



SYMBIO

A FAURECIA MICHELIN HYDROGEN COMPANY

CONFÉRENCE MOBILITÉ HYDROGÈNE

VISION MARCHÉ ET TECHNOLOGIES VÉHICULES HYDROGÈNES

6 octobre 2020

ACCESS TYPE: PUBLIC STATUS: VALID



01

THE ZERO-EMISSION CHALLENGE



Access to city centers are more and more restricted, while urban delivery becomes more and more necessary





This challenge is solved with electric urban duty vehicles, hydrogen-powered fuel cells are already part of the solution

Small Vans

Renault Kangoo ZE



Peugeot Partner & Citroen Berlingo electric



StreetScooter Work



Renault New Kangoo ZE



Nissan e-NV200



Mercedes eVito



PSA Small & Medium LCVs



Renault Kangoo ZE Concept



2011 2012 to 2015 2016 2017 2018 2019 2020 2021

Large Vans



StreetScooter Work L
40kWh - 80km real world
Payload 900 kg



Renault Master ZE



Volkswagen e-Crafter



Peugeot Boxer & Citroen Jumper



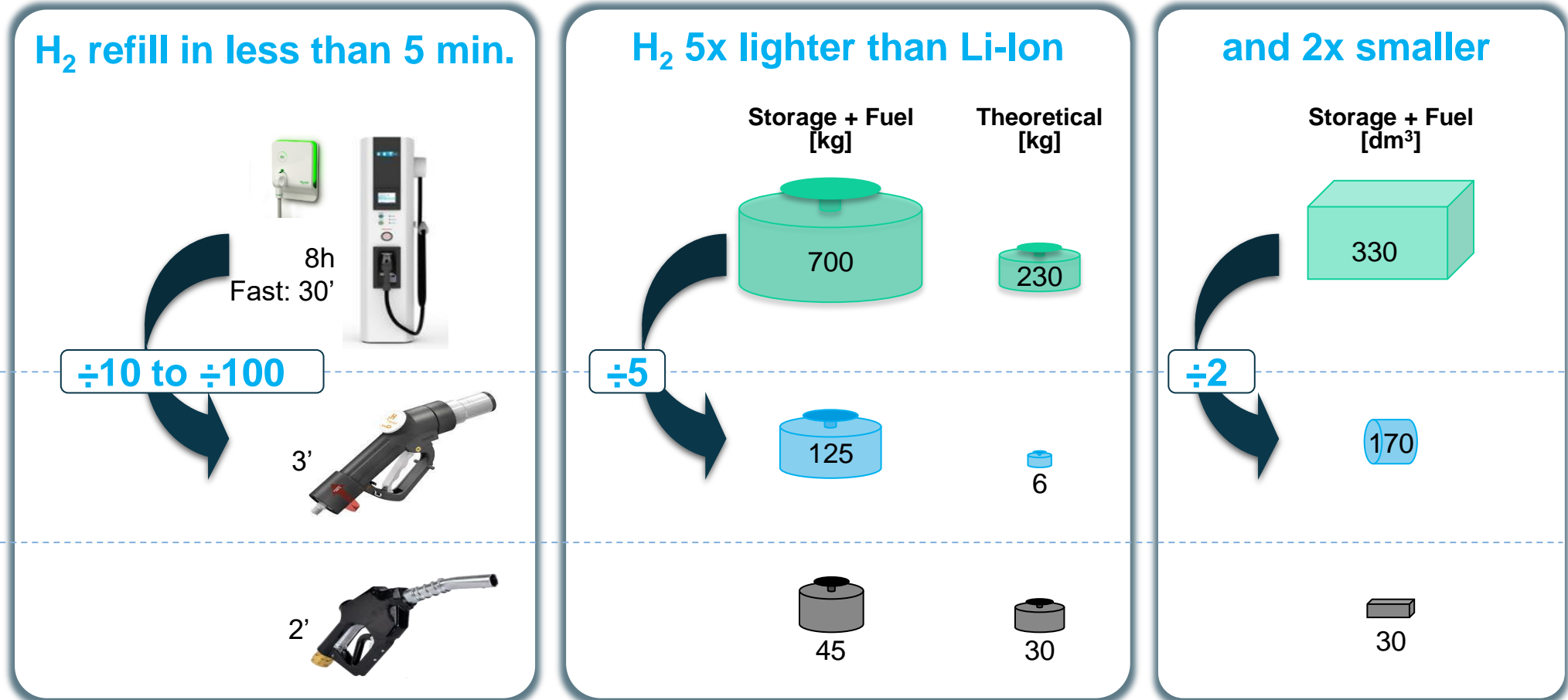
Mercedes eSprinter



StreetScooter Work XL (Ford eTransit)



