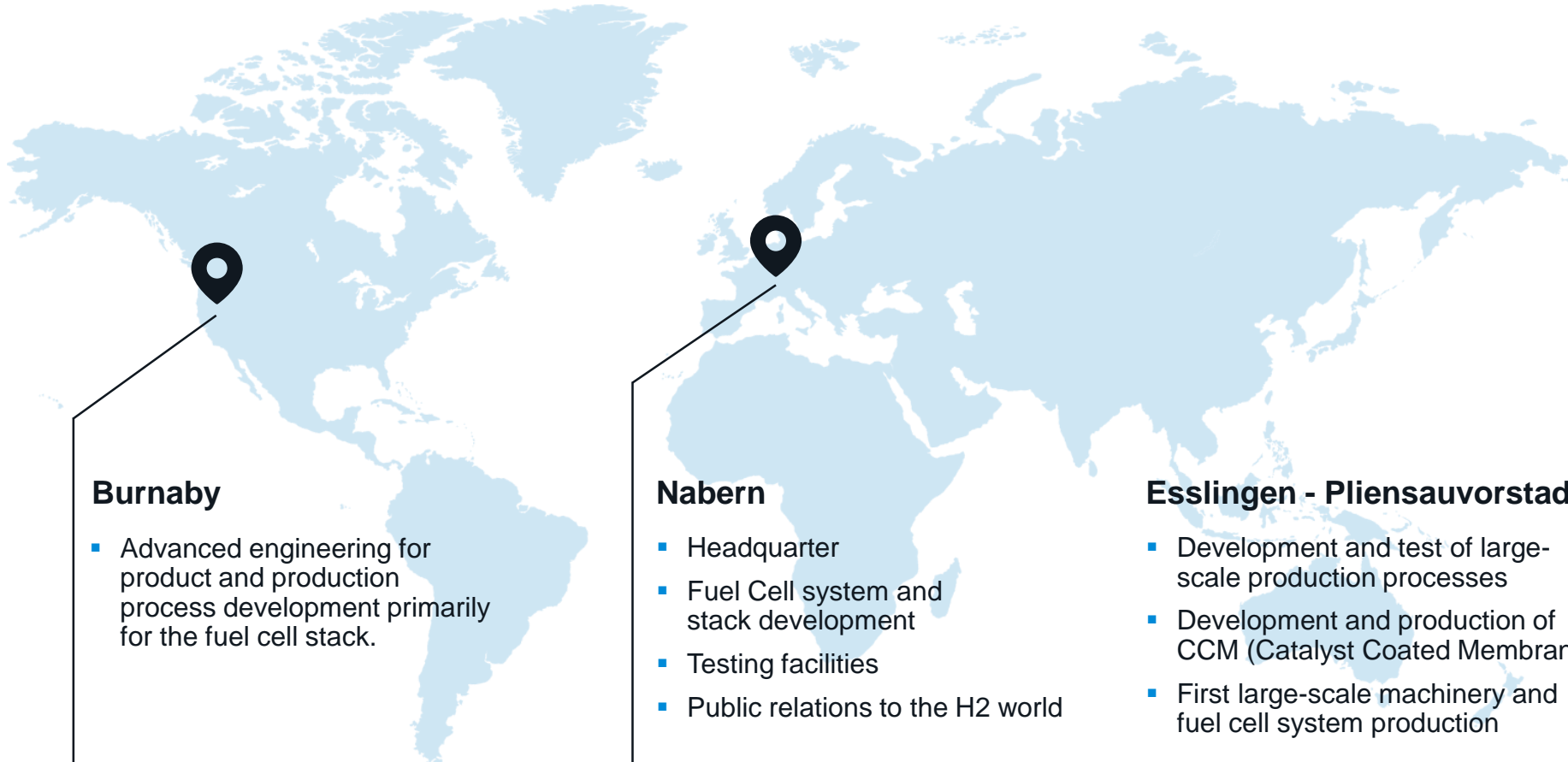


# cellcentric – The Fuel Cell Company

1. Hydrogen Fuel Cell systems for zero-emission heavy-duty trucking and other applications
2. Automotive large-scale TIER 1 supplier to Daimler Truck, Volvo Group and others
3. 30 years of experience and over 700 patents
4. Germany and Canada based R&D and production
5. Focus on durability, reliability and fuel efficiency
6. Excellent cost-benefit and lifetime service solution because of mass production for automotive OEMs
7. Limited use of rare, special and precious raw materials



# The Germany and Canada based Fuel Cell company



**>560 employees**  
support Fuel Cell  
activities from our  
main locations ...

## Burnaby

- Advanced engineering for product and production process development primarily for the fuel cell stack.



