DAIMLER

The way to emission-free urban transport

TrolleyMotion

30.11.2010

Monika Kentzler

Content

1 ***Strategies to improve environmental performance***

2 BRT System

3 Citaro BlueTec Hybrid

4 Citaro FuelCELL-Hybrid

The improvement of the overall environmental performance and the reduction of CO2-emissions play an important role in the product strategy of Daimler Buses

Improving the fuel efficiency by

Transporting more people per Vehicle (Bus Rapid Transport Systems)

- Dedicated bus lanes
- Specific vehicles with often high capacity
- Traffic prioritization for BRT lines with specific traffic lights
- Integration into existing or with other modes of transport

Optimization of the vehicle itself

- EEV vehicles (incl. closed particulate filter)
- EURO VI vehicles (2013/2014) (incl. closed particulate filter)
- Diesel-Hybrid Buses
- Fuel Cell Hybrid Citaro

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Fast transportation on dedicated lanes

Key elements of a sucessful BRT system

BRT is more than just a segregated bus lane

Separated lanes exclusively for BRT buses

Platforms with adapted height

Off-bus ticketing systems

Specific vehicles, often high capacity articulated buses

High quality vehicle image and travelling environment

Traffic prioritization for BRT lines with specific traffic lights

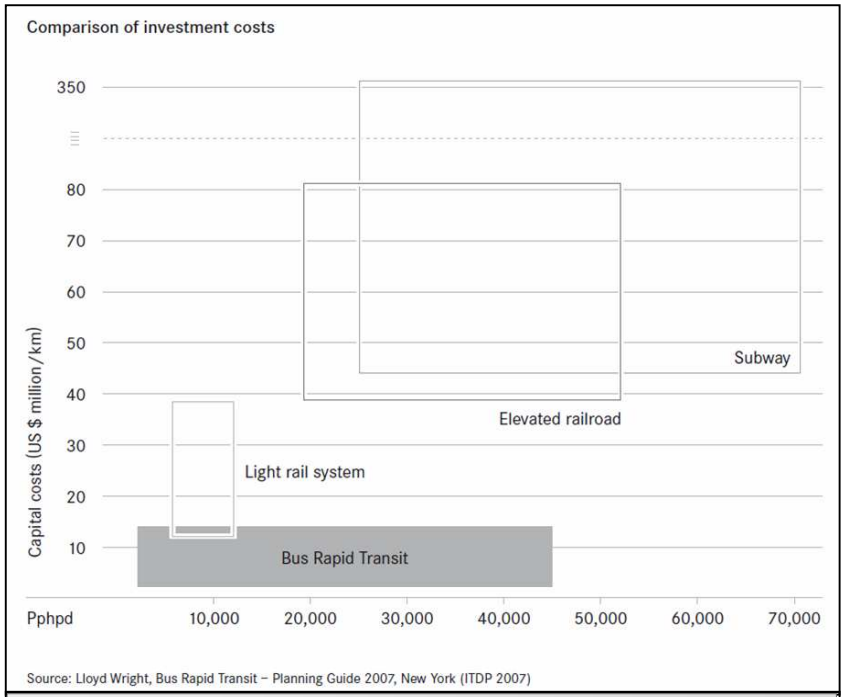
Integration into existing or with other modes of transport

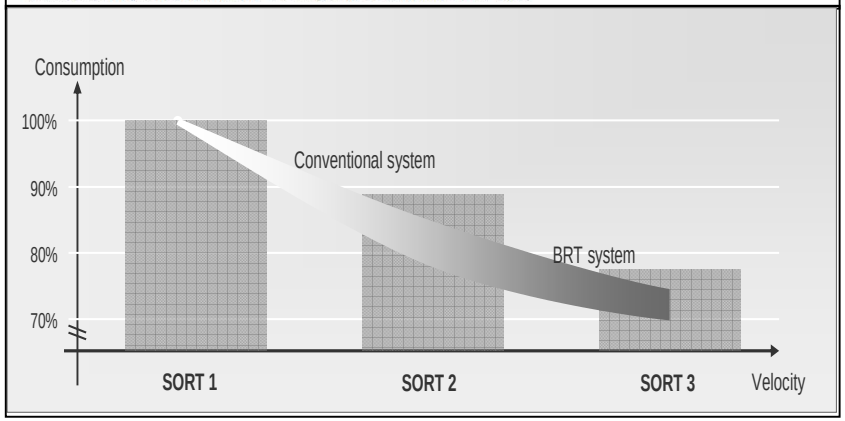
Controlled operation of „feeder services" and „trunk routes"

To realize fast and reliable journey times and perception of the passengers of a high quality service

BRT benefits

+ Can be implemented quickly
+ High flexibility in set-up and in adapting to changes
+ Cost-advantages to other means of transportation with similar capacities
+ Can easily adjust to peak hours
+ Existing means of transportation can be integrated
+ Enhanced environmental profile thanks to high efficiency

