



# FAURECIA HYDROGEN STRATEGY

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**faurecia**  
inspiring mobility

# Agenda

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FAURECIA INTRODUCTION

2

H<sub>2</sub> AUTOMOTIVE MARKET CONTEXT

3

FAURECIA H<sub>2</sub> PRODUCT AND BUSINESS ROADMAP

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WRAP-UP

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Q&A

# Faurecia: A top ten global automotive technology supplier

**€17.8bn**  
of sales\*

**4**

activities

- > Clean Mobility
- > Seating
- > Clarion Electronics
- > Interiors

**1 in 3**

vehicles in the world equipped  
with a **Faurecia technology**

**A trusted partner**  
for all **automakers, commercial vehicles**  
and **high horsepower**



**115,500**

employees of **102 nationalities**  
in **37 countries**

**248**  
Plants

**37**  
R&D centers

**Convictions & Values**  
for **sustainable development**

*\*At December 31, 2019*

# Faurecia Clean Mobility: World leader in emissions reduction

MARKET DRIVERS

## CLIMATE CHANGE GLOBAL WARMING



- Stricter CO<sub>2</sub> emission regulation
- Electrification of vehicles
- Lightweight solutions
- Alternative Energy - Renewables

## AFFORDABLE MOBILITY



- Mobility for everyone
- Micro mobility rise
- Growth in emerging markets

## URBANIZATION



- Low emission zones
- Air quality improvement in cities
- Zero emission mobility solutions
- Stricter local pollution control

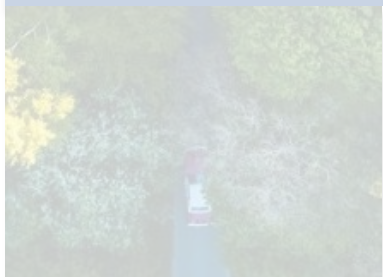
## DIGITALIZATION



- Connected cars
- Semi-autonomous driving
- Ride sharing

OUR SOLUTIONS

## ULTRA LOW EMISSIONS



- CO<sub>2</sub> reduction
- Emissions reduction
- Packaging optimization & Noise reduction