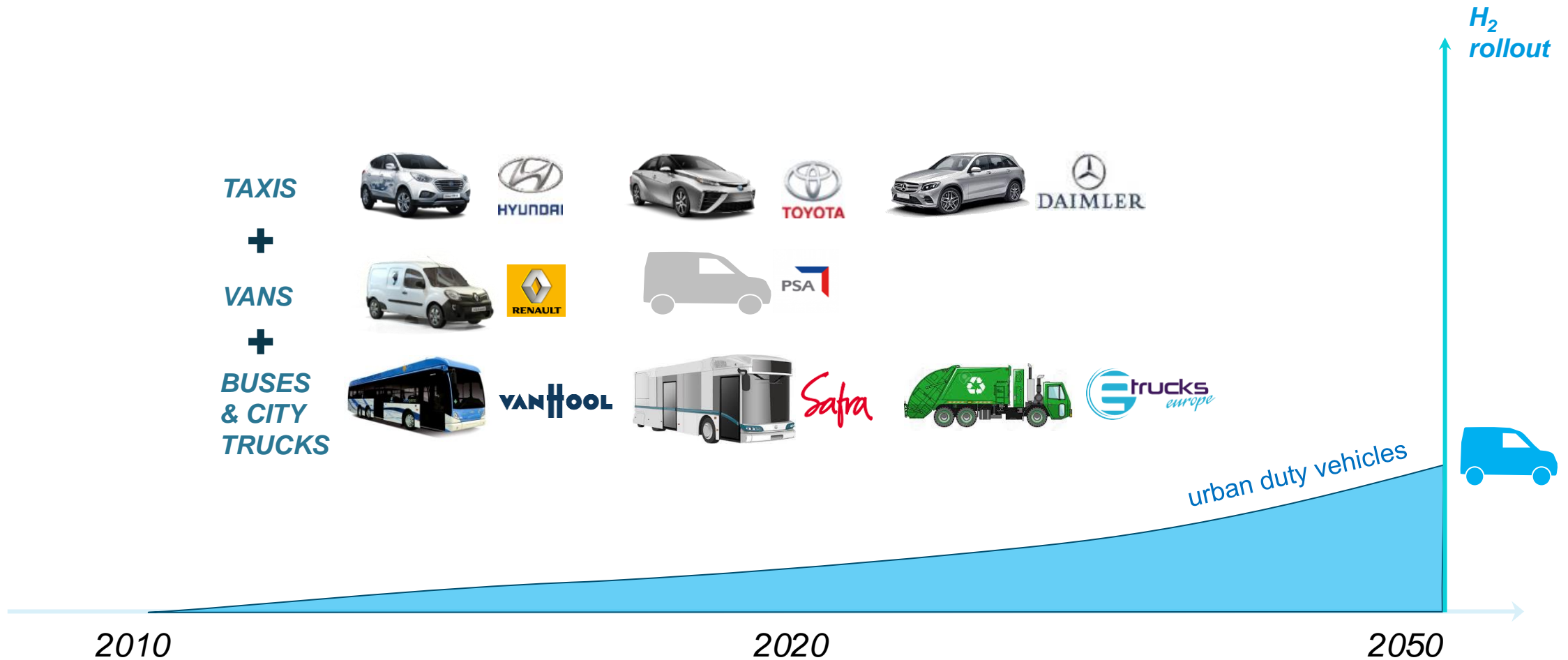
Why hydrogen-powered fuel cells? Because it combines zero-emission and usage flexibility



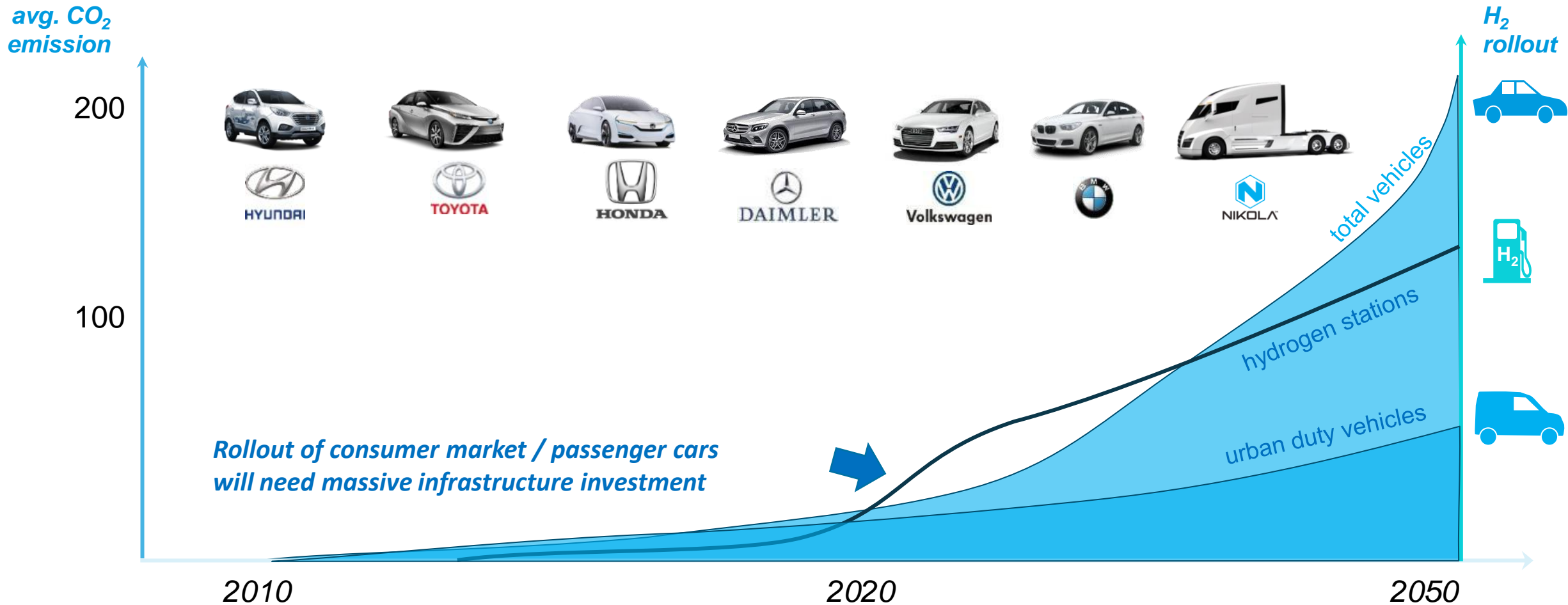
for 500 km range, compressed H₂ 700 bar



The hydrogen mobility market is emerging on urban duty vehicles...