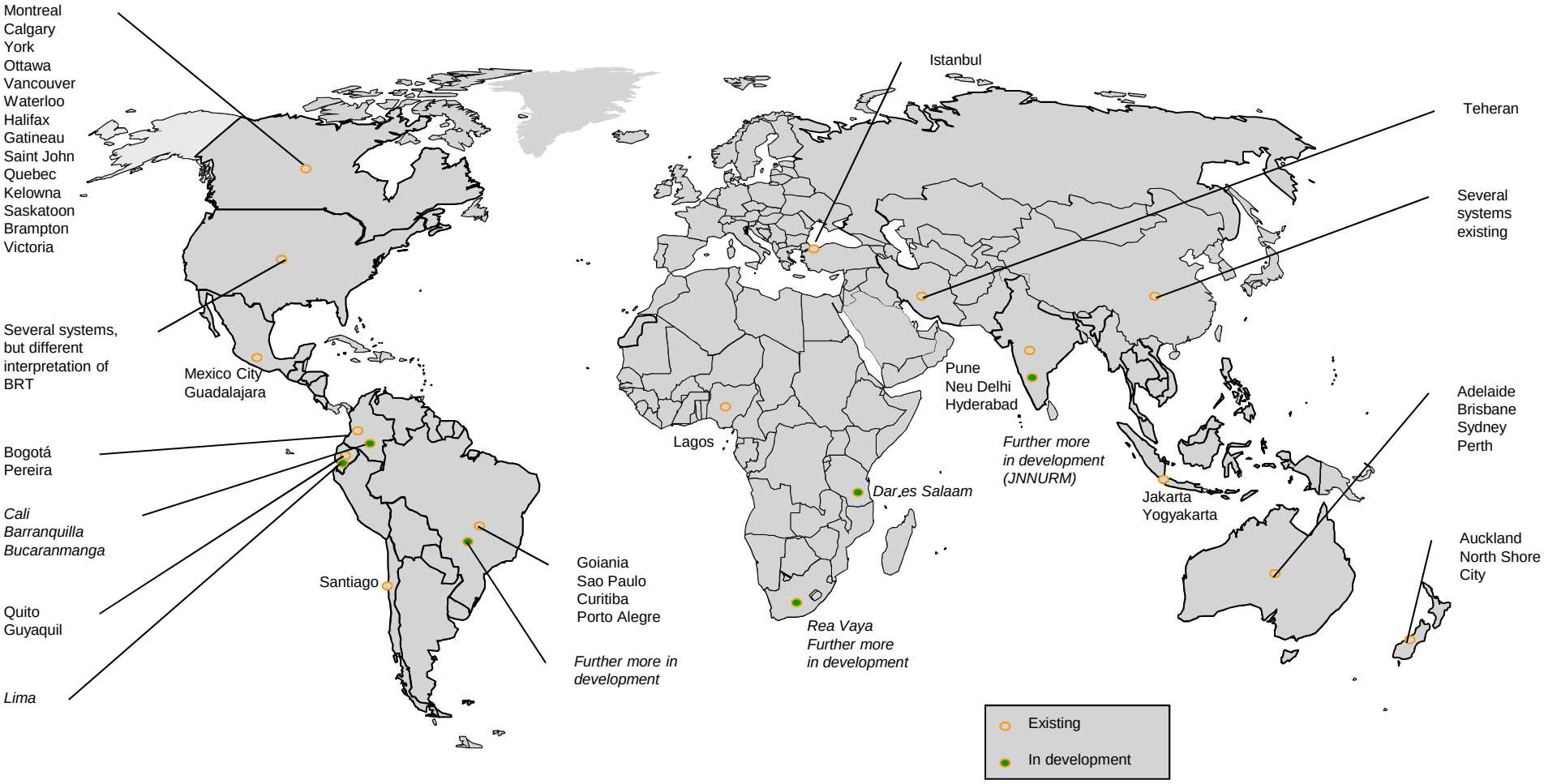




BRT stands for high-quality, reliable, attractive, environment-friendly and cost-efficient public transport.

BRT worldwide

System overview



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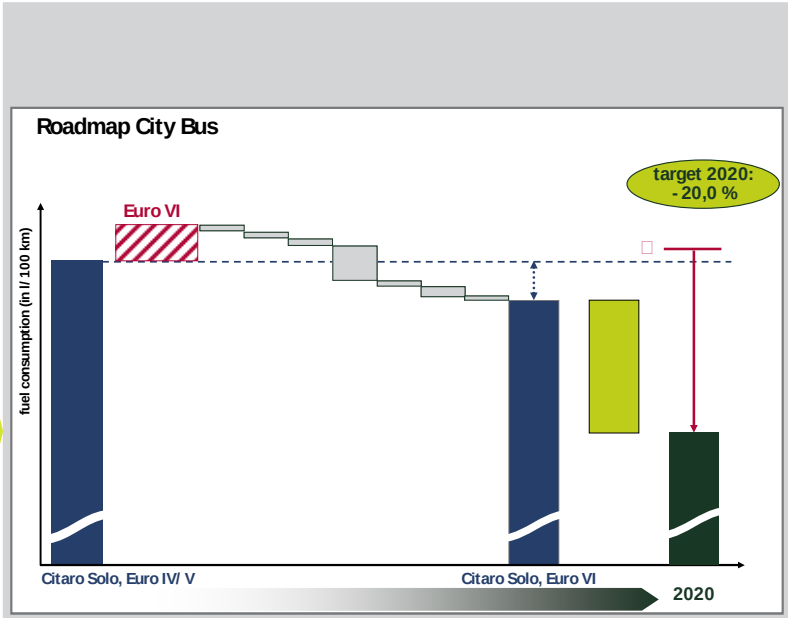
Mercedes-Benz roadmap from clean to zero emission public transport

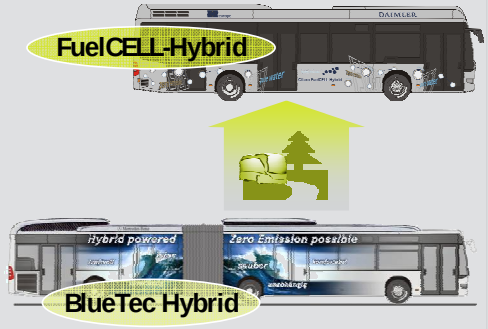
Today's product program with BlueTec Diesel engines

BLUETEC 5



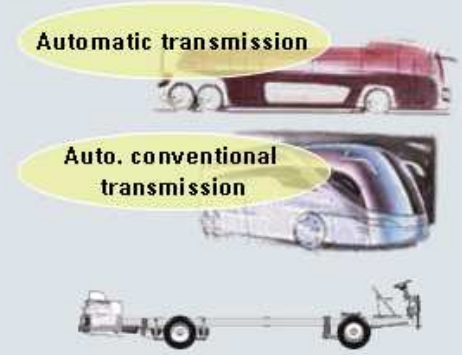
Conventional optimization

- **Citaro Serial Hybrids**



High end green solutions

- **Citaro Parallel Hybrids**



Mercedes-Benz roadmap from clean to zero emission public transport

Diesel engine

automatic gear-box

Citaro Diesel bus

Fuel cell

E-Drive

Energy storage

Citaro FuelCell-Hybrid

Diesel engine

E-Drive

Energy storage

Citaro G BlueTec Hybrid

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Citaro G BlueTec Hybrid

Customer

high fuel savings

high reliability because of established Citaro platform

Driver

regular Citaro cockpit/driver interface

Passenger

low noise level

Environment

high savings of CO_2

zero emission in sensitive areas

low noise level

Technical Highlights

Lithium-Ion battery (330kg, 26 kWh capacity)

Electrified wheel hub motors (4x 80 kW)

