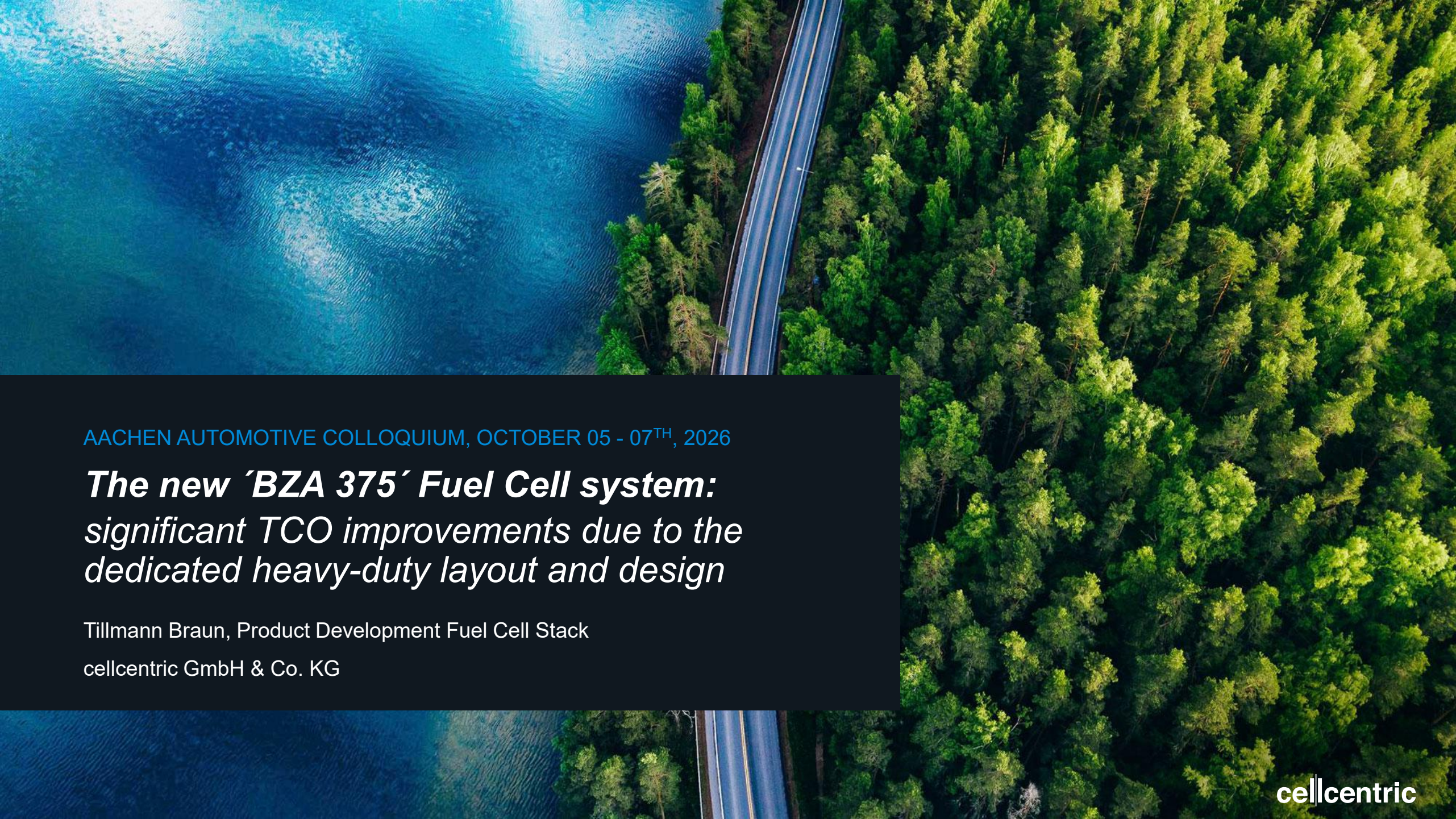




AACHEN AUTOMOTIVE COLLOQUIUM, OCTOBER 05 - 07TH, 2026

***The new 'BZA 375' Fuel Cell system:
significant TCO improvements due to the
dedicated heavy-duty layout and design***

Tillmann Braun, Product Development Fuel Cell Stack
cellcentric GmbH & Co. KG

Who is cellcentric?

Set-up



- **>30 years** of fuel cell experience
- **focus** on heavy-duty fuel cell technology
- **joint** development approach with OEM

Heavy Duty focus



- **tailor-made** for global long-haul trucking
- suitable for many **other applications**

Scale Effect



- **economies of scale** with leading OEMs
- product **commonality** for all customers

Growth Outlook



- independent **tier1** supplier setting
- broad range of **target applications**
- **global** target markets

50:50 JV of competitors



one product



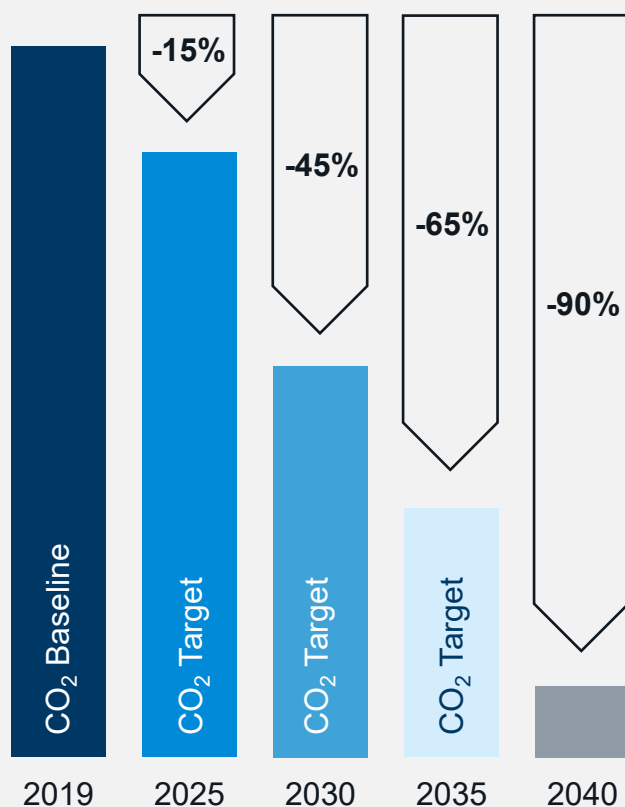
>560 employees in 4 locations



EU legislation for 2030+ will require H₂ technology in addition to BEV*

LEGISLATION

Reduction of OEM CO₂ emission targets for trucks for all new sales



SOLUTION

There is not “the one” solution to decarbonize heavy-duty trucks

Battery Electric Trucks
(BEV*)

Hydrogen Combustion Trucks
(H₂ ICE**)

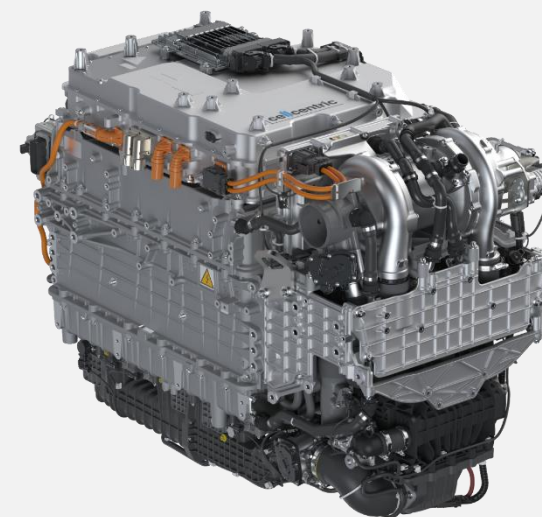
Fuel Cell Electric Vehicle
(FCEV)

Hydrogen enables **short & decoupled refilling cycles** similar to Diesel trucks



DEDICATED TRUCK LAYOUT

Tailor-made for long-haul trucking in Europe and North America



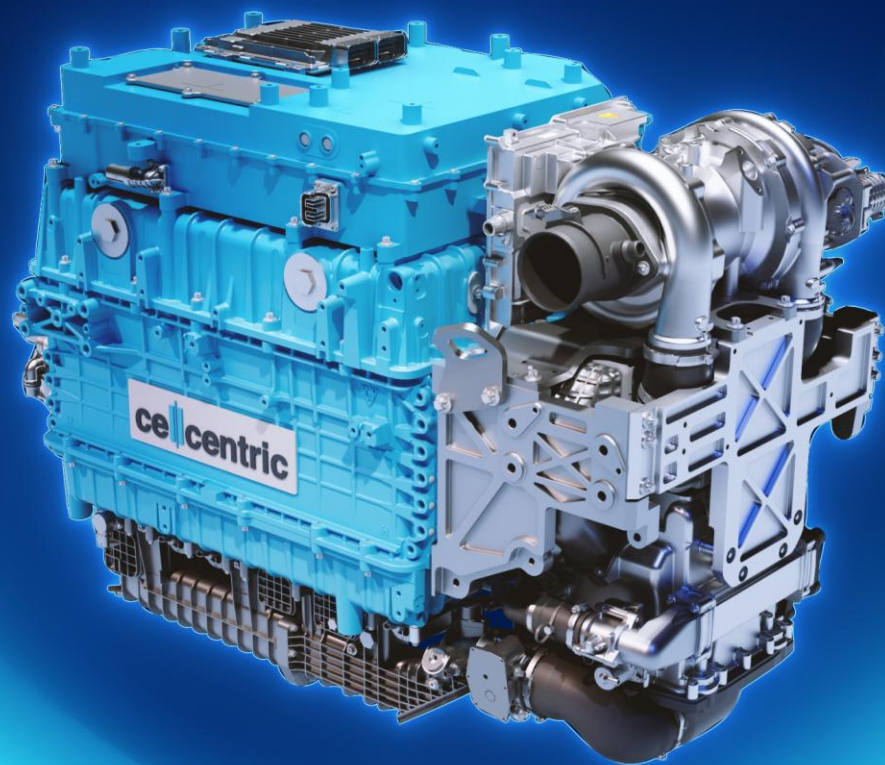
Optimized for **best-possible total cost of ownership** in heavy-duty