## ZERO EMISSION - HYDROGEN



- Hydrogen storage systems
- Hydrogen fuel-cell stack

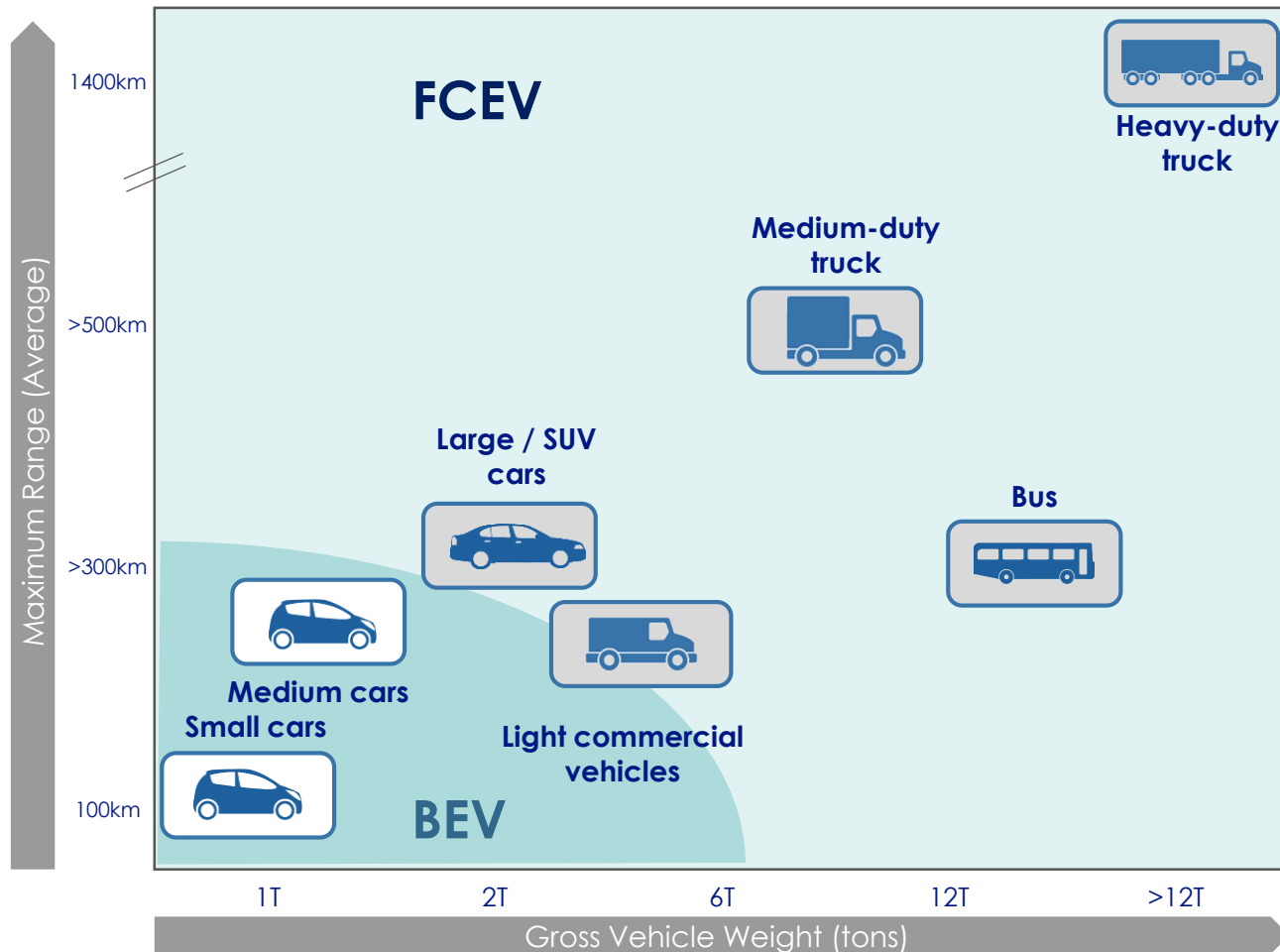
## COMMERCIAL VEHICLES & INDUSTRIAL



- Large engine emission reduction
- Ultra low NO<sub>x</sub>
- Fuel cell systems

# Fuel Cell Technology: A complement to battery-electric vehicles targeting larger vehicles with strong momentum

## FCEV VS. BEV: CO-EXISTENCE DRIVEN BY USE-CASE

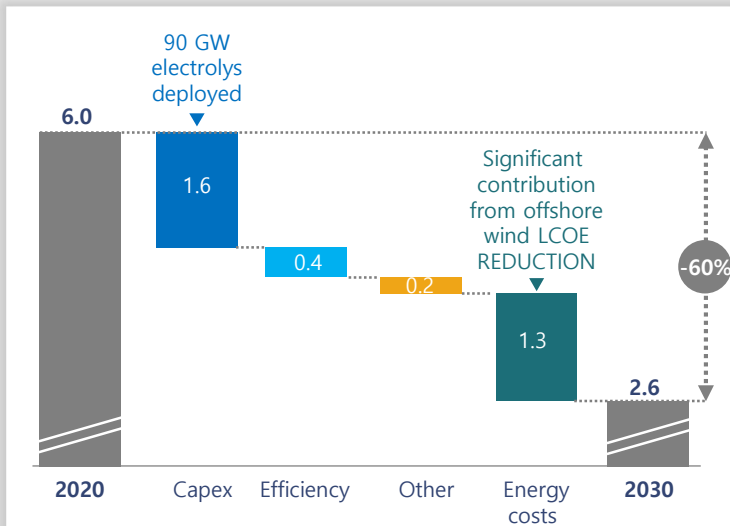


- Fuel cell more suitable for larger vehicles and applications: SUV, LCV, CV, large off-highway
  - Superior TCO potential versus BEV
  - Increased **convenience**: longer range, short refueling time
- Major players take position in fuel cell market
  - **HYUNDAI/TOYOTA** to develop and commercialize FC Electric powertrains
  - **PSA** and **RENAULT** to commercialize light commercial vehicle
  - **CNH/ IVECO** to produce trucks in EU in partnership with Nikola
  - **GM** to produce pick-up trucks in partnership with Nikola
  - **BOSCH** licensed Powercell technology
  - **CUMMINS** acquired Hydrogenics
  - **VOLVO** and **DAIMLER** forming JV to produce large scale series of Fuel Cells

# Fuel Cell Technology Costs: Significant drop forecasted all along the value chain through technical optimization and scaling