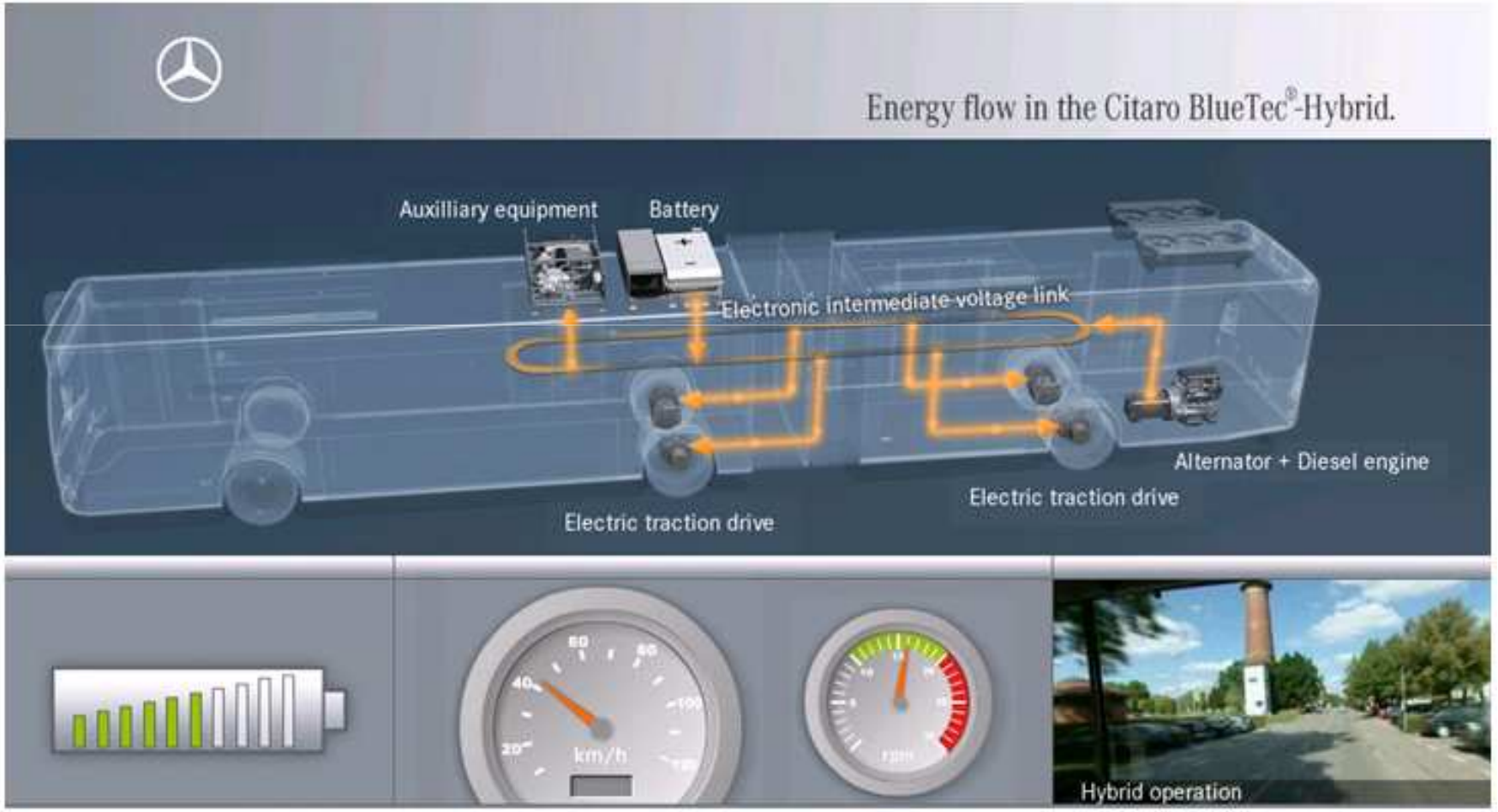
Electric powered auxiliaries

Power pack (diesel engine + generator)

Design

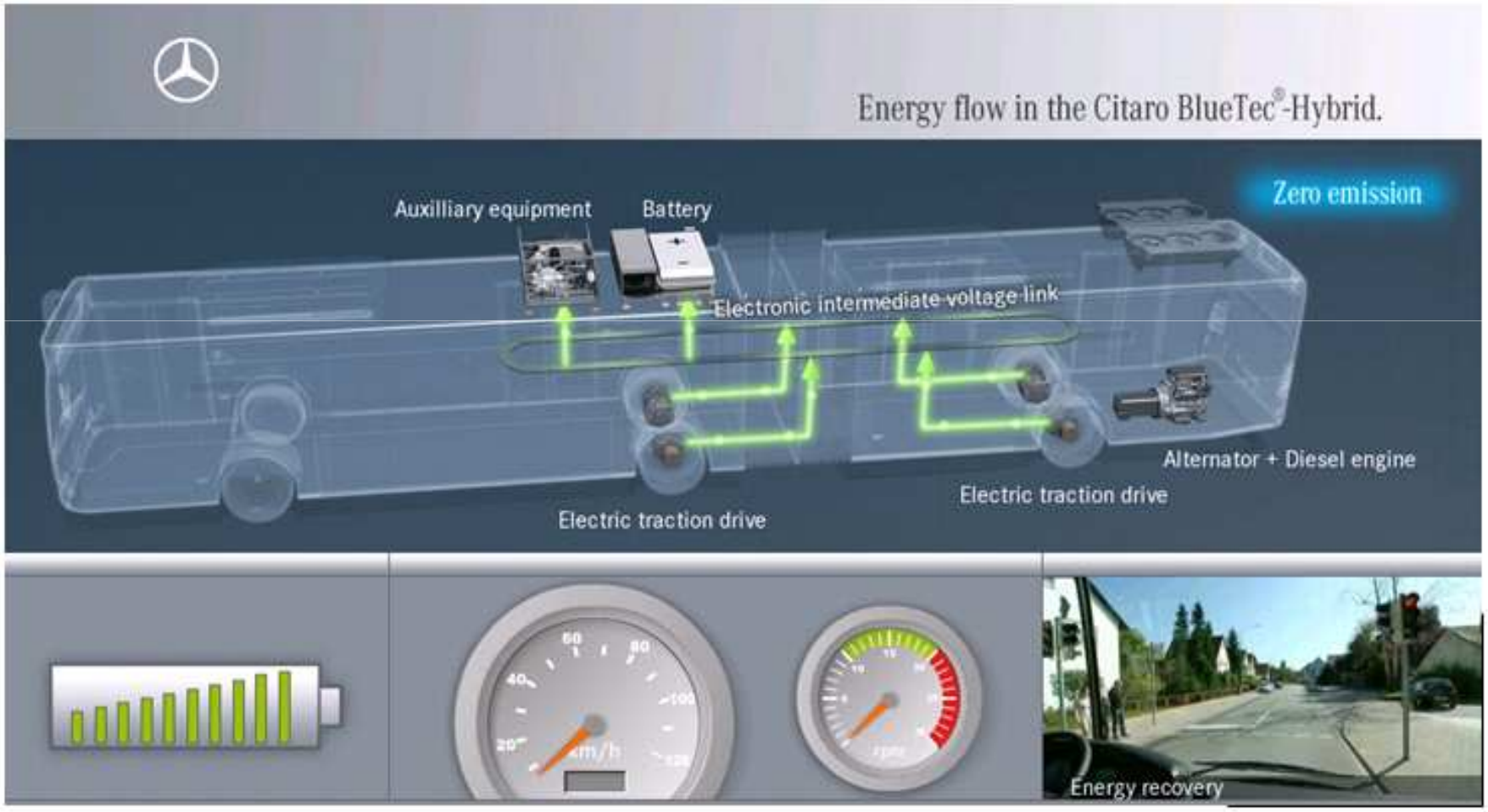
Energy flows during the operation mode “Hybrid”