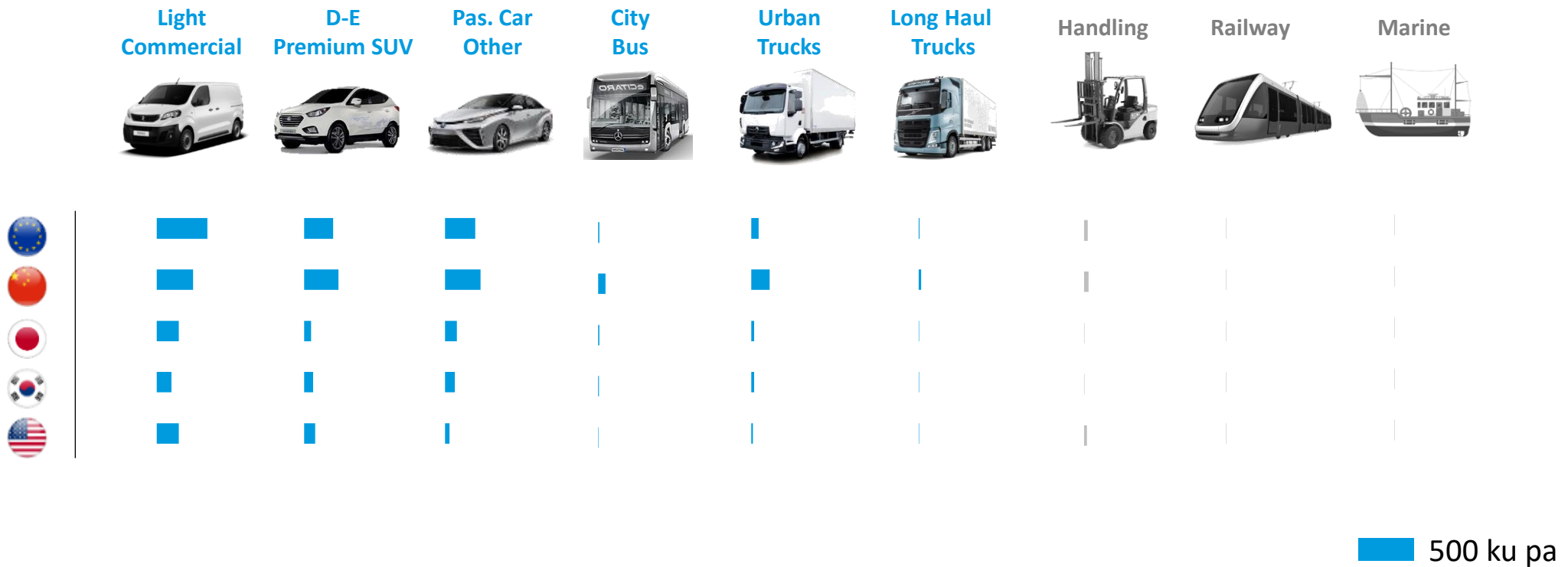
...and OEMs prepare a massive rollout of hydrogen passenger cars and trucks...