OEM feedback allows continuous increase of system efficiency

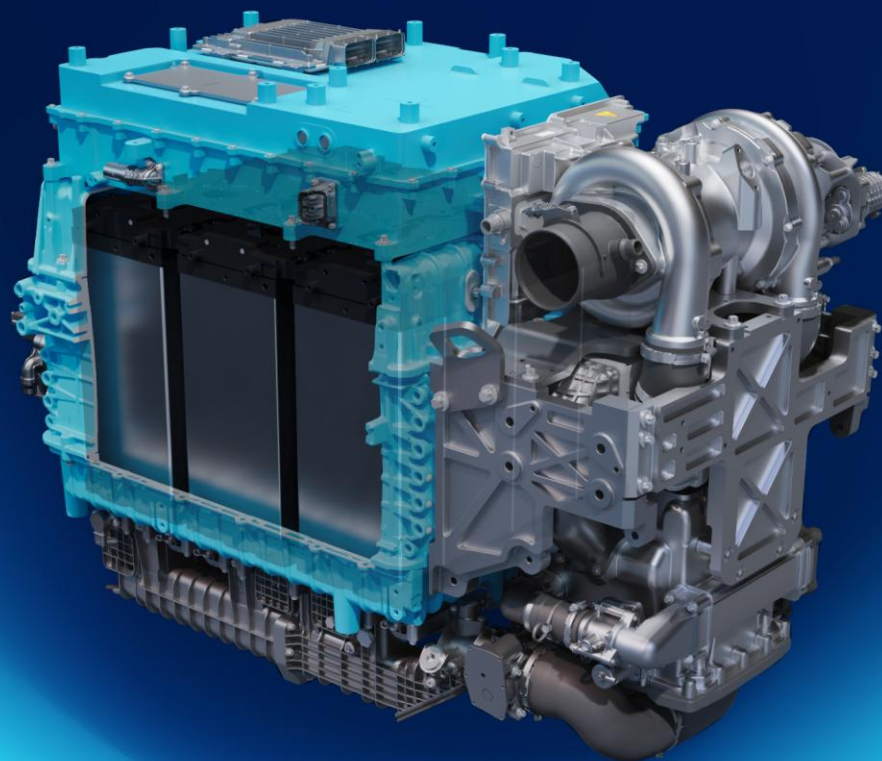
From "Twin-System" to...