Battery and diesel engine is active



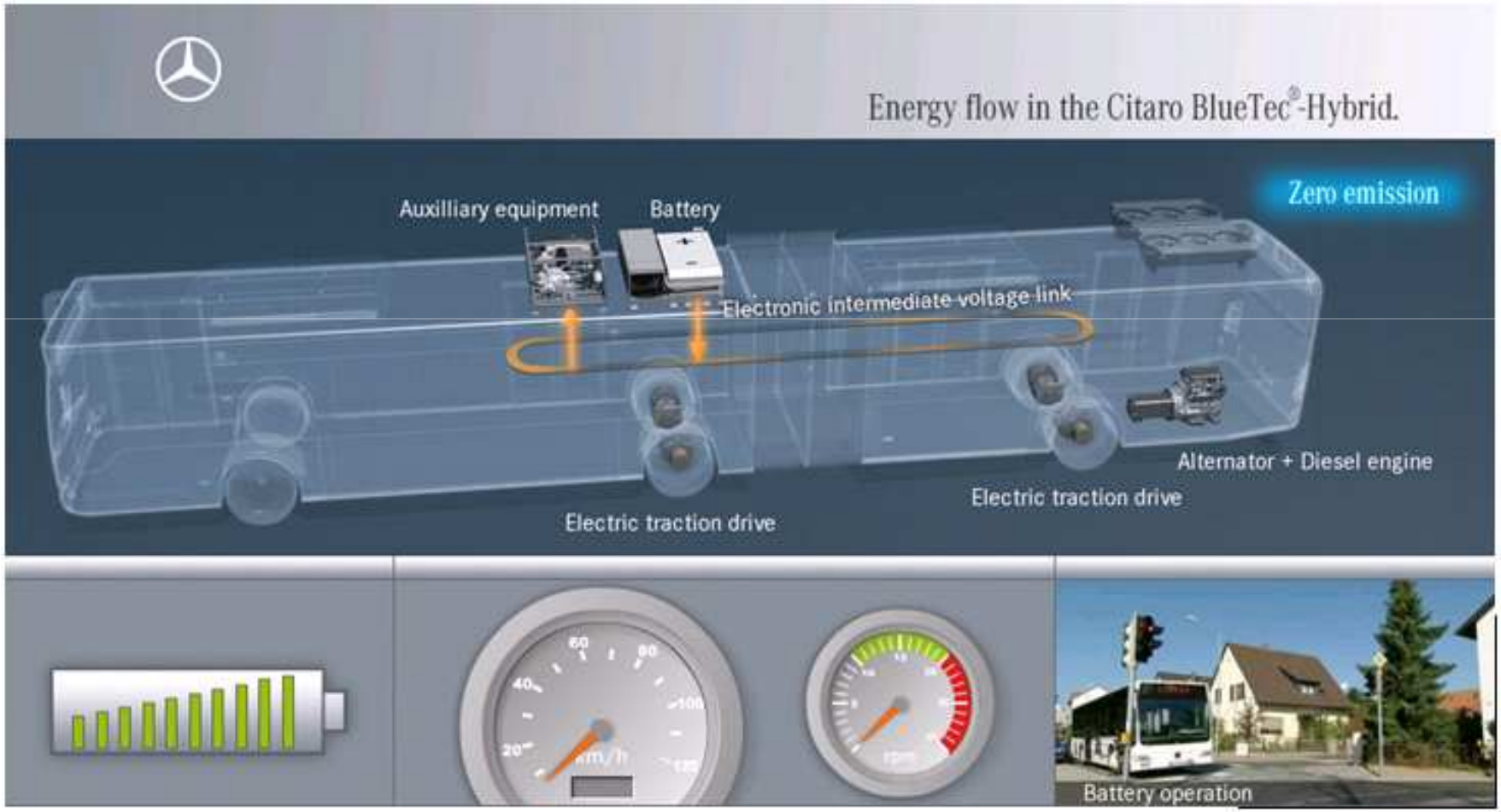
Energy flows during braking

Electrical energy produced by the electrical motors is stored in the battery



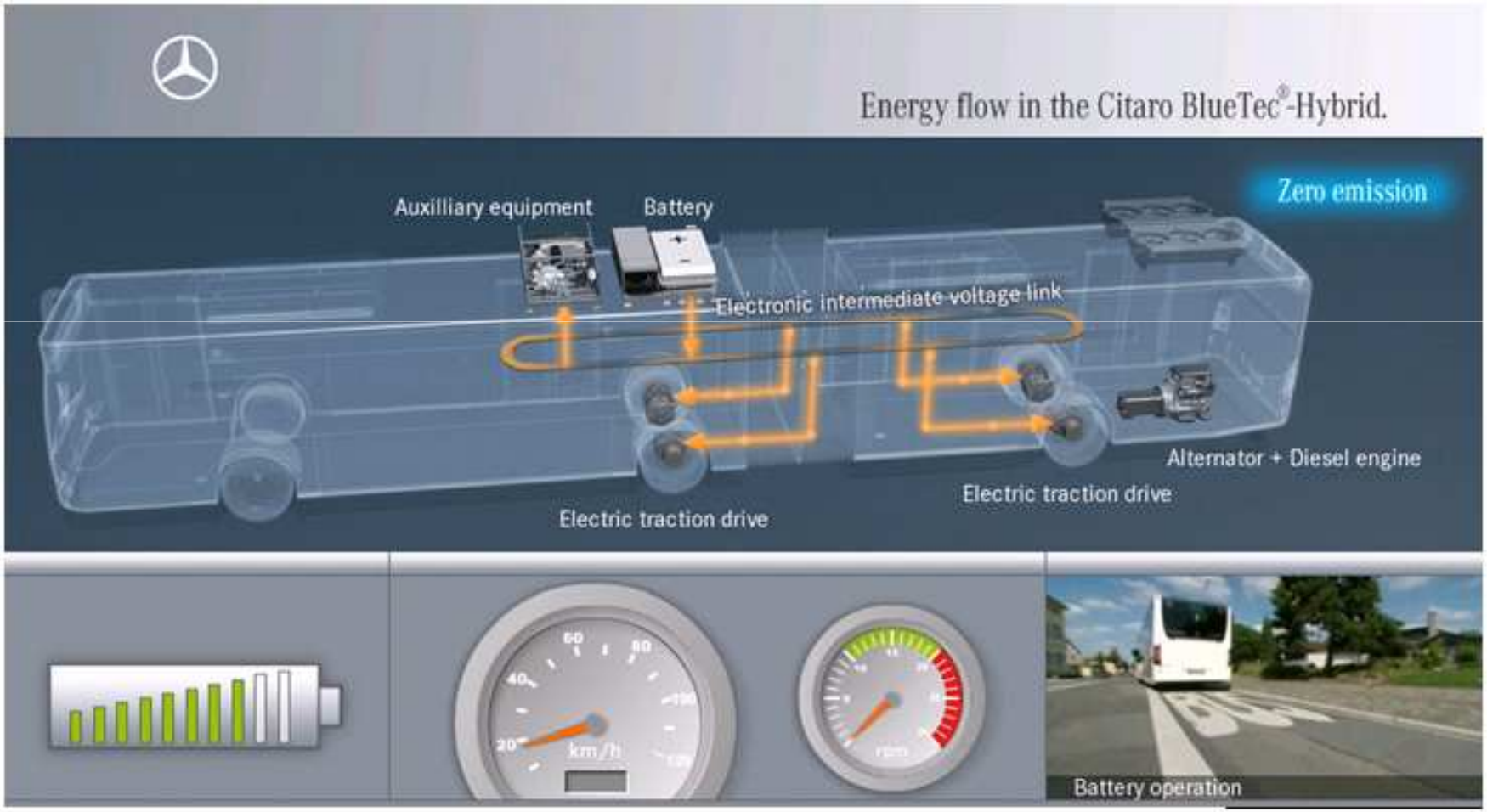
Energy flows while standing (at a traffic light)