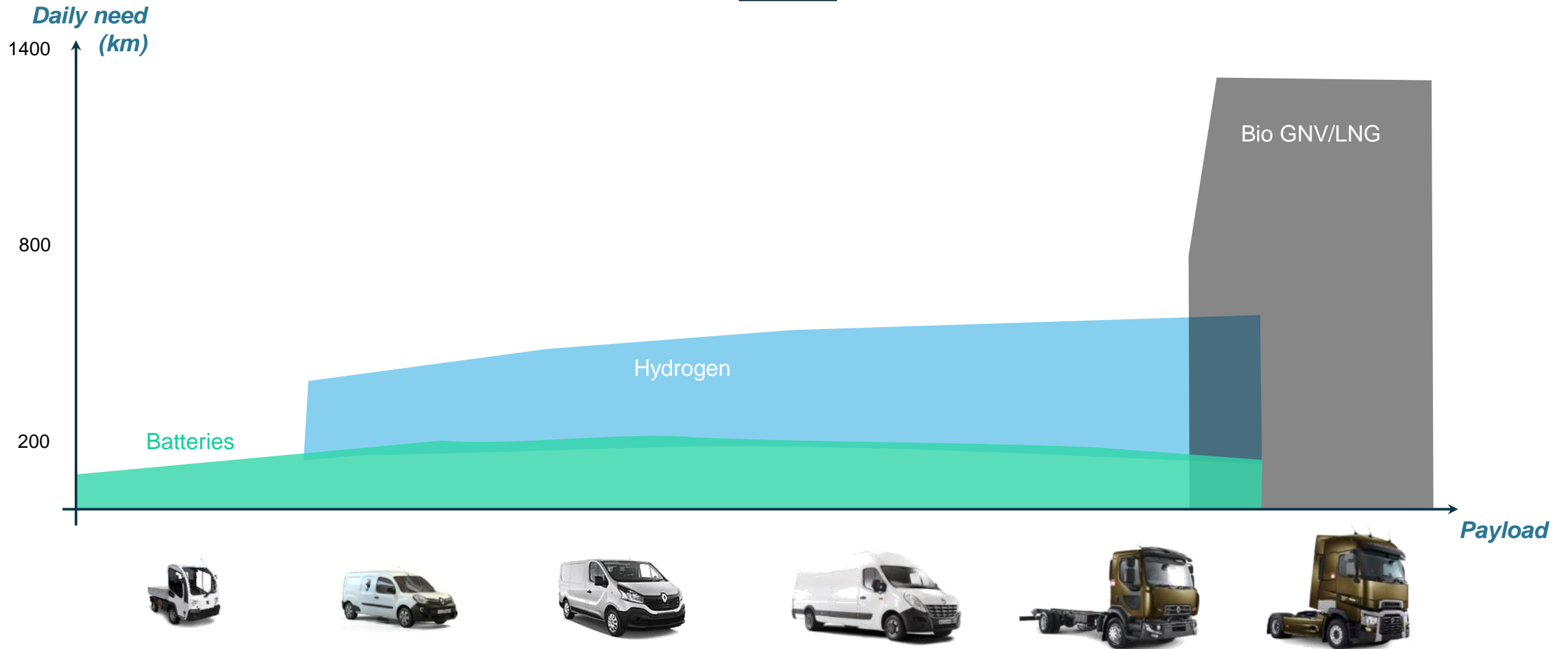
...throughout the world, starting in Europe and China

Projected H₂ market 2030 : [2 – 4] % of total vehicle market





Hydrogen-powered fuel cells is one solution, among other necessary energies to replace fossil fuels