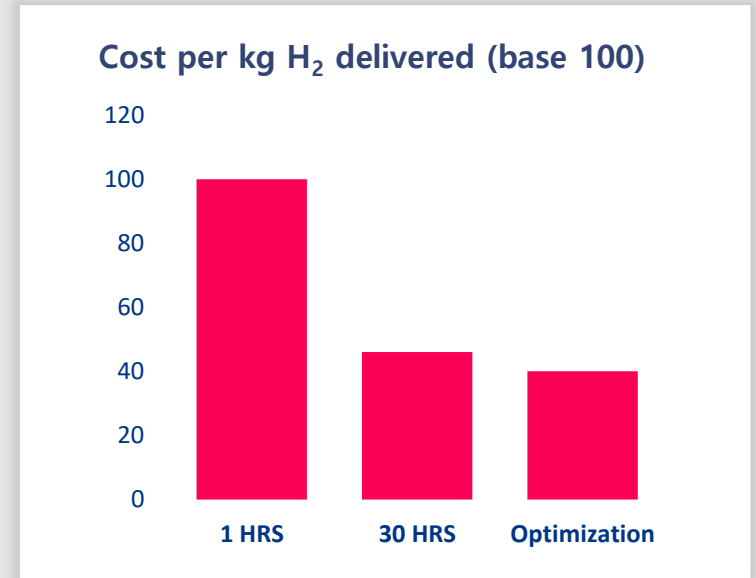
## GREEN H<sub>2</sub> COST ROAD MAP REDUCED BY 60% BY 2030



## AN OPTIMIZED SOLUTION FOR EACH USE CASE

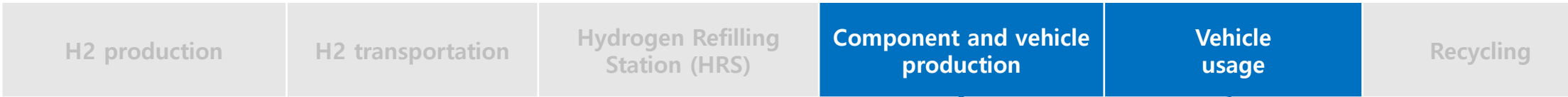


## 50% SAVINGS THANKS TO SCALING



# Fuel Cell Technology Costs: Significant drop forecasted all along the value chain through technical optimization and scaling