The auxillary equipments are powered by the battery



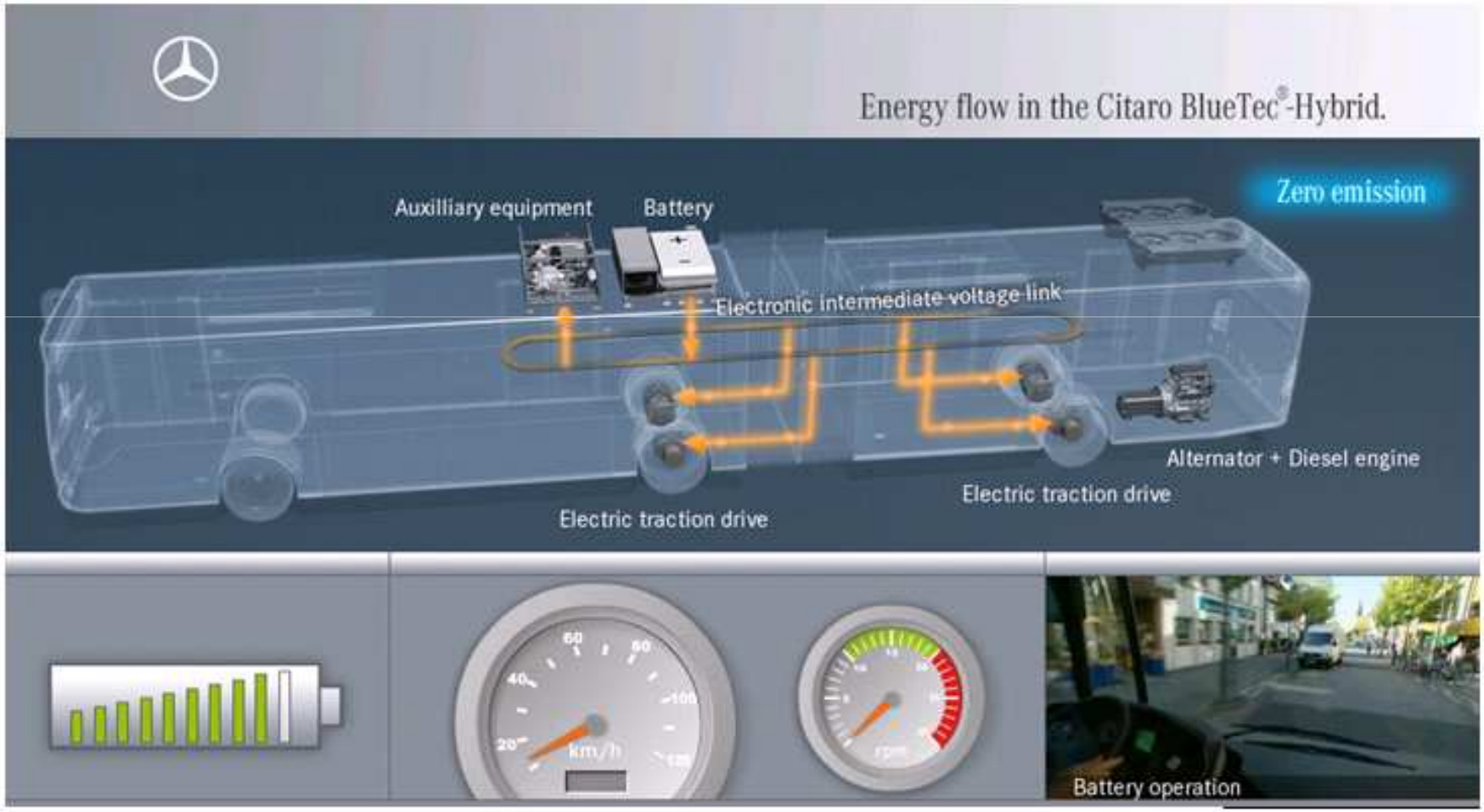
Energy flows during acceleration (e.g. leaving a bus stop)