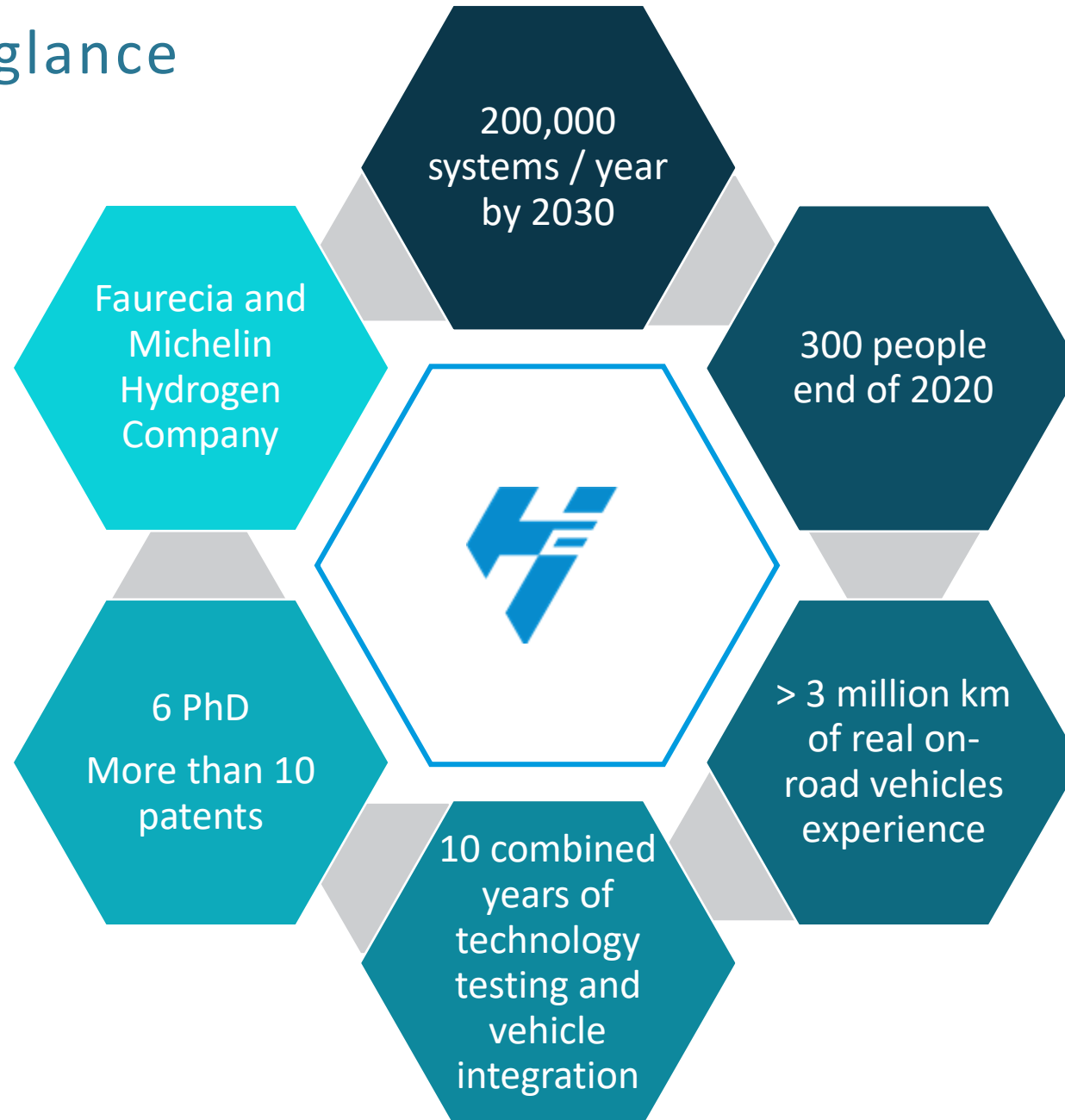


02

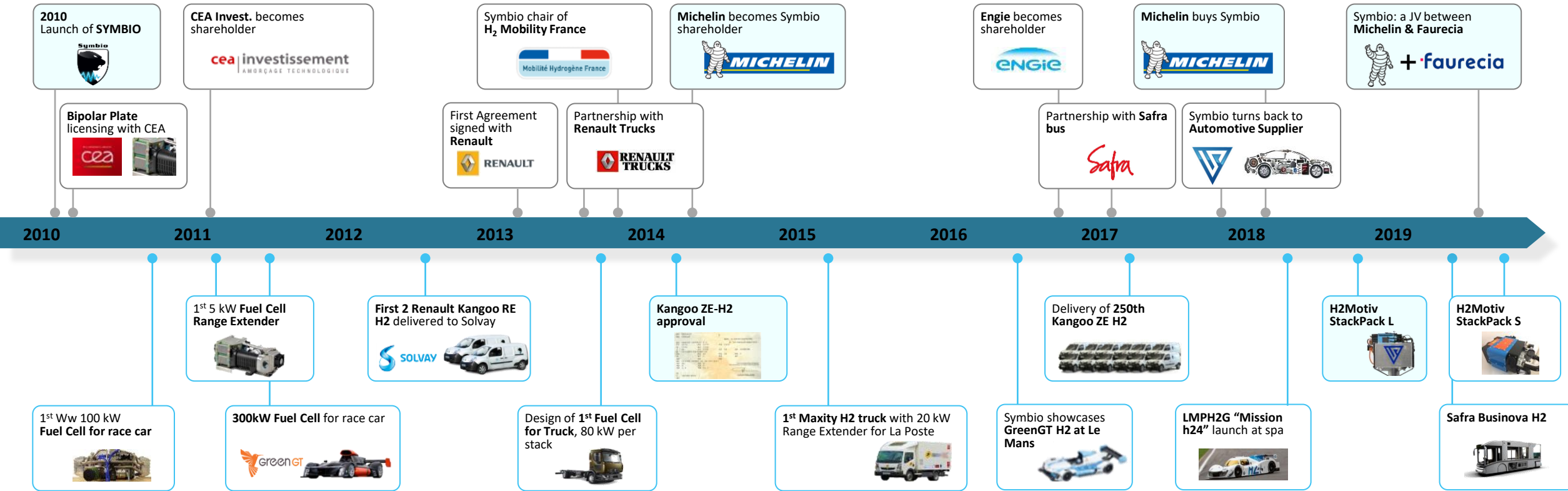
WHO WE ARE



Symbio at a glance



Our history: from a small series converter to an automotive equipment supplier specialized in hydrogen systems



... with an upcoming industrial flagship site

- ▼ Heart of “Hydrogen Valley” close to Lyon in France
- ▼ Direct connection to Green H2 production > 6t/day
- ▼ Pilot plant production capability > 50 000 units/year