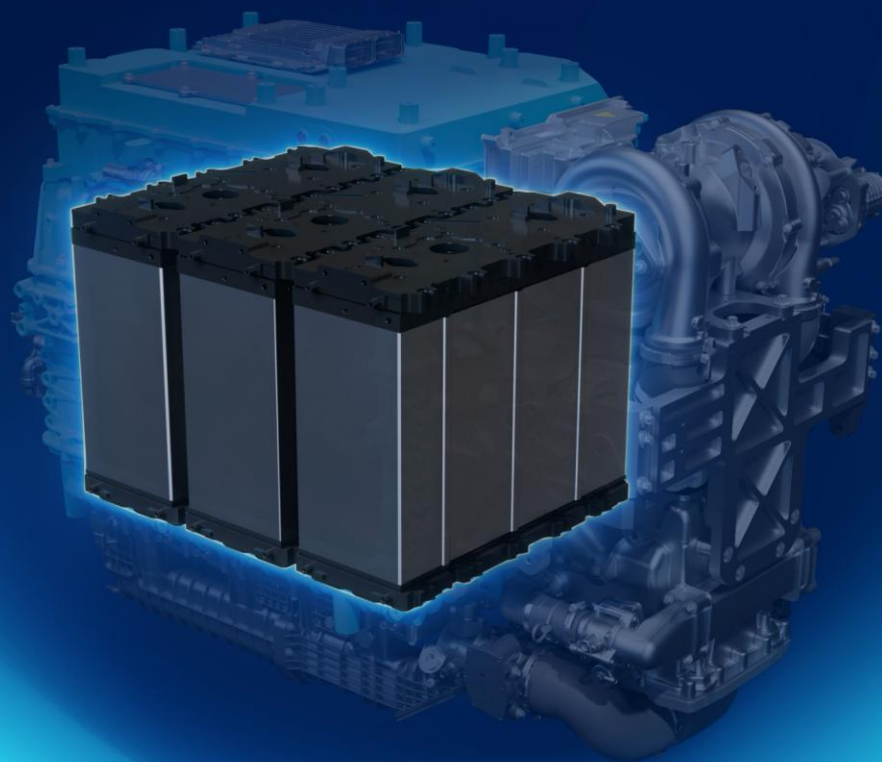
..."Single-System" Design



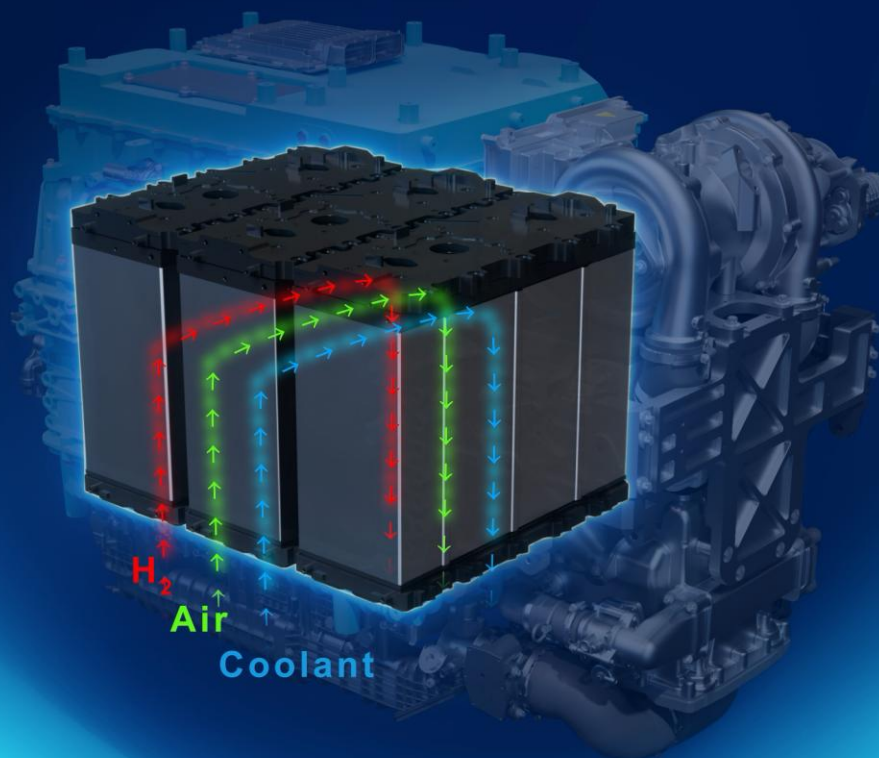
Stack Module



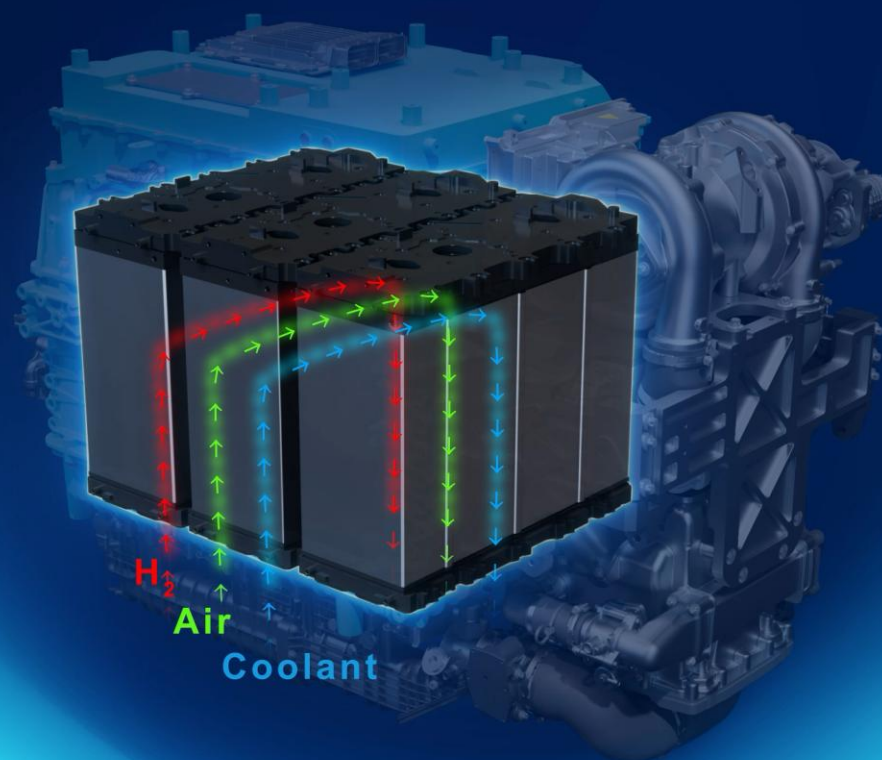
Stack Module



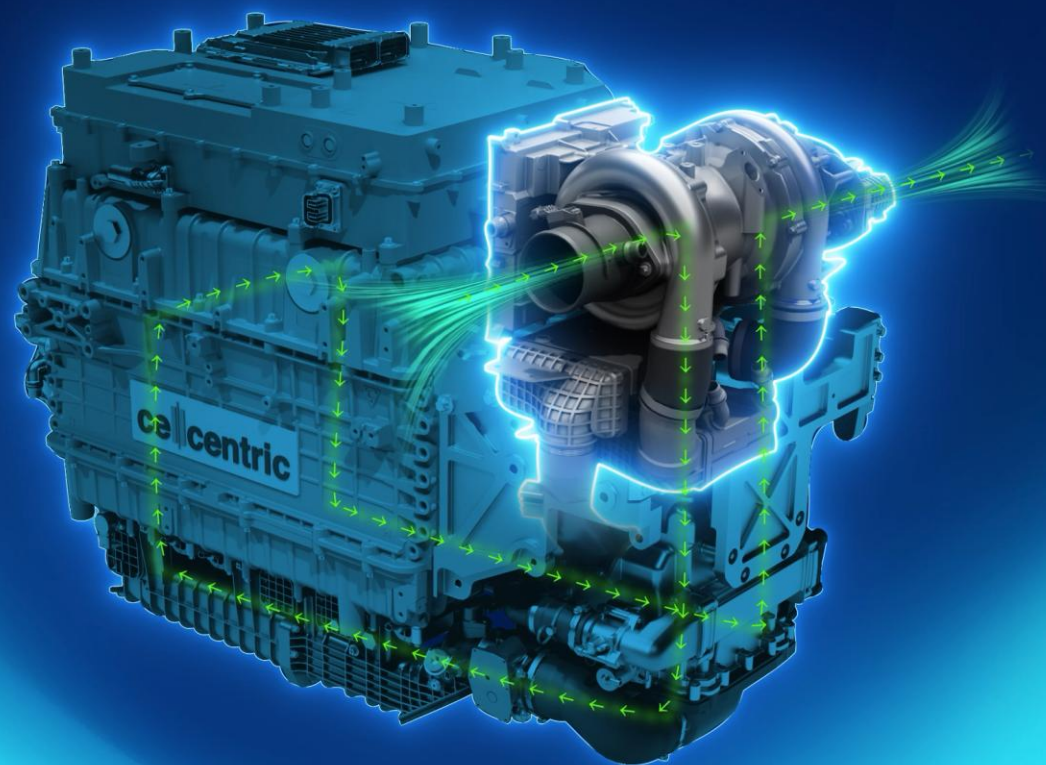
Stack Module



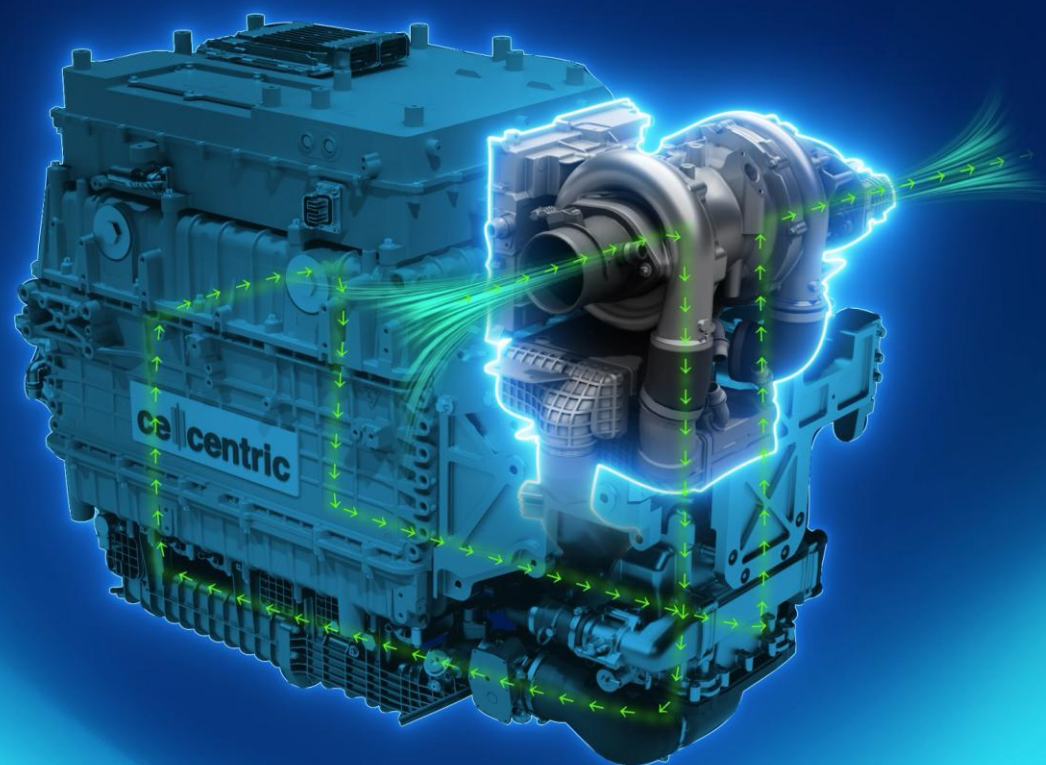
Air Supply



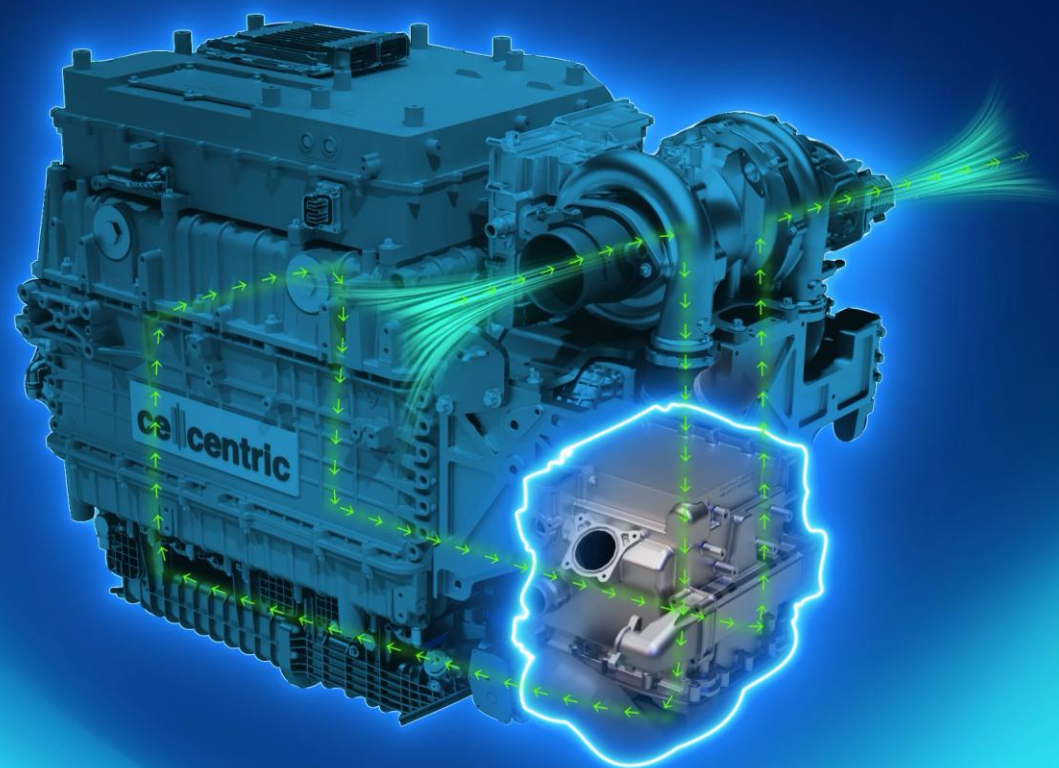
Air Supply



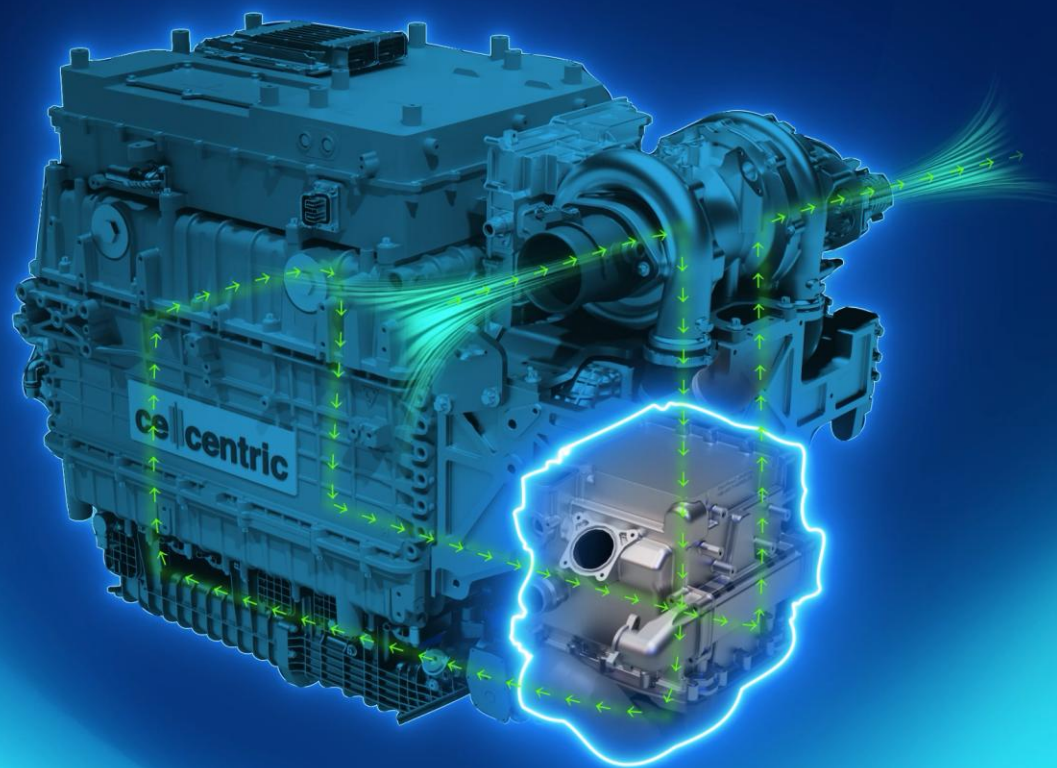
Humidification



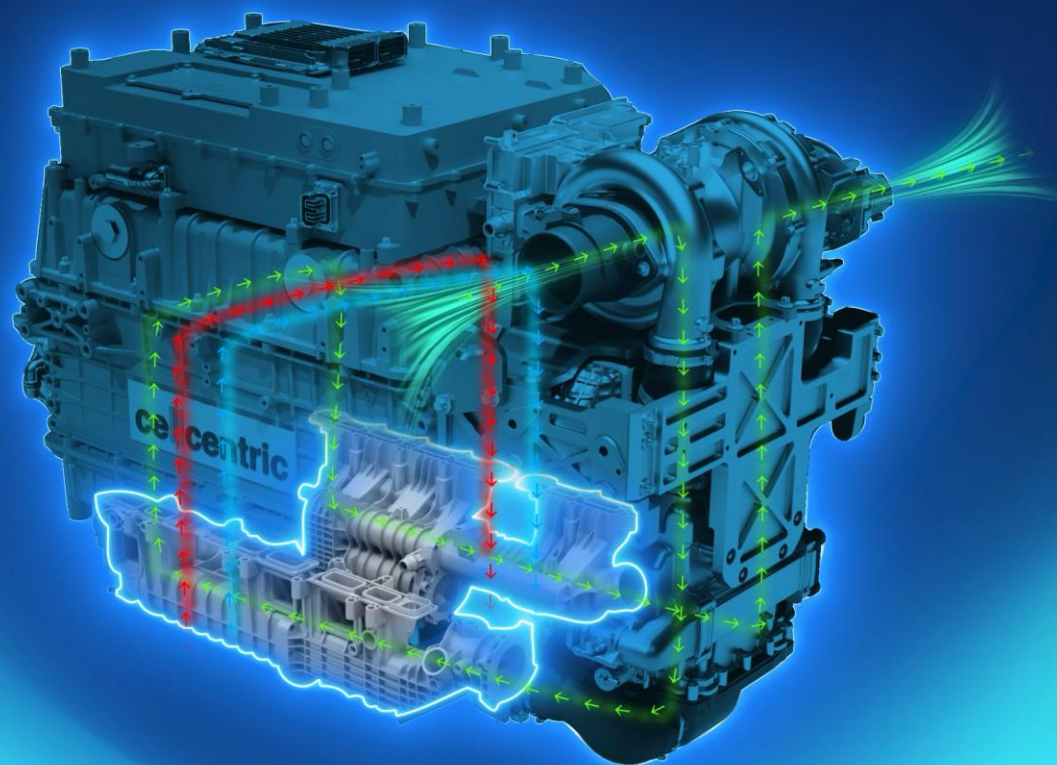