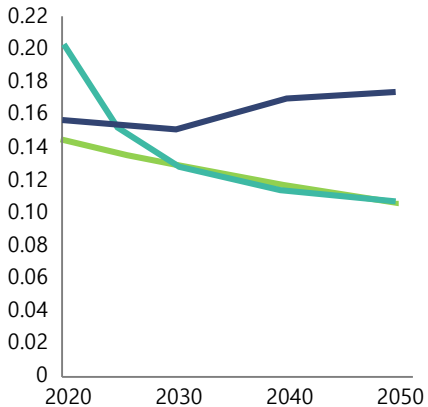
LIFE CYCLE



## TCO FOR LCV AND TRUCKS

### LCV FOR URBAN TRANSPORTATION

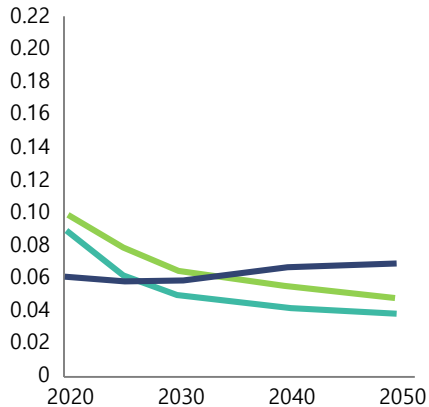
USD/ton per km



Range in tank 300km

### MDT FOR REGIONAL TRANSPORTATION

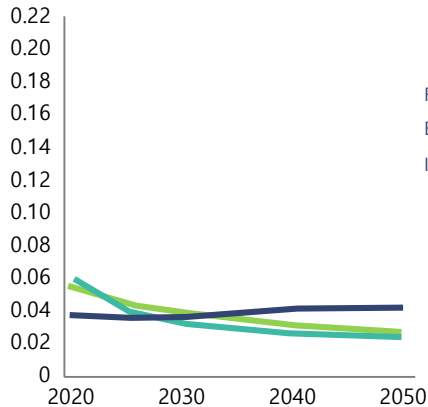
USD/ton per km



Range in tank 500km

### HDT FOR LONG-HAUL TRANSPORTATION

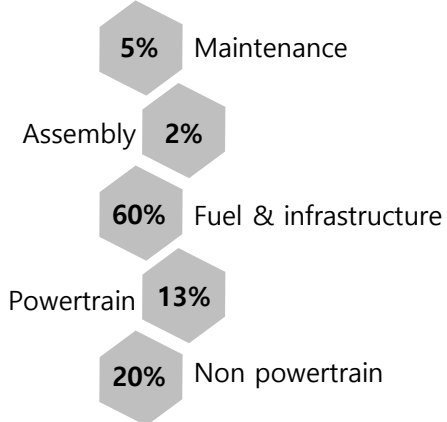
USD/ton per km



Range in tank 600km

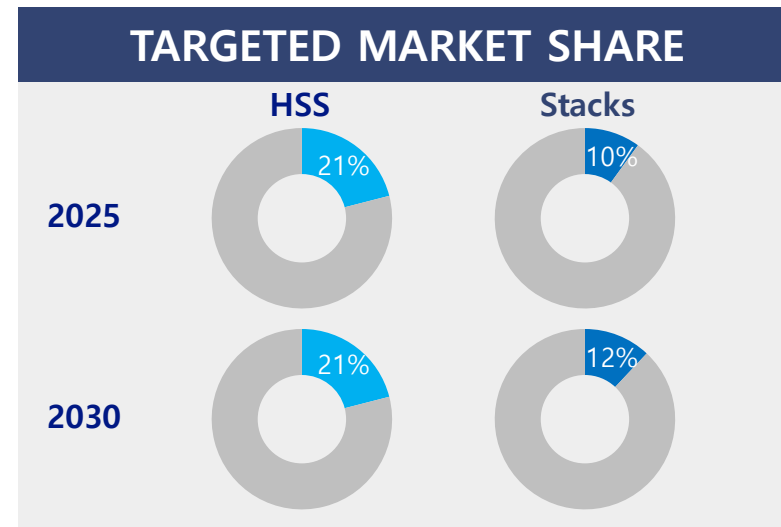
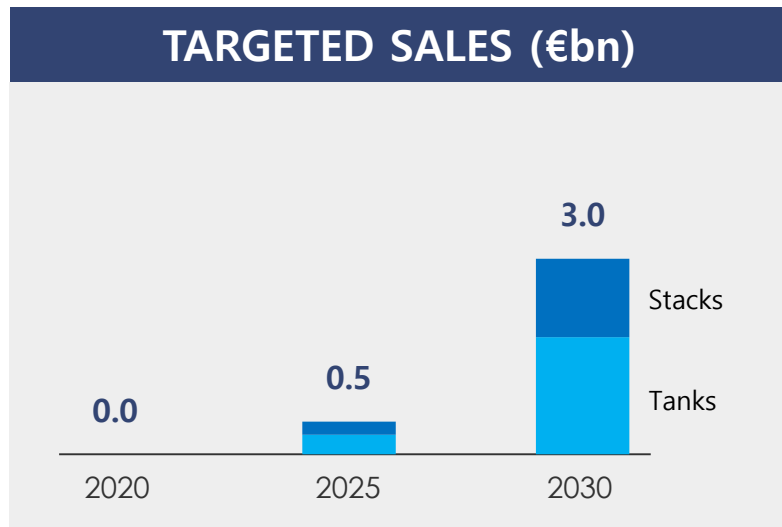
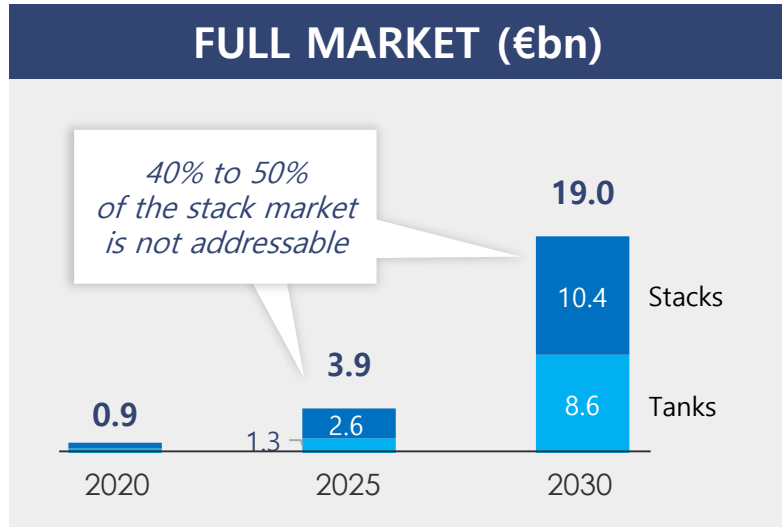
FCEV  
BEV  
ICE

### COST BUILD-UP FOR A MEDIUM DUTY FUEL CELL TRUCK IN 2030



Source: McKinsey for Future Mobility; CARB Advanced clean truck; ICCT

# Faurecia Hydrogen Business Summary: Targeting >20% market share with €3bn sales by 2030



- ### KEY PRIORITIES
- Accelerate H<sub>2</sub> cost decrease:** carbon fiber, process cost
  - Secure first wave of business acquisition:** Light Commercial Vehicle in Europe, Commercial Vehicle in China
  - Address unique Commercial Vehicle stack performance requirement**