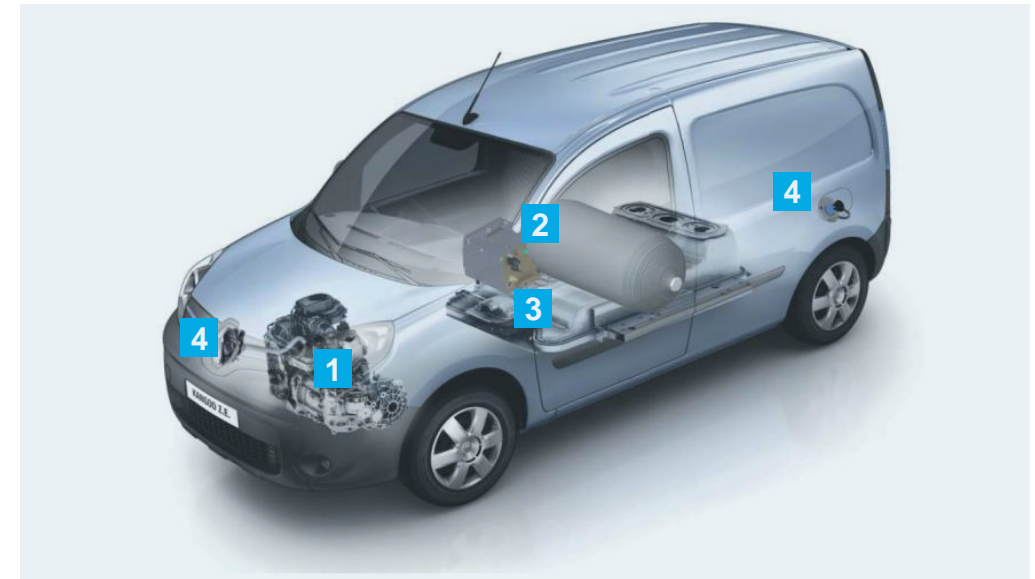
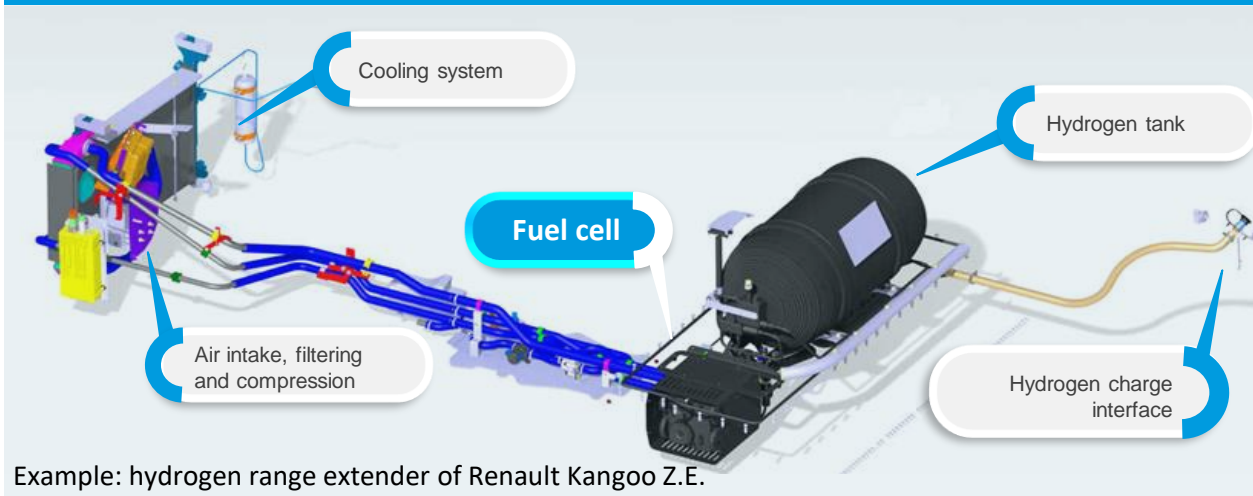
03

PRODUCTS AND SERVICES

Symbio designs and produces fuel cell safe systems, and service all customers for vehicle integration programs



Fuel cell system

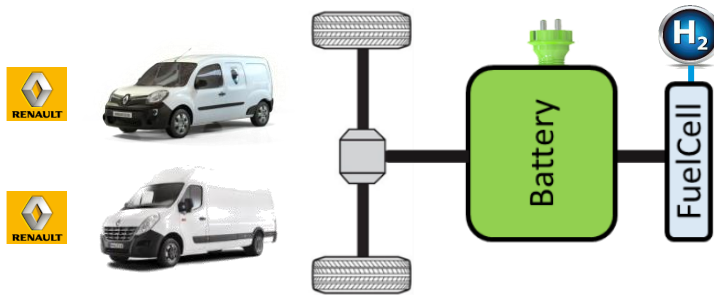


- 1 THE ELECTRIC MOTOR ENSURES ZERO EMISSION PROPULSION
- 2 THE HYDROGEN FUEL CELL PRODUCES ELECTRICITY ON BOARD
- 3 BOTH BATTERY AND HYDROGEN FUEL CELL POWER THE MOTOR
- 4 HYDROGEN RECHARGES AT THE STATION



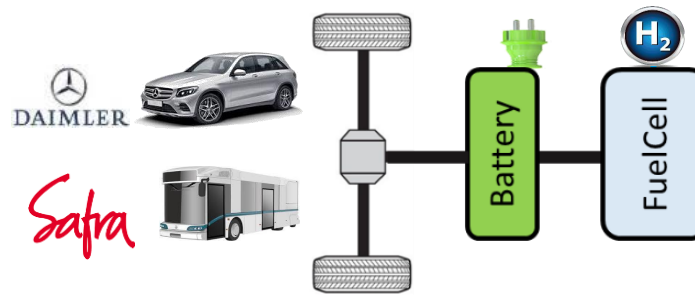
There are three modes of Battery + Fuel Cell hybridization

Range extender fuel cell



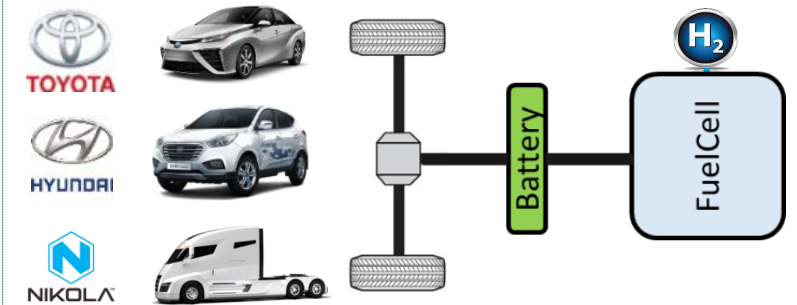
Leveraged by fleet owners to increase battery-only vehicles insufficient range and improve usage flexibility

Dual power fuel cell



Leveraged by OEMs for vehicles with a balance of urban and highway usages, in a context of limited H₂ recharging stations

Full power fuel cell



Leveraged by OEMs at the forefront of hydrogen mobility industry, and go-to solutions for high range and high payload vehicles

Symbio delivers full range of Hydrogen product from StackPacks to complete PEM fuel cell systems