Humidification



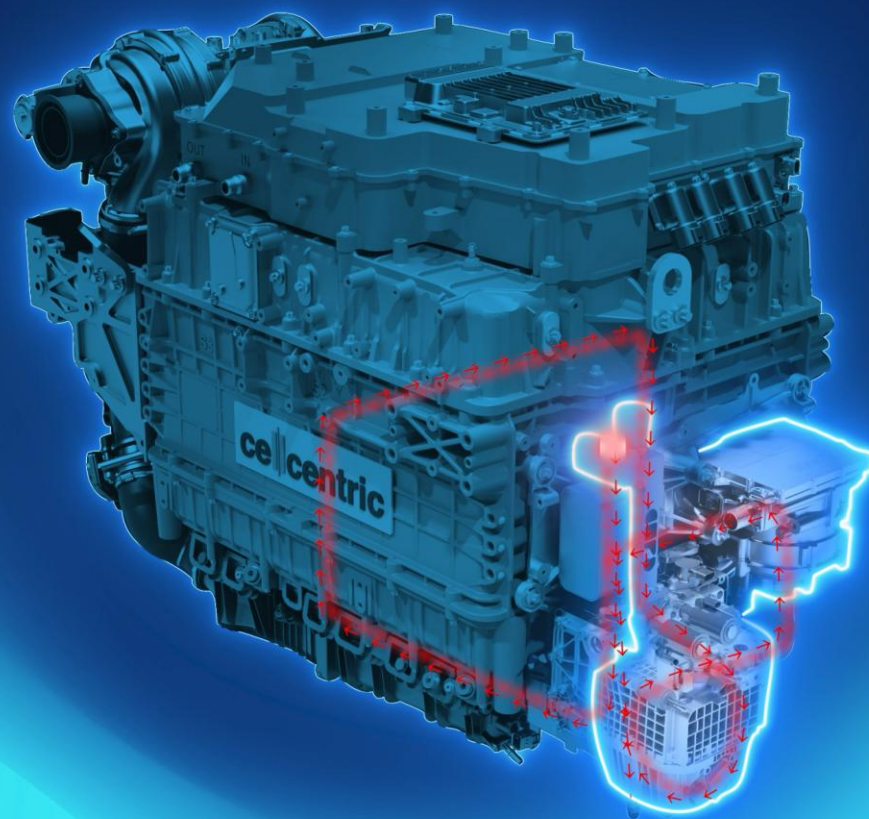
Media Distribution



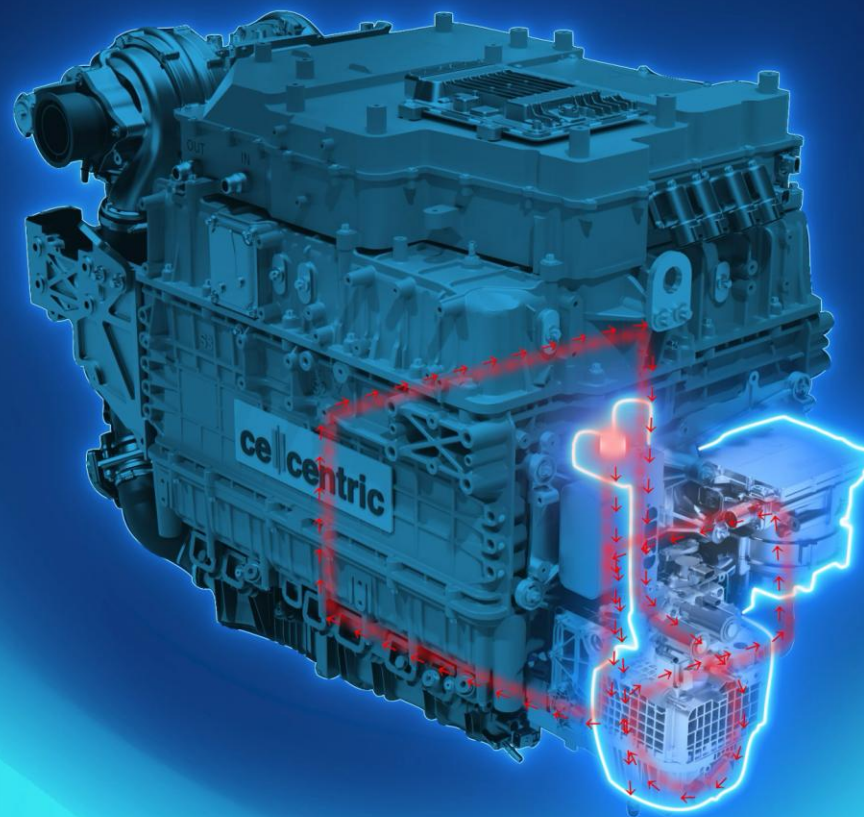
Hydrogen Supply



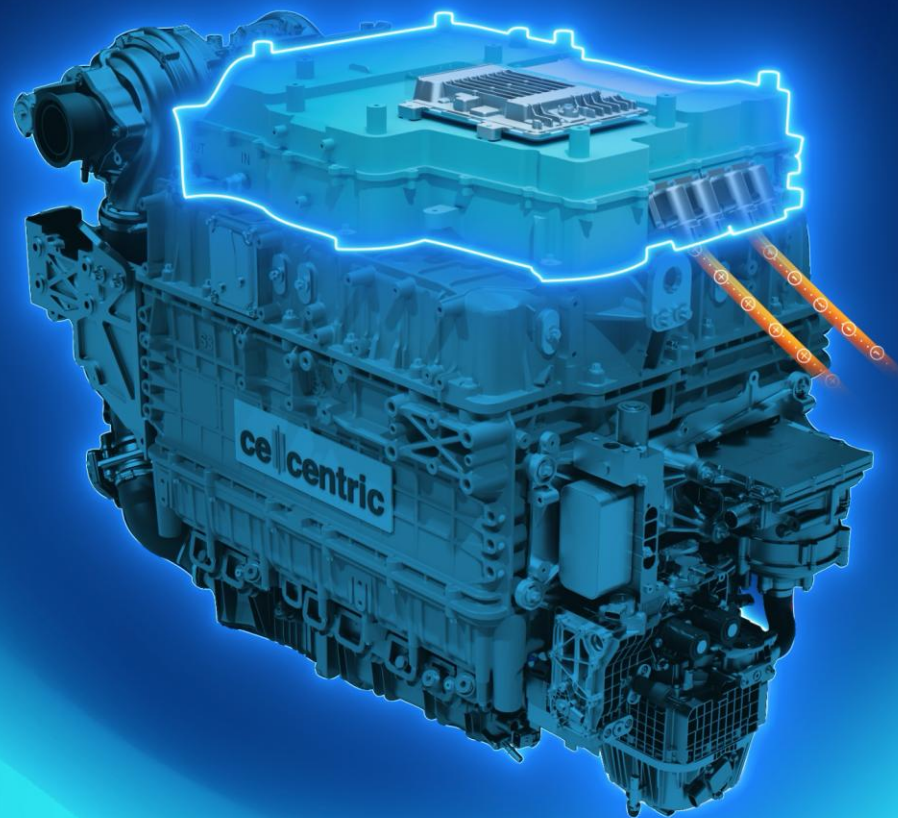
Hydrogen Supply



Power conversion



Power conversion



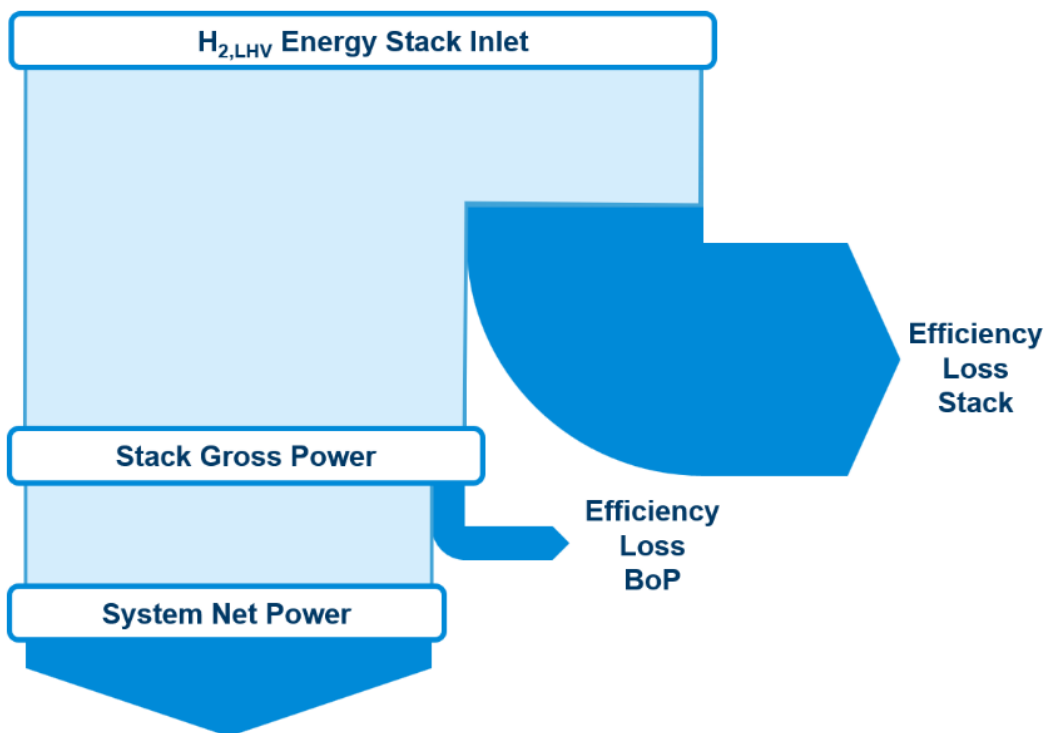
BZA375

- Single system package
- 375 kW (>500 horsepower) cont. net power
- 20% less fuel consumption
- 40% reduction of waste heat
- <6 kg H₂ per 100 km in long-haul HDT