## Nabern

- Headquarter
- Fuel Cell system and stack development
- Testing facilities
- Public relations to the H2 world



## Esslingen - Pliensauvorstadt

- Development and test of large-scale production processes
- Development and production of CCM (Catalyst Coated Membrane)
- First large-scale machinery and fuel cell system production



## Stuttgart - Untertürkheim

- Series manufacturing processes development and testing strategy
- CCM (Catalyst Coated Membrane) coating development
- CCM production



# Extensive company and product history

## Commercial vehicles



1994  
NECAR 1



1997  
Nebus



2001  
Fuel Cell Sprinter



2009  
Citaro FuelCELL-Hybrid



2021  
Fuel Cell Trucks

1996-2001  
Necar 3 | 4 | 5



1996  
Necar 2

2003-2009  
Fuel Cell Citaro |  
Fuel Cell Sprinter

2009-2010  
Fuel Cell Sprinter

2003-09  
F600 | A-Class F-Cell  
Advanced



2003  
A-Class F-Cell



2010  
B-Class F-Cell



2018  
GLC F-Cell

## Passenger cars



# A Joint Venture of Volvo Group and Daimler Truck



**Fuel cells under extreme conditions –**  
Volvo Trucks tests hydrogen-powered electric trucks on public roads in northern Sweden

**Touring the Alps with hydrogen –**  
CO<sub>2</sub>-neutral trucks from Daimler Truck demonstrate their capabilities



Powered by cellcentric



Proven in  
Extreme Conditions

Reliability



GenH2 Truck  
Hydrogen Record Run

# cellcentric powered Mercedes-Benz GenH2 Trucks now in customer hands





Hydrogen plays a vital role  
in the global energy transition

→ Hydrogen will be available at scale

Several factors contribute to a  
reduction in hydrogen price

→ Hydrogen will be available at attractive price

Decarbonizing CVs requires a  
multitude of different approaches

→ There is not the one decarb solution in CVs

Fuel cell technology makes them  
best fit for a major CV segment

→ Fuel cells are best-fit for long-haul trucks





# H2 for CVs reduces limitations by infrastructure in decarbonization

En-route charging for BEV trucks will reach limitations in volume scale-up

- Locally and time-wise condensed charging at hubs with a high energy need for big batteries
- Large amount of chargers required for relatively long parallel charging of several vehicles
- Potential grid uprating for energy provision
- Increasing marginal cost for infrastructure

En-route refueling for H2 trucks will compensate

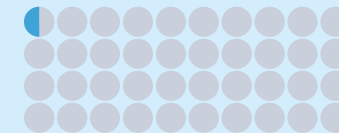
- Energy logistics comparable to existing solutions
- A single refueling station can cater for large number of vehicles due to short refueling time
- Scale effects due to demand and utilization
- Decreasing marginal cost for infrastructure
- ➔ **Two infrastructures are cheaper than one**

## Required infrastructure to match European truck CO2 targets

High-power chargers >400kW (as is 2024 vs need 2030)



H2 refueling stations (as is 2024 vs need 2030)