Hydrogen System – Full breakdown

Symbio Credentials



Stack



StackPack



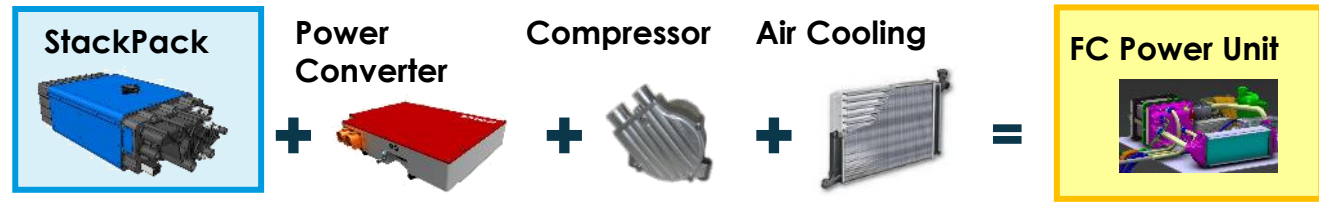
SOP 2020
Undisclosed - LCV

GreenGT

Undisclosed - HD



Fuel Cell Power Unit

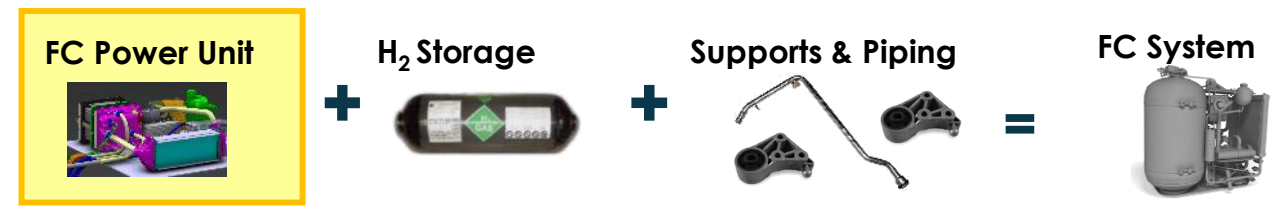


SOP 2019

Safra



Fuel Cell System

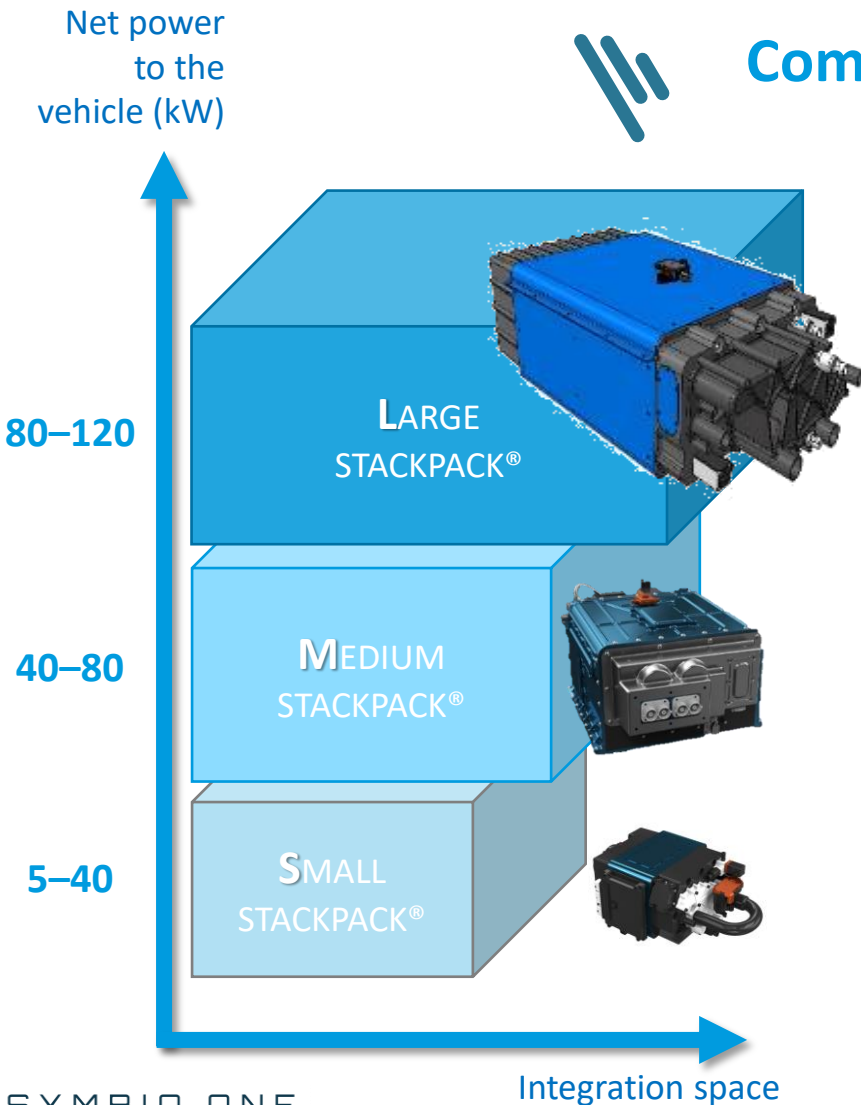


290 veh in the field

RENAULT TRUCKS



StackPack® portfolio covers broad range of powers, sizes, vehicles and hybridization architectures