The battery powers the electrical motors and the auxillaries



Energy flow in the operation mode „ZEV“

The battery powers the eletrical motors and the auxiliaries



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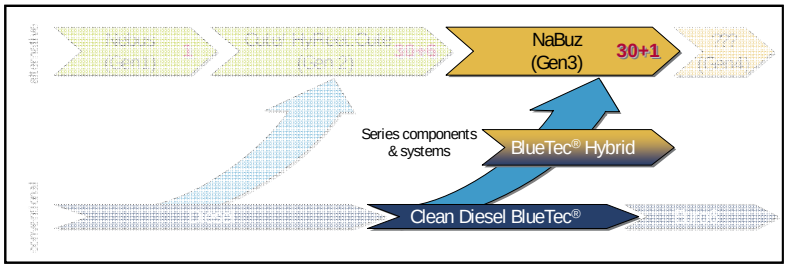
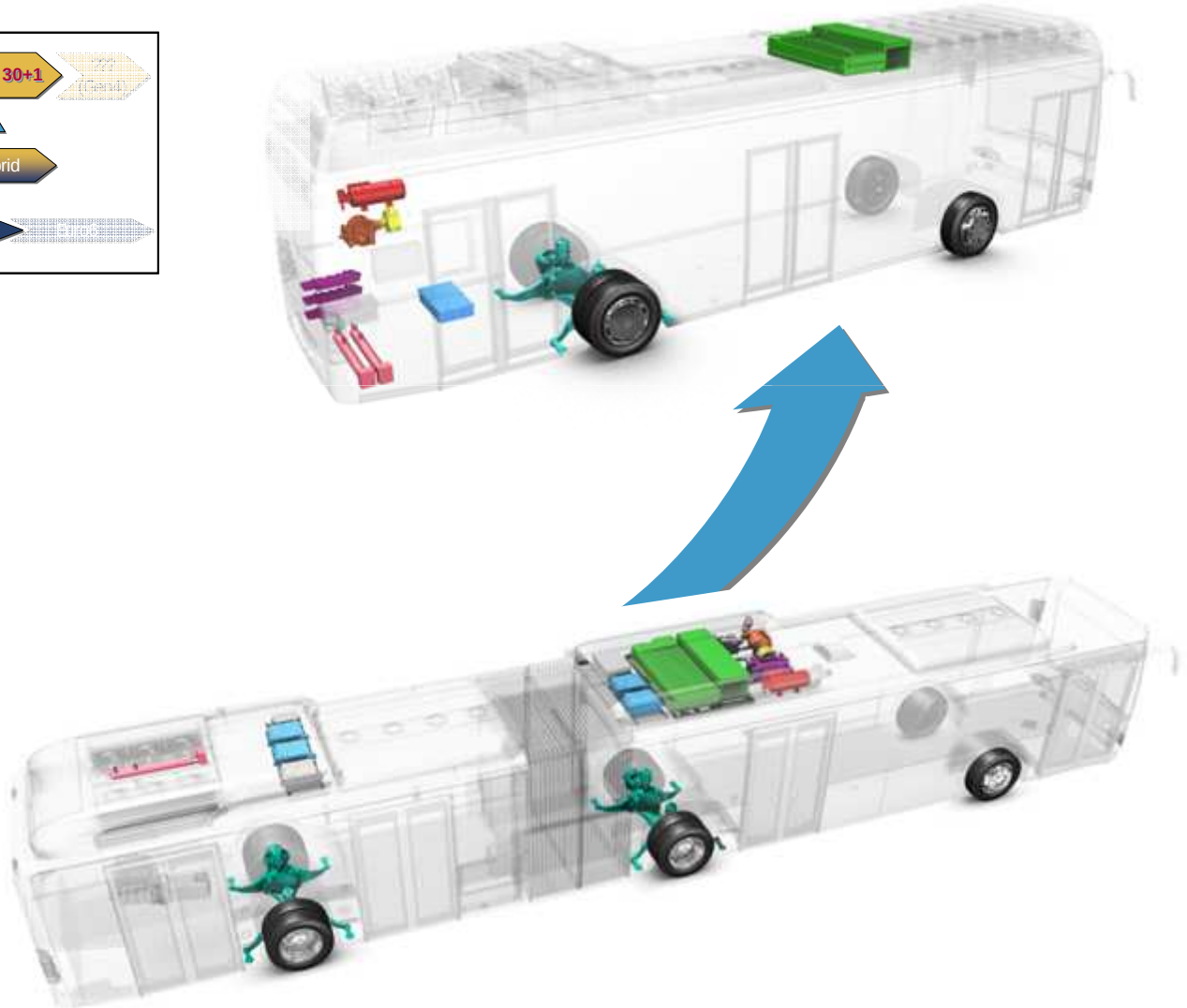
Modular approach: „Hybrid carryover parts“ from Citaro G BlueTec Hybrid and Citaro FuelCELL-Hybrid





- Battery
- Wheel-hub motor
- AC compressor
- Air compressor
- Electric steering pump
- Auxiliaries inverter
- Brake resistor
- Traction inverter

Mercedes-Benz roadmap from clean to zero emission public transport:

I. Modular approach towards clean public transport

II. Long-term commitment/sound strategy

III. Maturity through strong link to series vehicles

Research

(Pre-Series) Development

Technology Demonstration ***Customer Acceptance*** *Profitability and sustainability*

alternative

Nebus (Gen1) **1** — 1997

Cute/HyFleet:Cute (Gen2) **30+6** — 2001-2009

NaBuz (Gen3) **30+1** — 2008-2015

??? (Gen4) — as of 201x

conventional

The Citaro FuelCELL Hybrid

Customer

Up to 50% reduction of hydrogen consumption
Improved lifetime of FC components
Citaro and BlueTec Hybrid serial components

Driver

Standard Citaro cockpit/driver interface

Passenger

Lowest noise level

Environment

Zero CO_2 emission
Zero PM, NO_x emission
Lowest noise level

Technical Highlights

Lithium-Ion battery (330kg, 26 kWh capacity)

Electrified wheel hub motors (2x 80 kW)