Sources: ACEA, H2 Live



# 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.

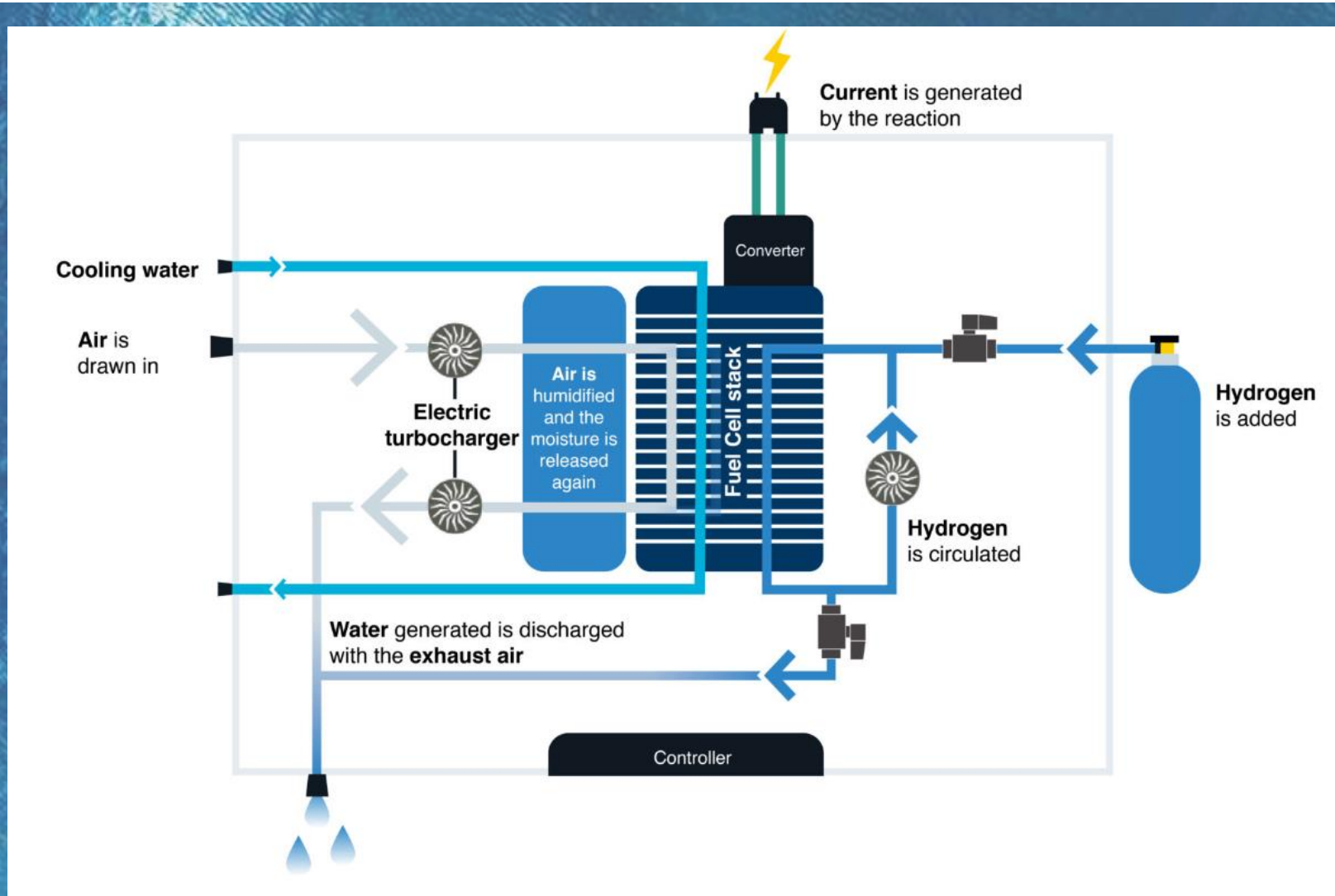


## Zero emission

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.



# How does a fuel cell produce electricity out of hydrogen and air?





# cellcentric fuel cell BZA150 - compact packaging & specification set of HD truck applications

## Weight

- Total weight approx. 200 kg

## Power & Performance

- Up to ~143 kW net power output (BoL) (~195 horsepower)

## Benefits

- Compact packaging
- High expected lifetime and durability
- High level of efficiency
- Robustness for demanding conditions

Current Daimler Truck and Volvo HD vehicles powered by 2 cellcentric BZA150 systems



Current generation BZA150



# cellcentric NextGen - heavy-duty long-haul game changer with TCO benchmark performance

## Power & Performance

- Single System package
- Up to 375 kW (more than 500 horse power) continuous net power