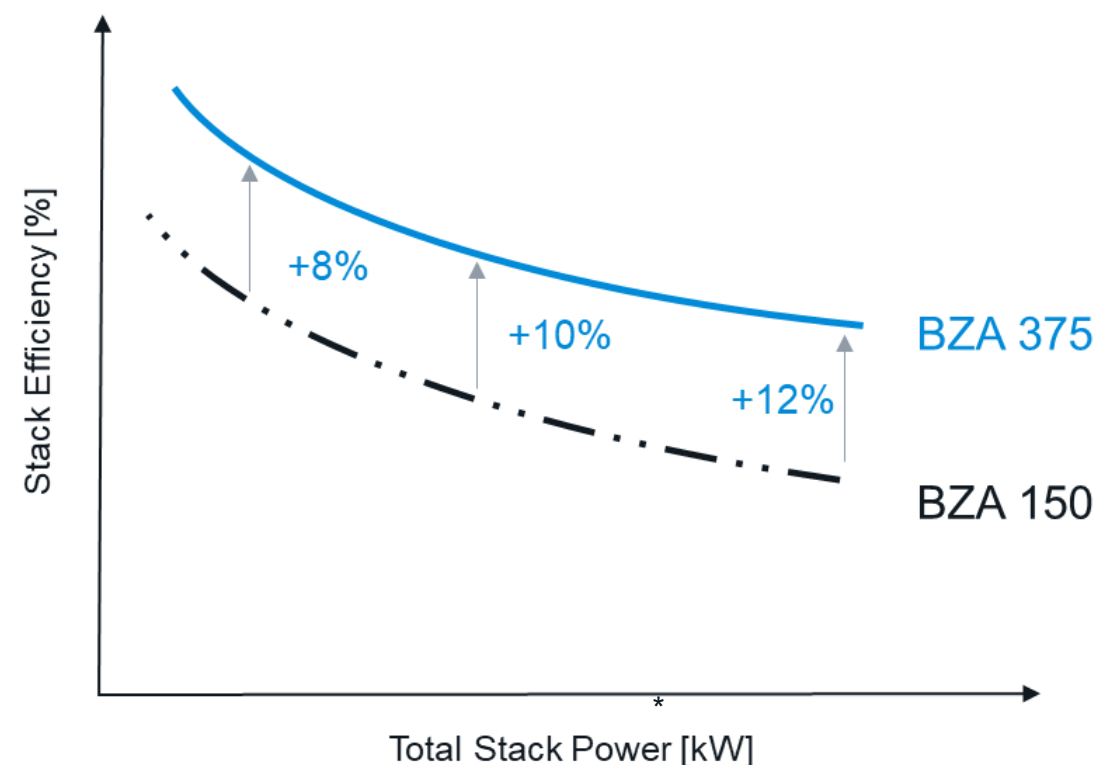


Max Stack Efficiency is the key for TCO in Heavy Duty Truck Fuel Cells

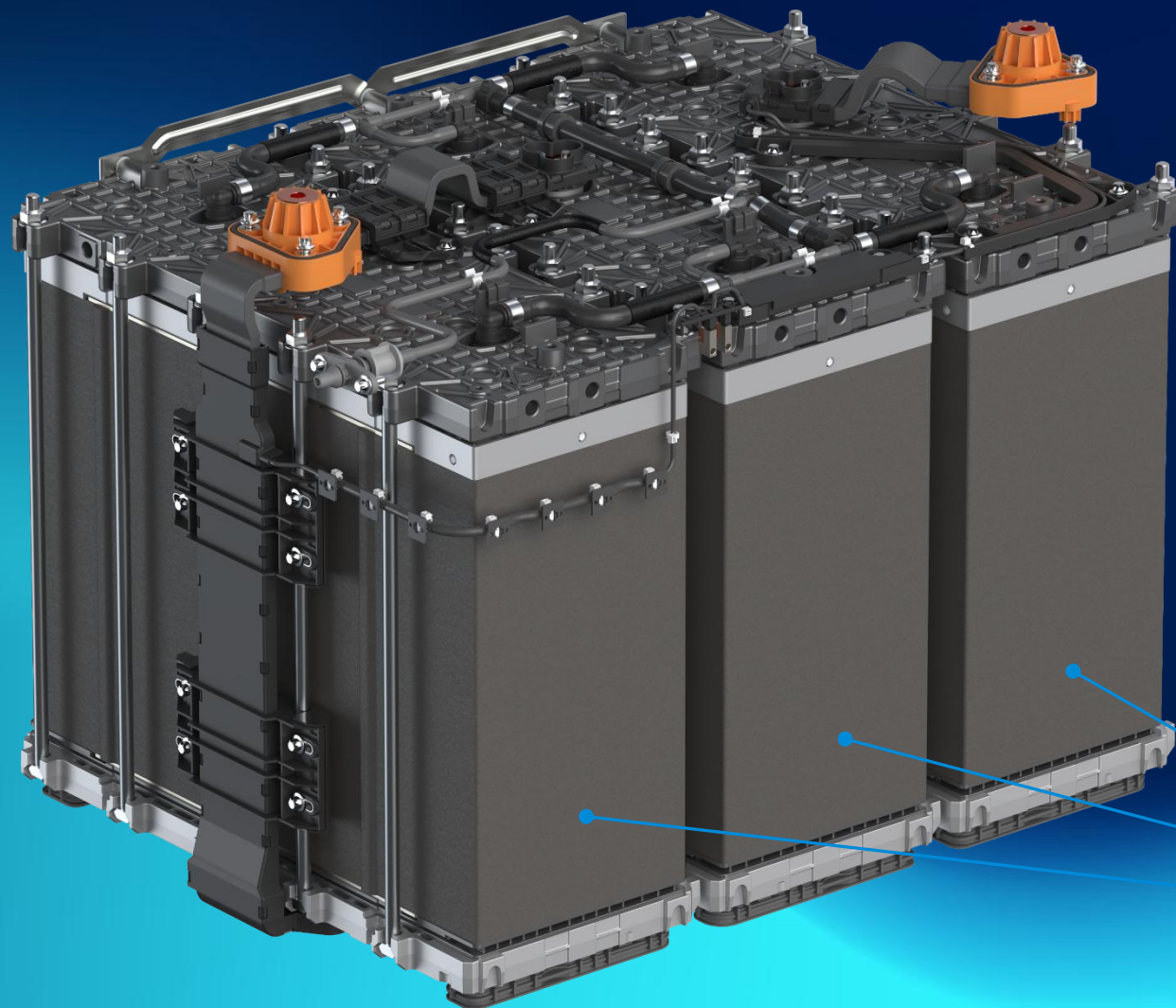
STACK EFFICIENCY IS THE DOMINANT FACTOR



TARGETS FOR STACK EFFICIENCY IMPROVEMENTS

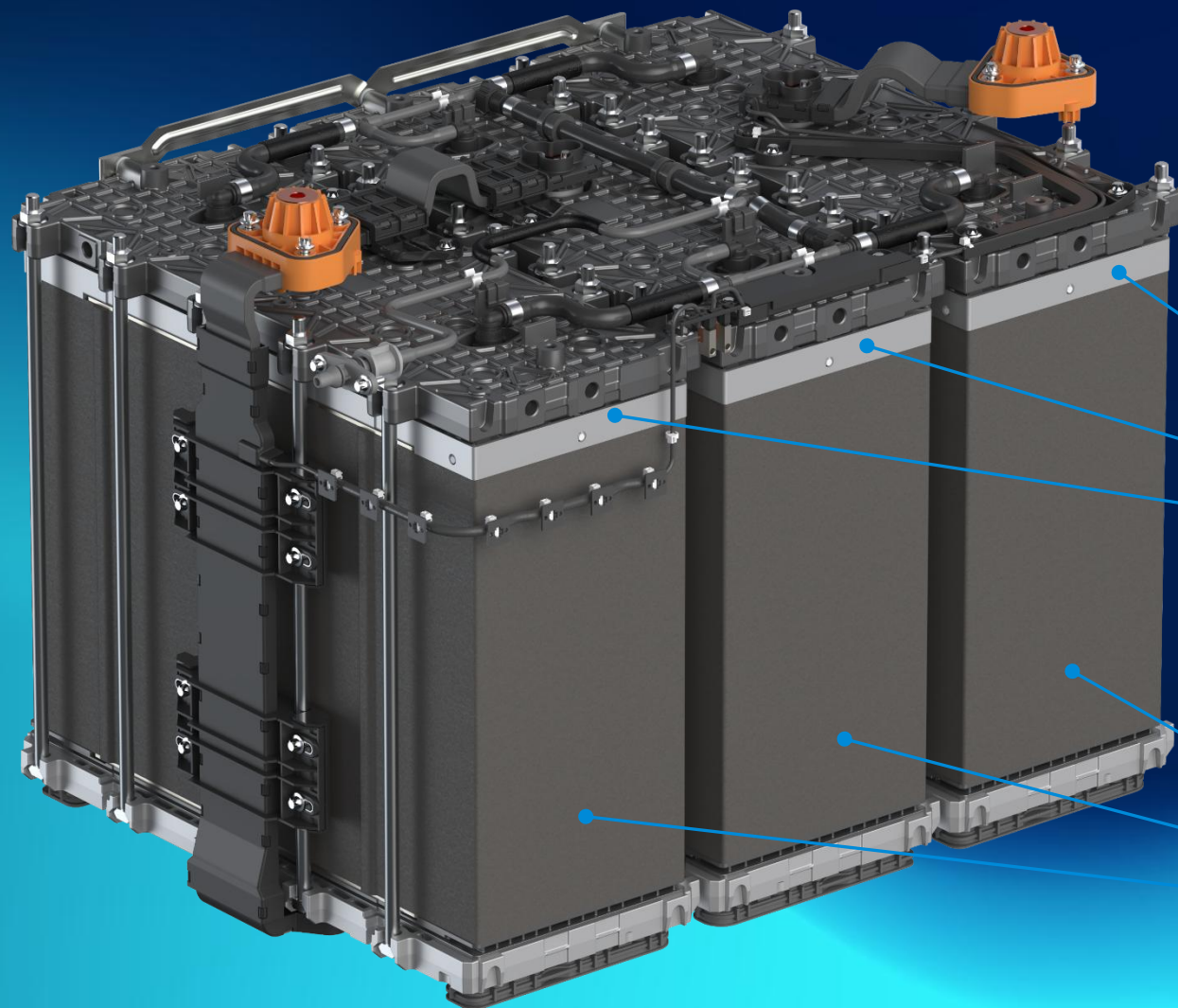


Fuel cell stack with 3 cell rows



3 Cell rows
vertical orientation

Fuel cell stack with 3 cell rows



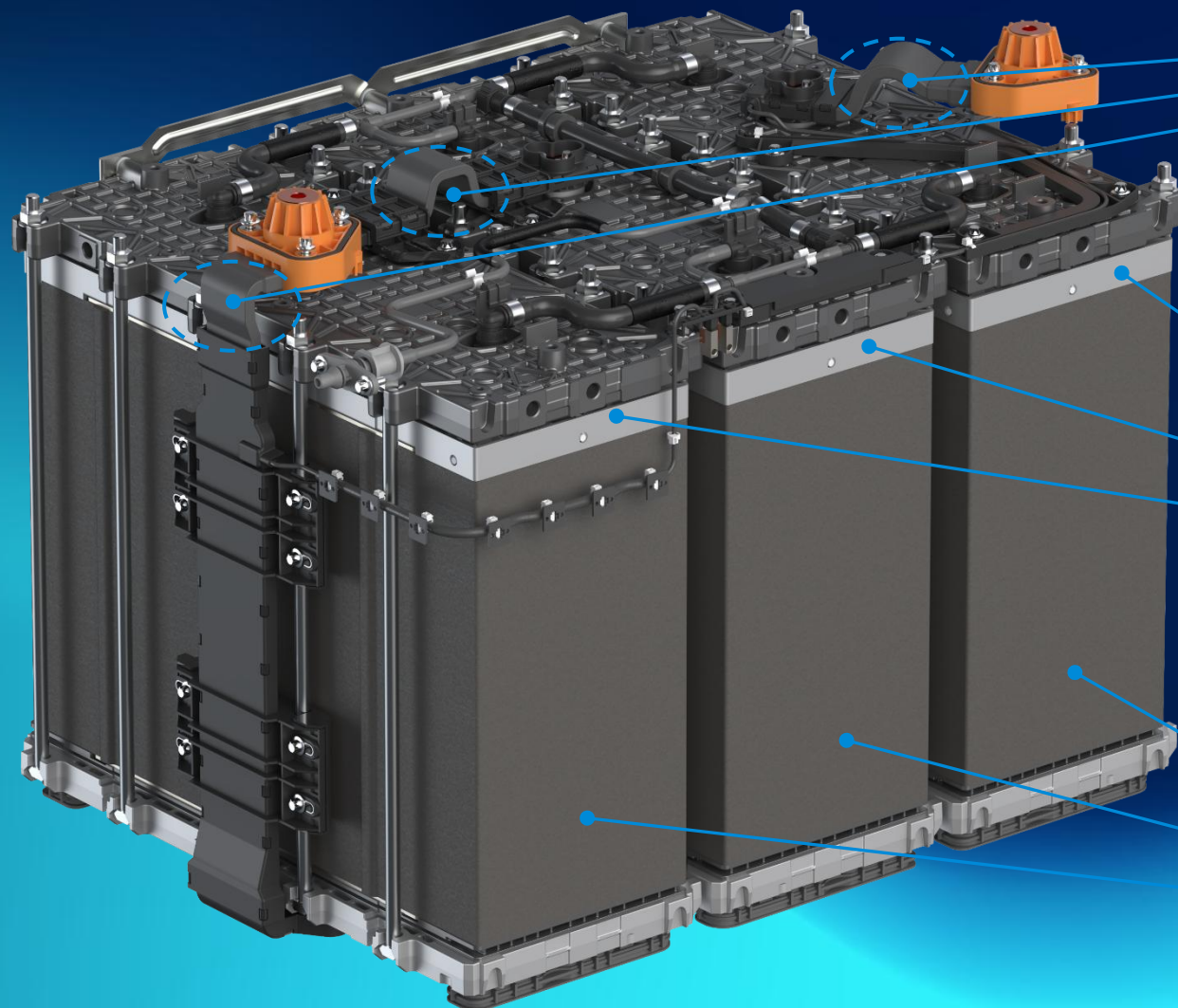
Compression system

To apply dedicated compression force over the entire stack life

3 Cell rows

vertical orientation

Fuel cell stack with 3 cell rows

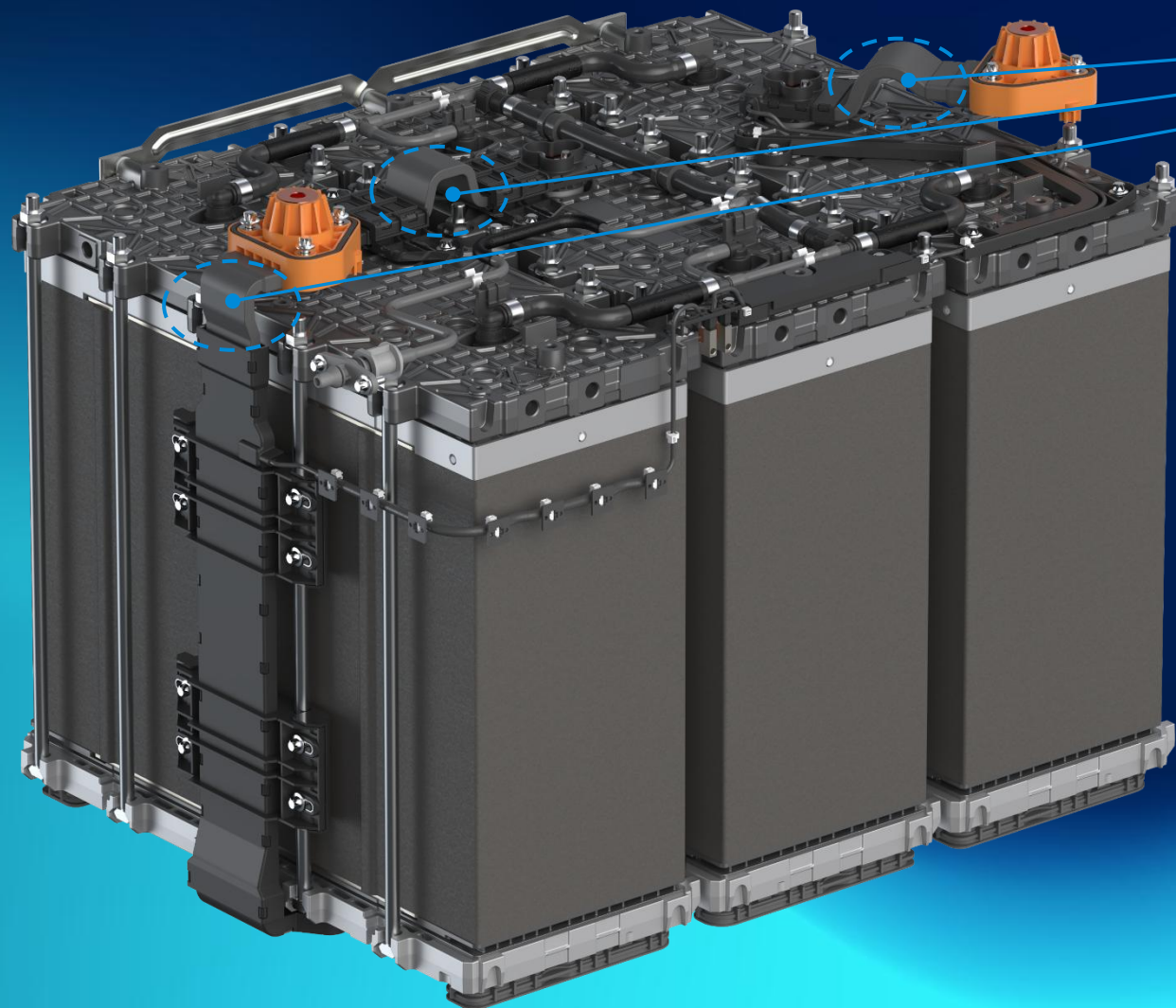