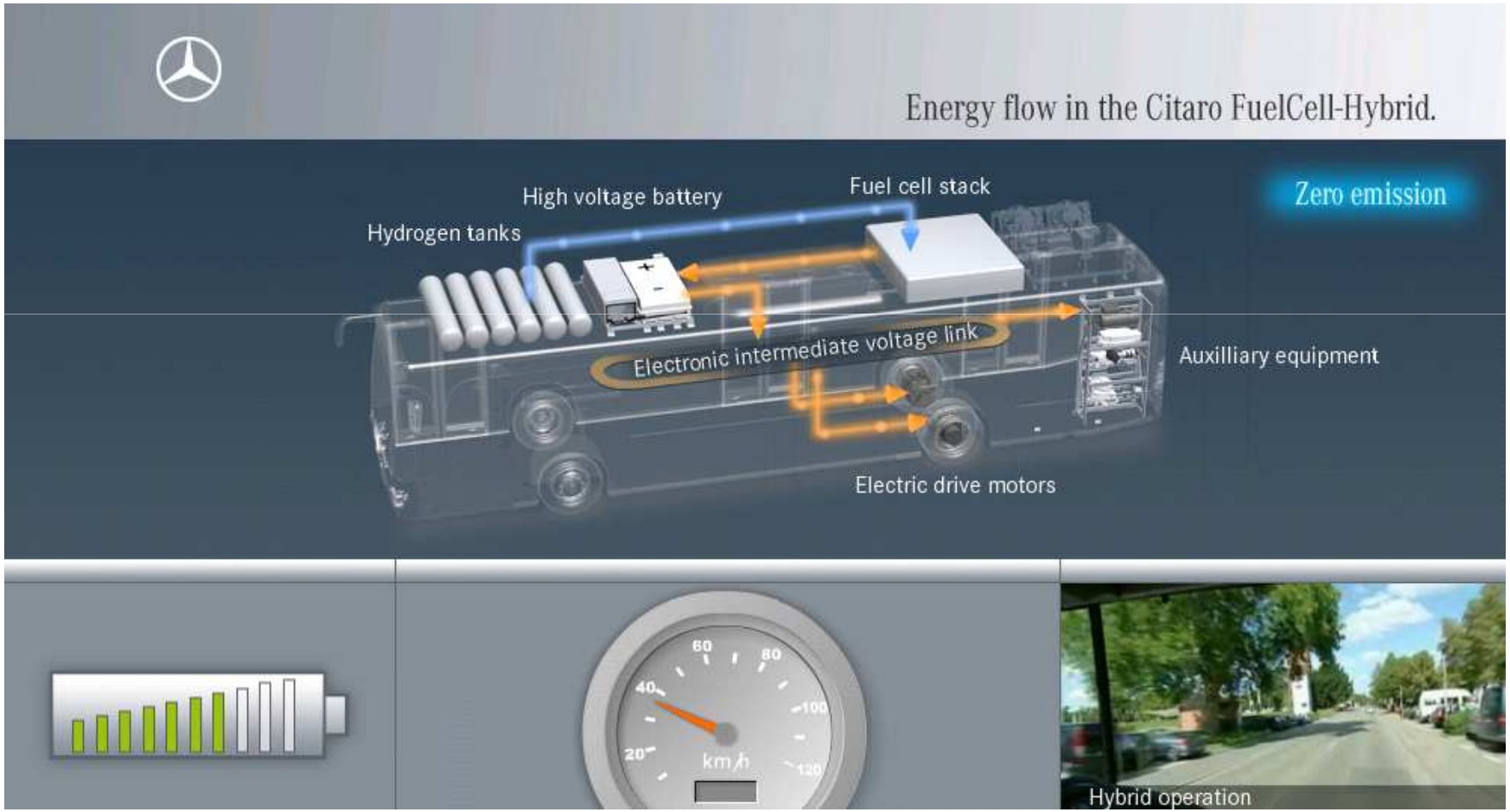
Electric powered auxiliaries

Fuel Cell System (120 kW)

Design

Energy flows during the operation mode “Hybrid”

Battery and fuel cell system are active



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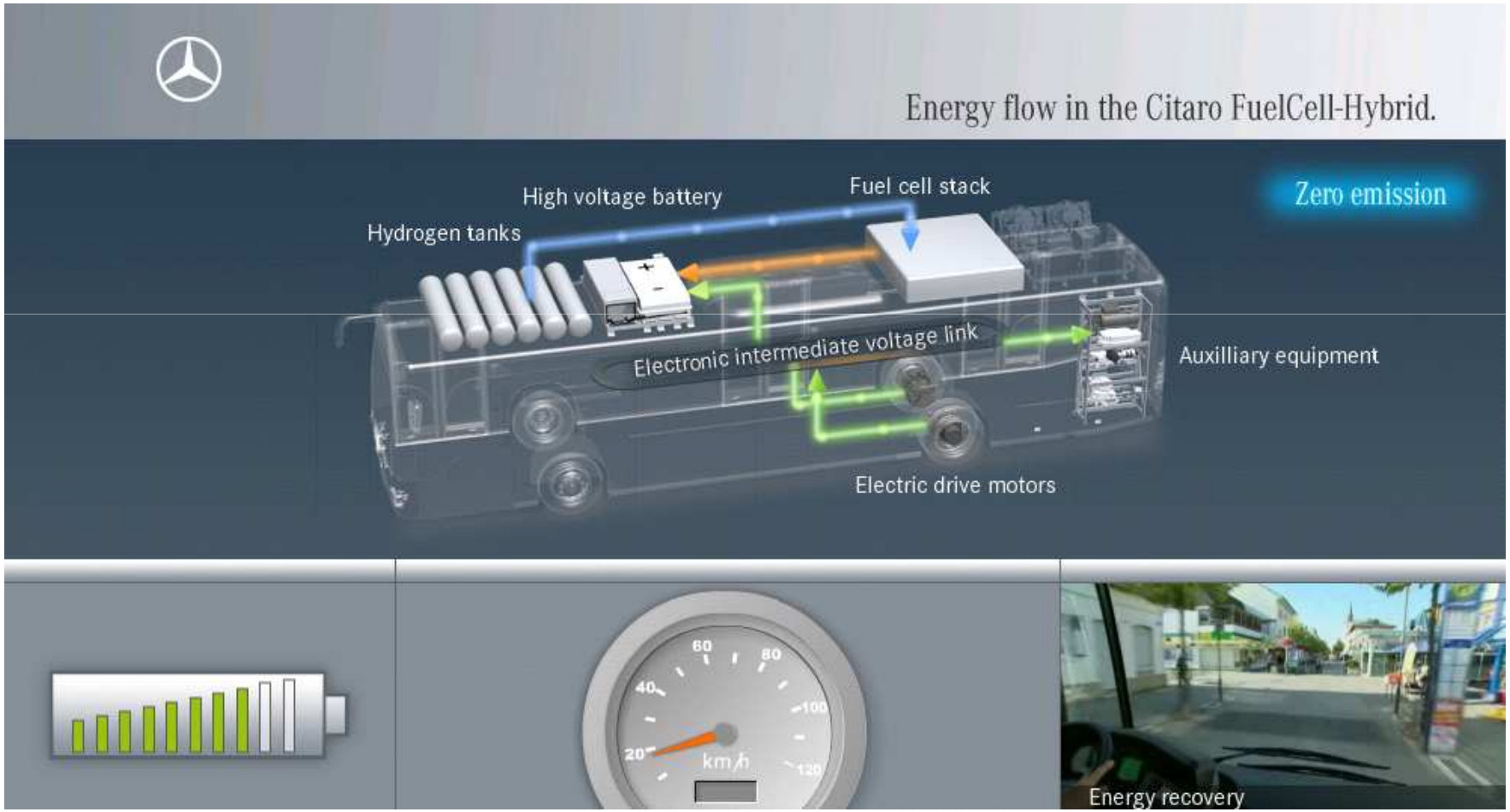