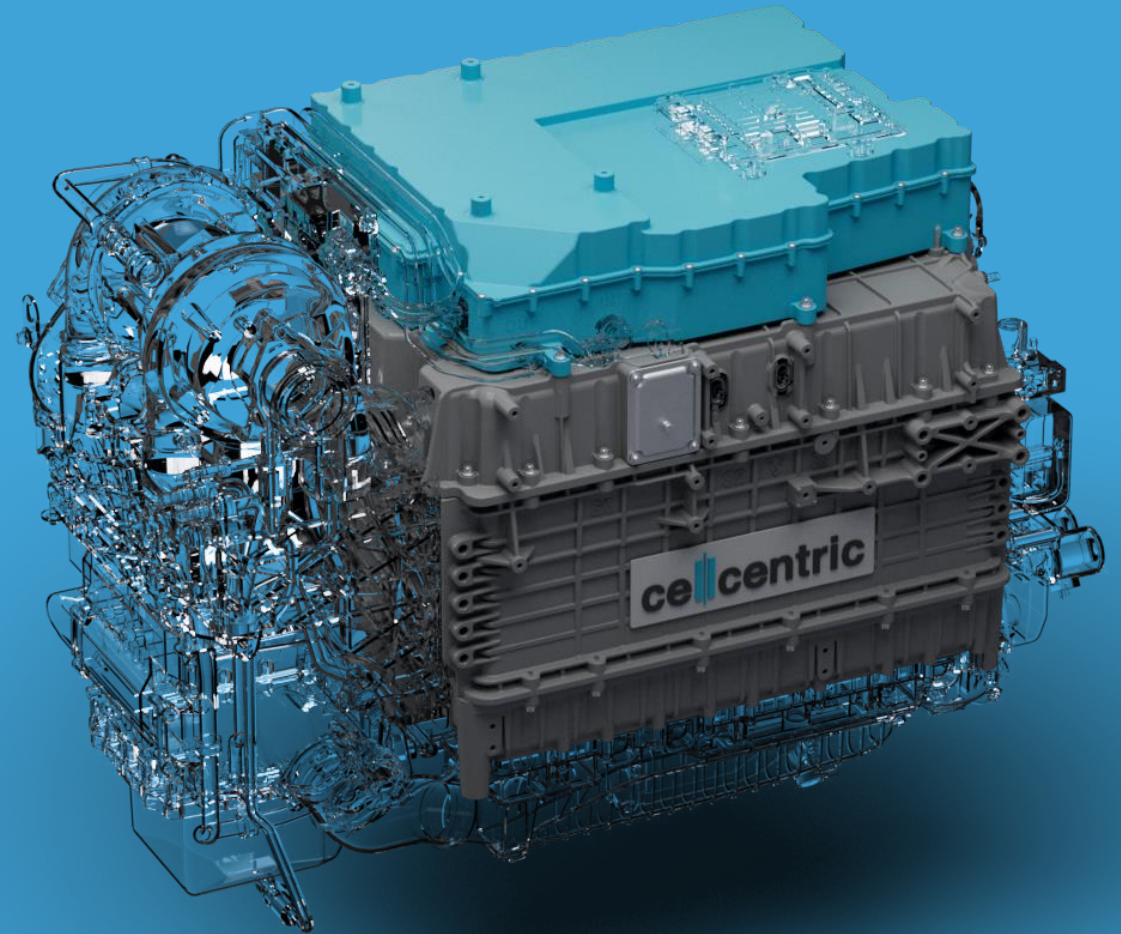
## Performance

- 20% less fuel consumption\*
- 40% reduction of waste heat at 300 kW net power\*
- 40% more power density\*
- 40% reduction of complexity\*