Compact HV bus bar concept
Short ways, tolerance management,
improved assembly

Compression system
To apply dedicated compression
force over the entire stack life

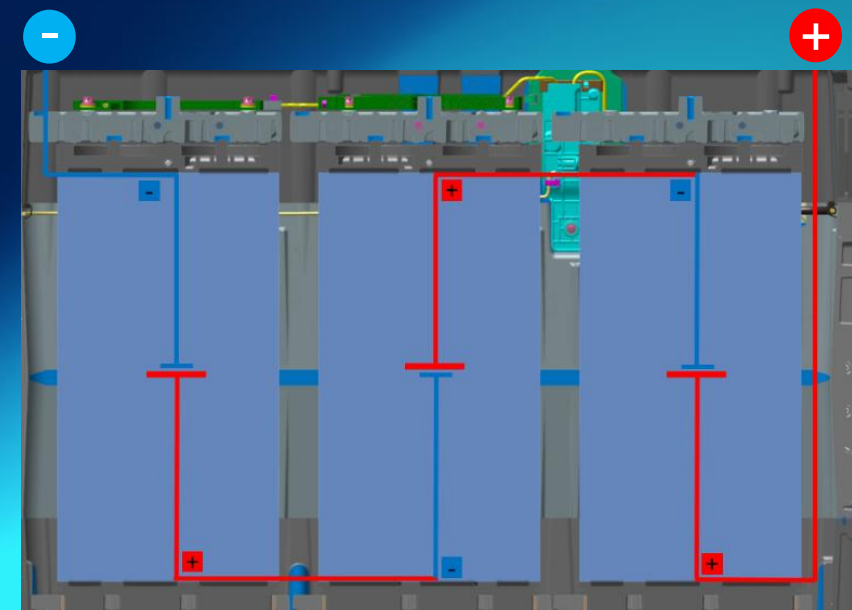
3 Cell rows
vertical orientation

Fuel cell stack with 3 cell rows and “flipped cell row” approach



Compact HV bus bar concept
Short ways, tolerance management, improved assembly

“Flipped cell row” approach
Middle cell row in upside down position



Carbon Bipolar Plates to meet Heavy Duty lifetime requirements



Carbon Bipolar Plates
For Heavy Duty lifetime
(> 25.000 h operation)