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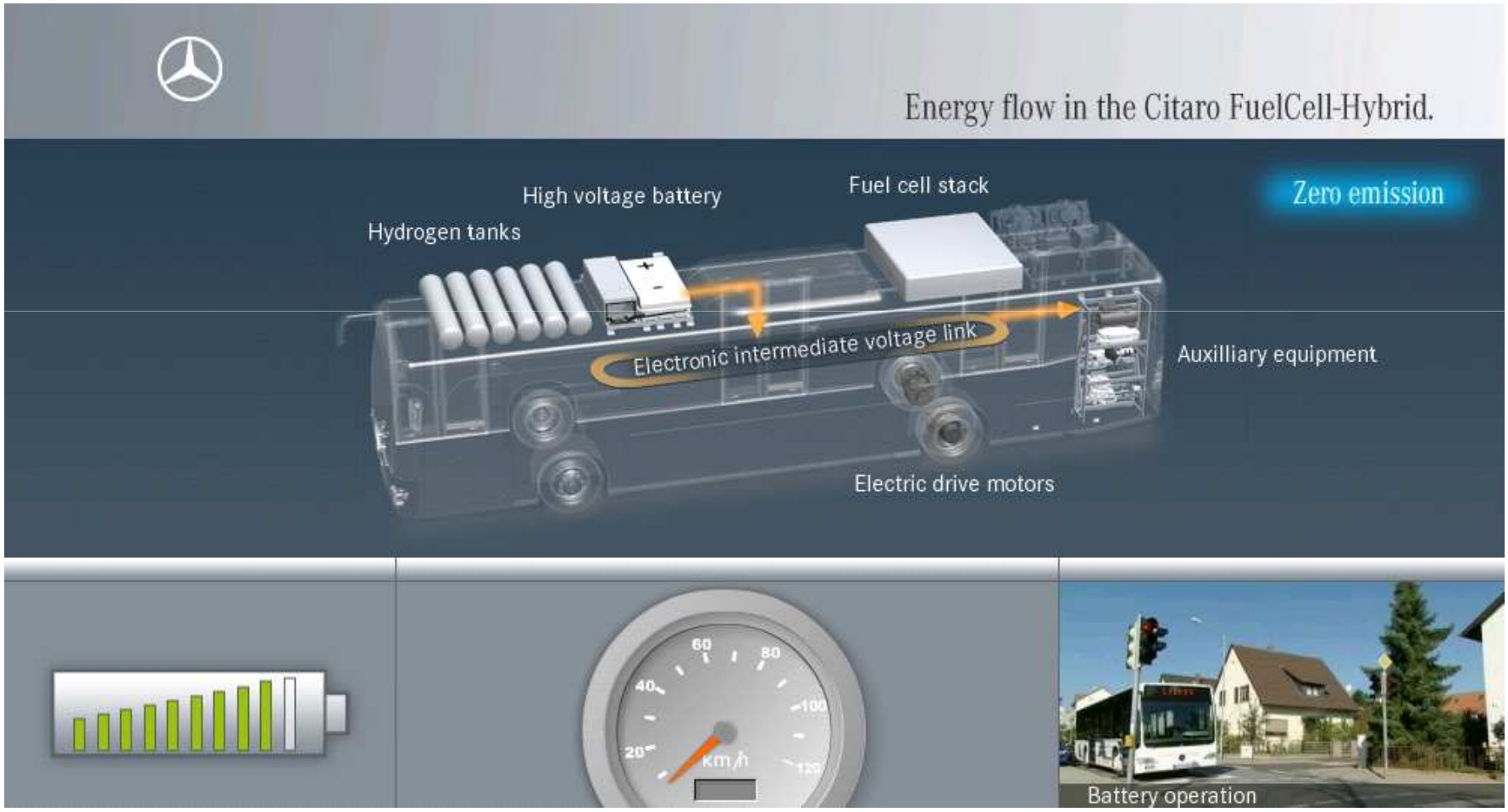

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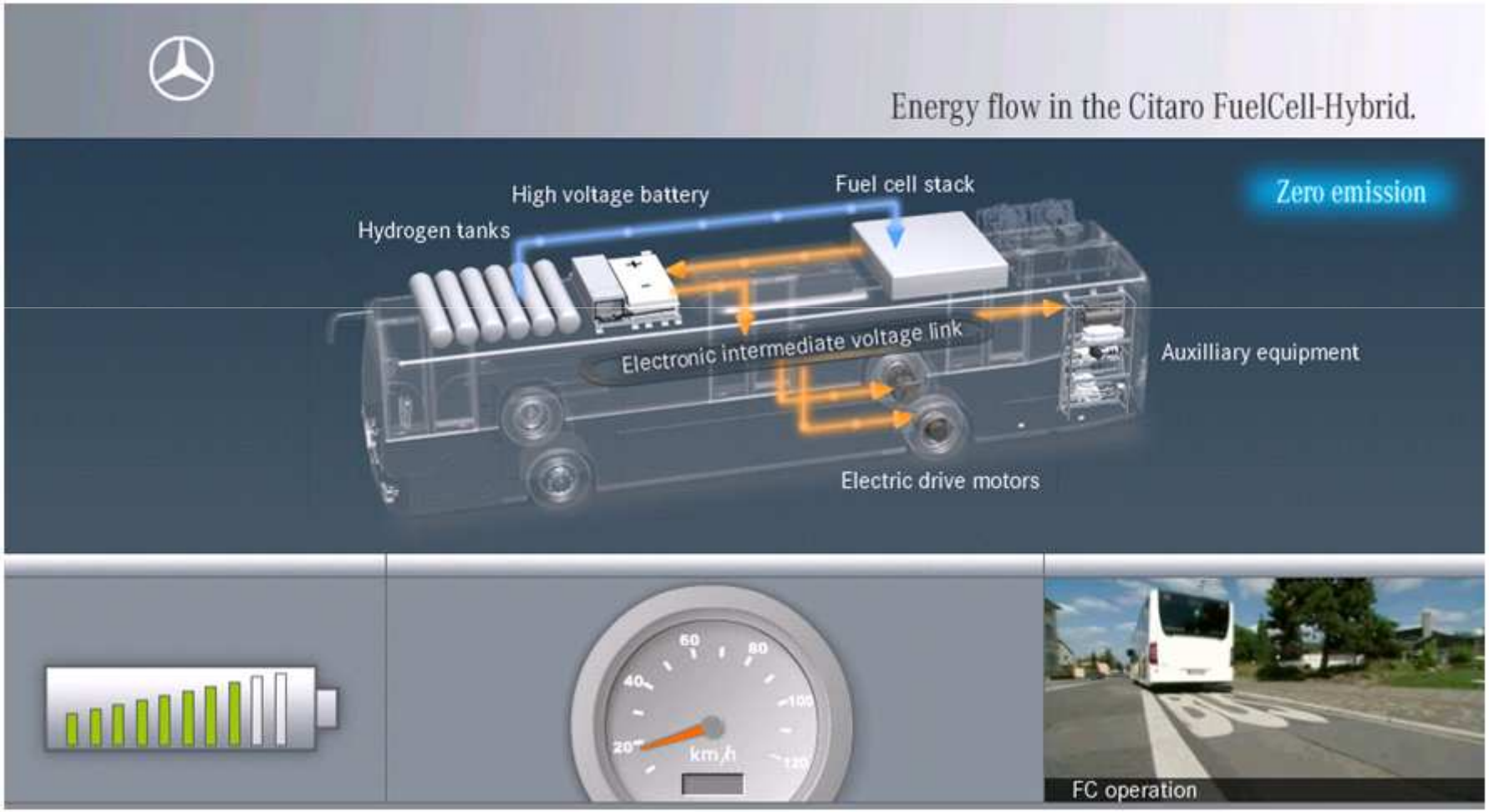

Thank you for your attention!

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