Comprehensive StackPack® portfolio

		LCV	SUV	BUS	Truck Small duty	Truck Medium duty	Truck Heavy duty
Range Extender							
Dual							
Full		 	 	 	 		

More than 10 successful OE integrations programs, made possible with Symbio products and services



5 kW / 30kWh
(2 kg of H2)



20kW / 45kWh
(3 kg of H2)



20kW / 60kWh
(4 kg of H2)



5 kW / 30kWh
(2 kg of H2)



30kW / 132 kWh
(10 kg of H2)



100kW / 60 kWh
(4 kg of H2)



300 kW / 60kWh
(4 kg of H2)



200 kW / 120kWh
(8 kg of H2)



12 kW / 100kWh
(7 kg of H2)



10 kW / 45kWh
(7 kg of H2)

Latest achievement: Renault Master Z.E. Hydrogen



Consumer
Technology
Association™



A range x2 as a minimum with no winter effect



20 °C

Master ZE

Master ZE + Kit H₂



5 °C

Master ZE

Master ZE + Kit H₂



-5 °C

Master ZE

Master ZE + Kit H₂

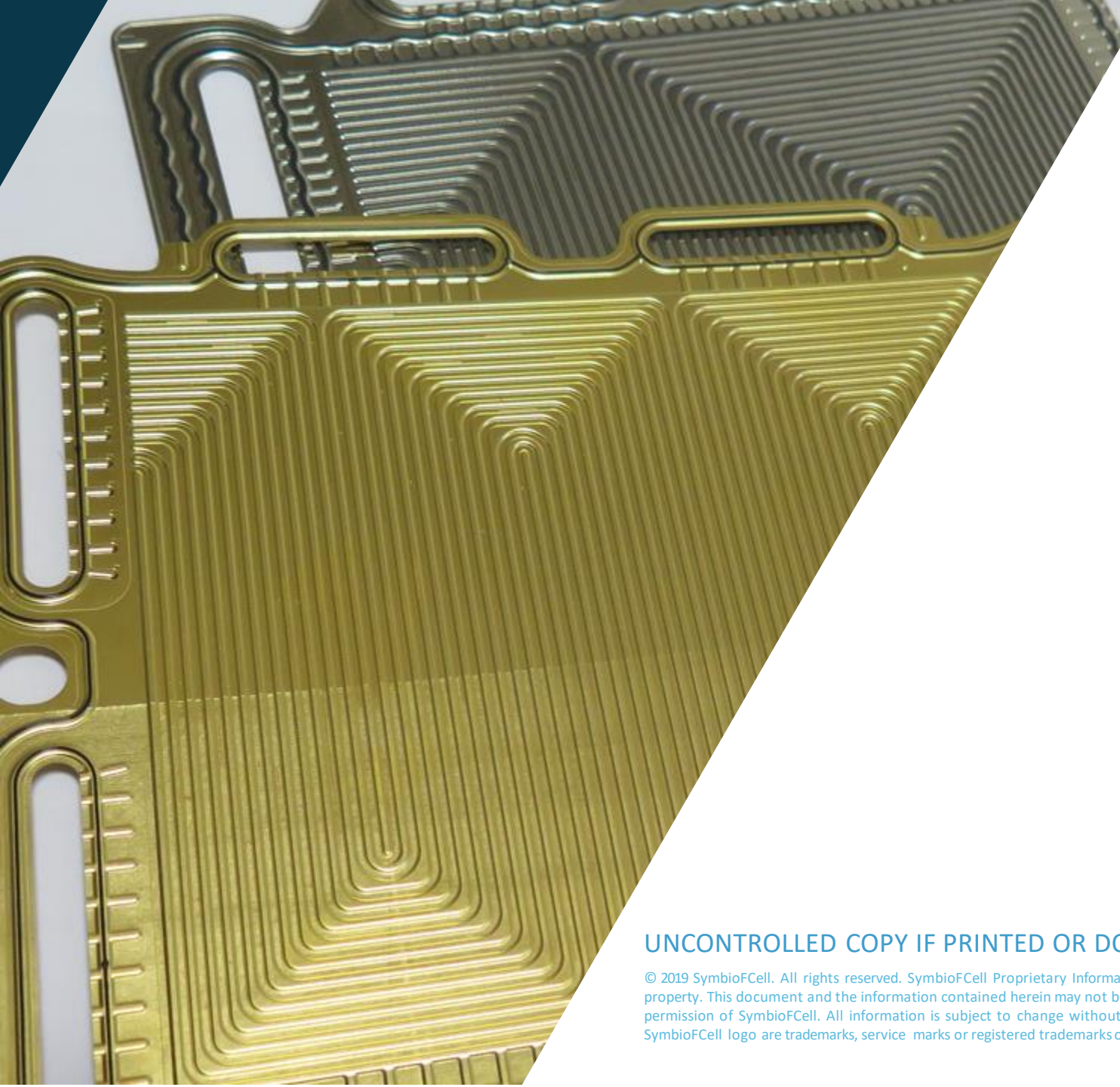


Benefits

- ▼ Best range
- ▼ No compromises on the load volume, with a reasonable additional weight
- ▼ Charging time five to ten minutes
- ▼ 56 kWh of additional energy in addition to a Master Z.E. 33 kWh battery



Renault Master Z.E. Hydrogen



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