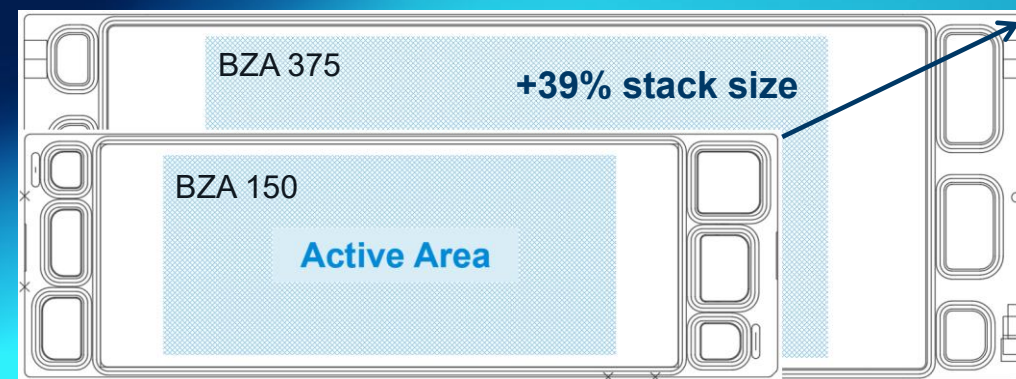
Bigger stack size provides increased Fuel Cell power



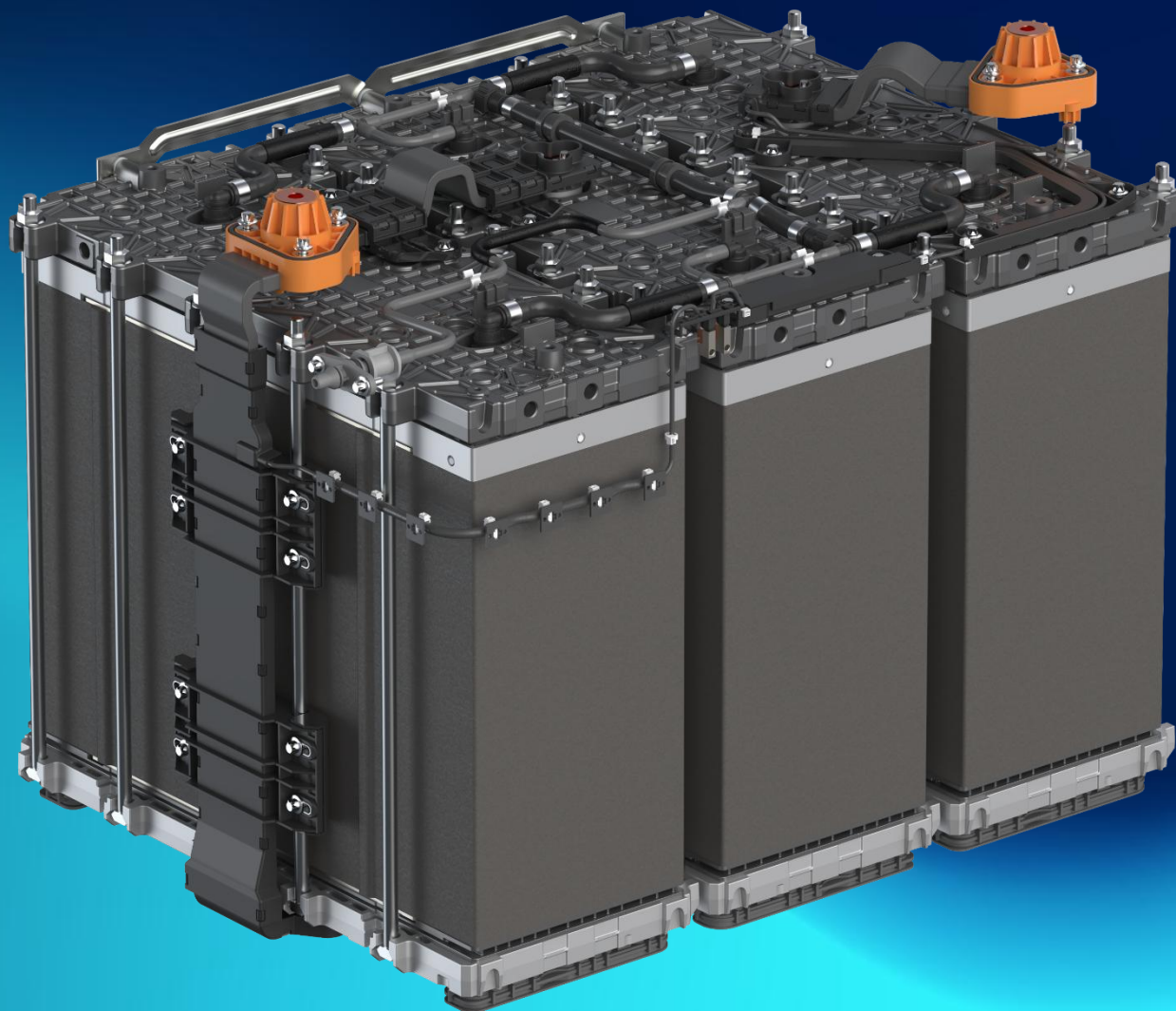
Carbon Bipolar Plates
For Heavy Duty lifetime
(> 25.000 h operation)



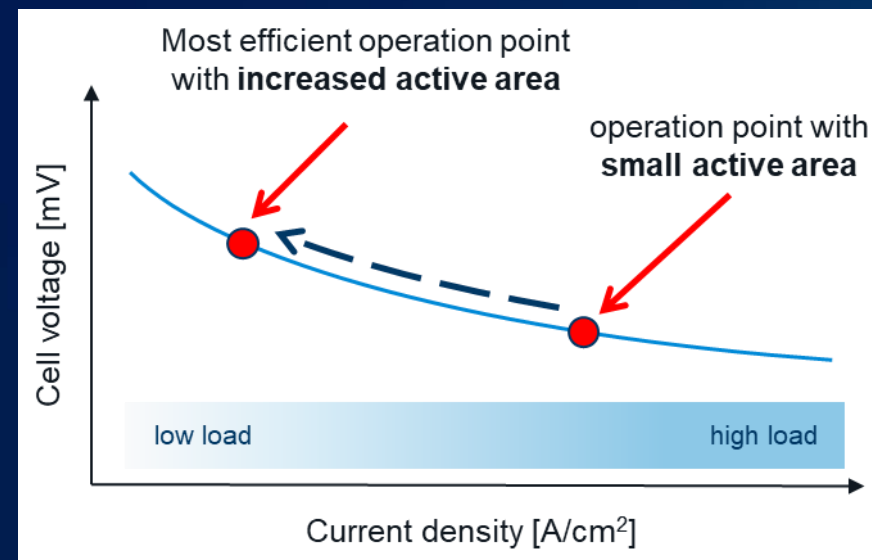
INCREASE OF MAXIMUM FUEL CELL POWER



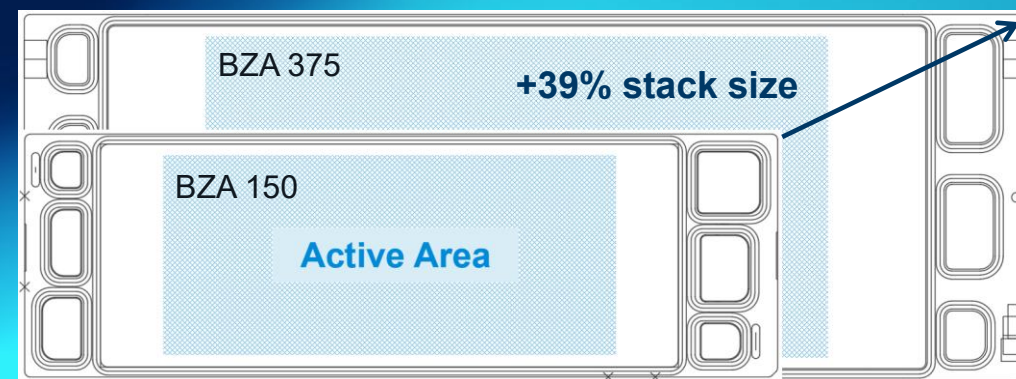
Bigger stack size provides increased Fuel Cell power and higher efficiency



INCREASE OF STACK EFFICIENCY



INCREASE OF MAXIMUM FUEL CELL POWER



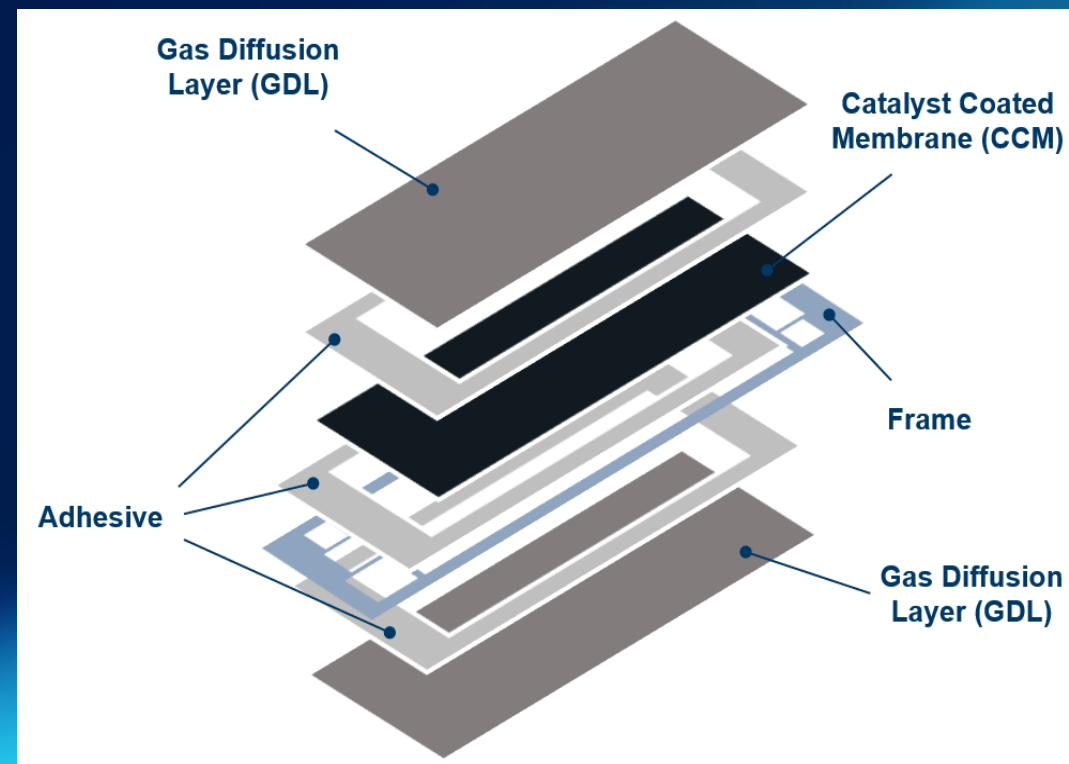
SMEFA* cell design with new Anode and Cathode Catalysts