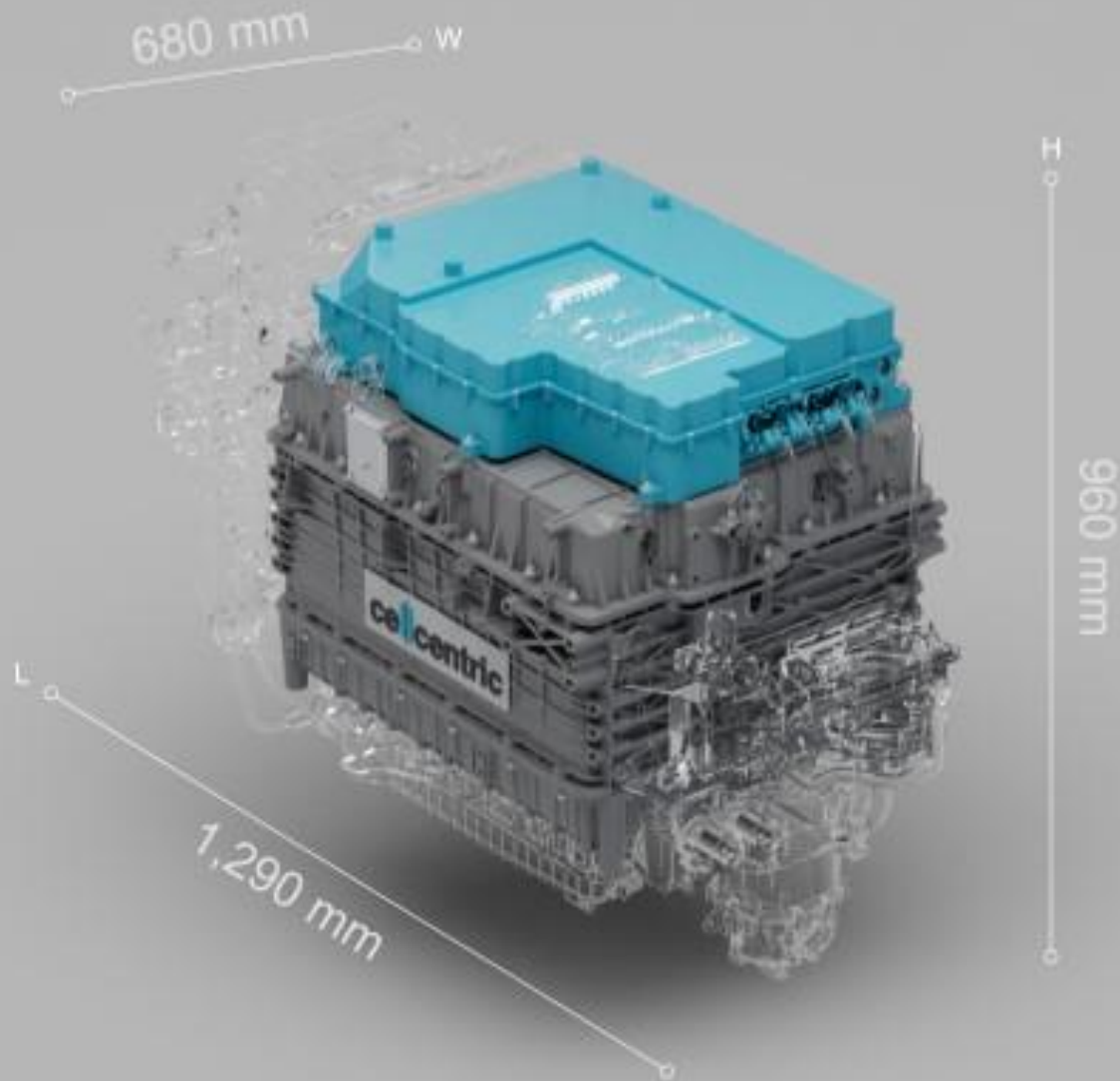
## Fuel Consumption

- 6 kg H<sub>2</sub> per 100 km
- 16.4 km per kg H<sub>2</sub>

\* vs. benchmark Fuel Cell System BZA150



Future generation NextGen



## CELLCENTRIC NEXTGEN FUEL CELL SYSTEM

# Heavy-duty long-haul game changer with TCO benchmark performance

### Size

- Length: 1,290 mm
- Width: 680 mm
- Height: 960 mm
- Designed for conventional 13-liter diesel-engine compartments

### Weight

- Total weight of less than 400 kg

### Lifetime

- About 25.000 hours / up to 10 years
- Fuel cell system for truck application equivalent to that of a conventional diesel engine



# Industrialization of cellcentric's fuel cell system production

## Pilot production in Esslingen (Germany)

- Important step towards CO2-neutral mobility in HD transportation
- Transition from development & prototype production phase to highly efficient large-scale production

## Pioneering work in Europe

- Complete production of fuel cell systems at one location on an industrial scale
- High degree of vertical integration and automation

## Applications

- Fuel cell systems for HD trucks and for various other mobile and stationary applications

## Future planning

- Pilot productions the marks step towards preparing Europe's largest fuel cell production in the new factory in Weilheim (**KLIMA|WERK**) towards the end of the decade



Industrialization

# cellcentric is in an optimum position to drive fuel cell use for CVs

## Set-up



- full focus on fuel cell technology only (cell, stack and system)
- independent supplier set-up with in-house R&D, operations and sales
- joint development approach with two leading truck manufacturers

## Experience



- >30 years in product and production development of automotive fuel cells
- high-volume automotive expertise of Daimler Truck and Volvo Group

## CV focus



- strong expertise in CV segment derived from shareholder structure
- custom-tailoring of product for prime use case: long-haul trucking

## Scale effect



- economies of scale from business with two globally leading truck OEMs
- 100% product commonality for all customers maximizes cost benefits
- price reduction vital to make fuel cells TCO champion in LH trucking

## Growth outlook



- independent supplier setting allows for easy 3<sup>rd</sup> party business
- technology attractive for further applications beyond trucking

→ cellcentric's unique setting is best-possible starting position to drive fuel cell technology



# Open for business

We believe in partnerships to drive trust and scale in trucking and other heavy-duty applications

## 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

# We power sustainable life

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