Dedicated Heavy Duty Cell Design

SMEFA* concept derived from BZA 150

With new catalyst technology for Anode & Cathode

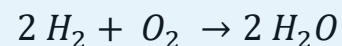


*sealed membrane electrode frame assembly

BZA 375 cell design with new Anode and Cathode Catalysts



CATALYSTS FOR HIGHER EFFICIENCY



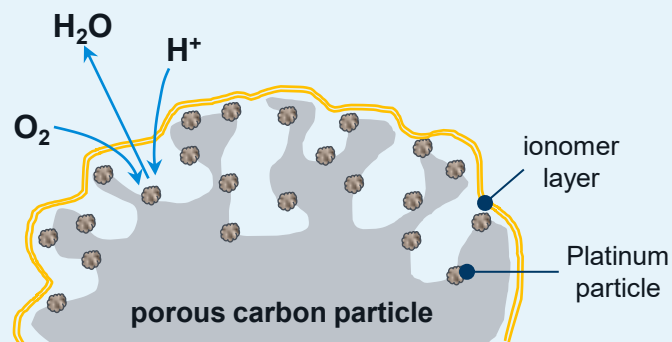
Electrochemical H_2O formation generates a **potential within the fuel cell**.

Catalysts containing precious metals are required for **reduction of activation energy**.



TUNABLE CATALYST PROPERTIES

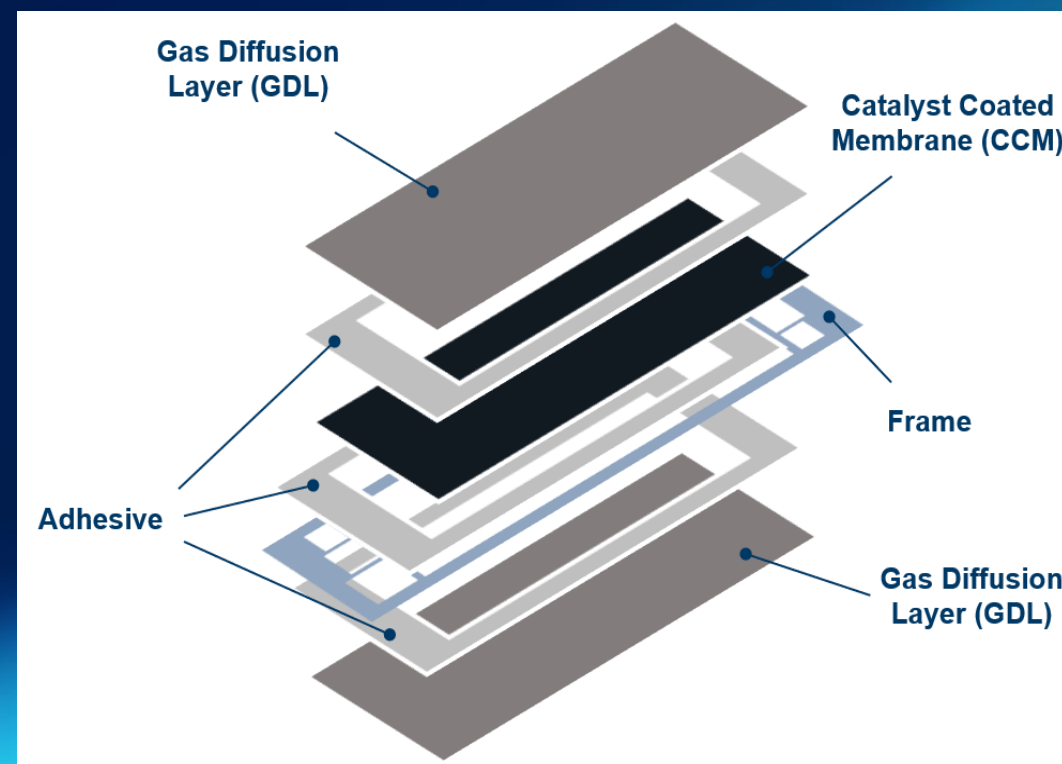
- Porosity & size of carbon particle, graphitization
- Platinum particle size
- Ionomer-to-carbon ratio
- Ionomer-particle adsorption



Dedicated Heavy Duty Cell Design

SMEFA* concept derived from BZA 150

With new catalyst technology for Anode & Cathode



*sealed membrane electrode frame assembly

BZA 375 cell design and process development

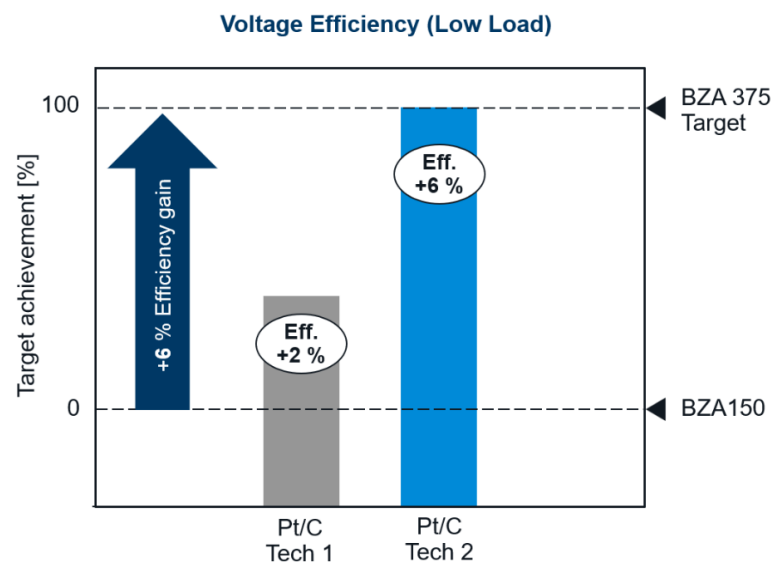


CATALYST MATERIAL BENCHMARKING

Continuous subscale screening of new materials and designs

- Pt/C Tech 1 = evolution of BZA 150 catalyst type
- Pt/C Tech 2 = innovative catalyst technology

Enhanced catalyst technologies as basis for significant performance increase

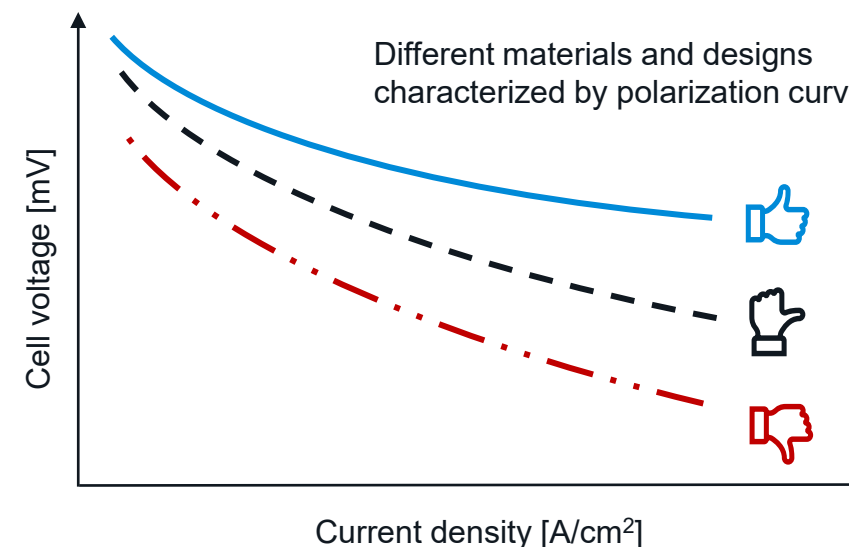


INHOUSE CATALYST INK DEVELOPMENT

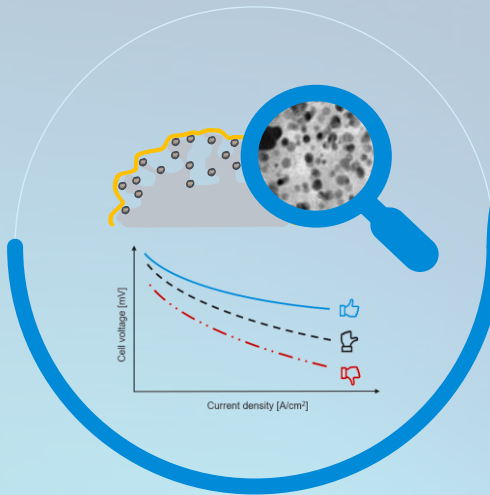
Inhouse catalyst ink development as key for optimized product properties and processing

- Recipe development on lab scale
- High throughput in testing iterations

In-house CCM process development for optimizing the catalyst morphology of high potential materials.

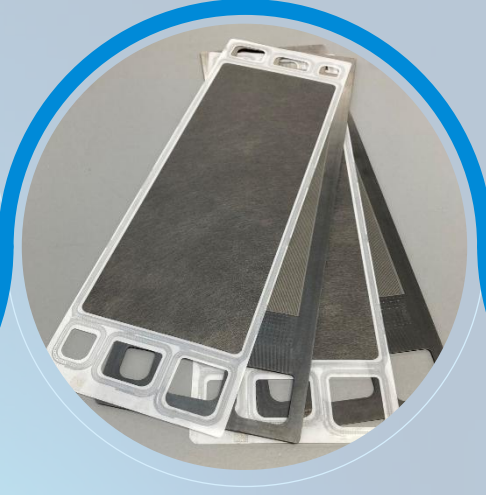


From raw material testing to customer trials on the road



Material Choices

Single components:
catalyst, recipe, gas
diffusion layer,
membrane



Cell Design

Interaction between
SMEFA components and
bipolar plates



Stack Concept

Compression, media
distribution, hardware,
operating conditions



Fuel Cell System

Operation strategy
aligned with the
customer's interface



Operation at Customer

Fuel cell system in
customer trials include
vehicle testing on the
road

Understanding customer's load profiles allows targeted stack and system layout

BZA375