\*Kilowatt

Note: all market values and FCM sales data is pre-COVID and assumes baseline electrification scenario



# Faurecia Fuel Cell Solutions: Addressing the full fuel cell system value for all transport applications, directly or through Symbio (JV with Michelin)

## 1. TANK sub-system

## 2. STACK sub-system

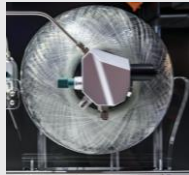
Complete H2 Fuel Cell System

### Hydrogen Storage System (HSS)

H2 tank

Valve

Other components



% of Total Value

40 %

faurecia

### Fuel Cell Stack system

### Auxiliaries

Bipolar plates

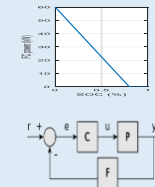
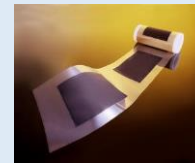
MEA  
Membrane  
Electrode  
Assembly

Endplate  
+ other  
components

Interfaces  
and controls  
laws

Electric &  
Electronics

Supply  
unit



35 %

25 %

SYMBIO  
A FAURECIA MICHELIN HYDROGEN COMPANY

Solutions cover all types of on-road applications:



# Main active programs: Most dynamics segments are addressed with H<sub>2</sub> leading OEMs with SOPs in 2021

## FUEL CELL STACK PACK

Already 3M km of real on-road vehicles experience on more than 30 fleets

LV



CV



## HIGH PRESSURE STORAGE SYSTEM



Co-development with German OEM (PC)



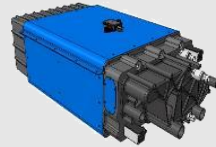
LCV fleet European OEM

# Product USP: High-performance with aggressive cost roadmaps

## FUEL CELL STACK PACK

### SYMBIO

A FAURECIA\_MICHELIN JV

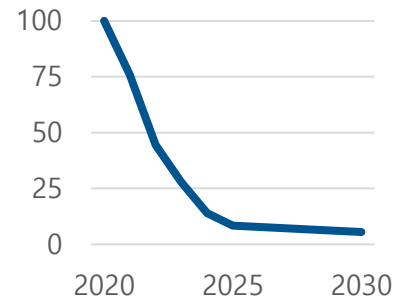


#### > Best in class power density

- By volume : 4.2kW/l vs today's best 3.1kW/l
- By weight : 2.6kW/kg vs today's best 2.0kW/kg

#### > Improved stack efficiency to 55% vs 50% today

Stack pack price  
(value 100 in 2020)



## HIGH PRESSURE STORAGE SYSTEM

### FAURECIA

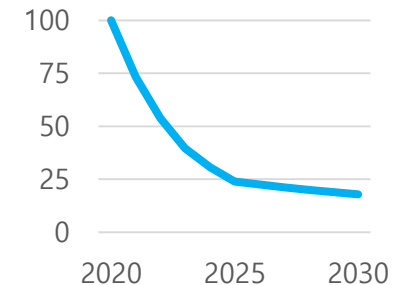


#### > Best in class weight ratio


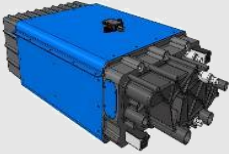
- >7% H<sub>2</sub> weight versus tank's weight whereas today benchmark at 5.7%
- 25% weight saving

#### > Better reliability due to anti-collapse features

Hydrogen storage system price  
(value 100 in 2020)



# Future Product Developments: Opportunities for more safety, performance and CO<sub>2</sub> efficiency

	LESS	SMARTER	LONGER
<b>H<sub>2</sub> STORAGE SYSTEM</b> 	<ul style="list-style-type: none"><li>&gt; Increase weight ratio from 5,7 to 7% gas vs tank</li><li>&gt; Remove the liner</li></ul>	<ul style="list-style-type: none"><li>&gt; Continuously measure the tank's health with sensors to optimize the design and improve safety</li><li>&gt; Use bio-based materials to produce carbon fiber</li></ul>	<ul style="list-style-type: none"><li>&gt; Reuse the tank for a second life</li><li>&gt; Develop recycled tank technologies with thermoplastic resins instead of thermoset</li></ul>
<b>STACK SYSTEM</b> 	<ul style="list-style-type: none"><li>&gt; Increase efficiency between 5 to 10%</li><li>&gt; Reduce size by 20%</li><li>&gt; Reduce Platinum content by &gt; 50%</li></ul>	<ul style="list-style-type: none"><li>&gt; Dual power (FC Stack /Battery) to optimize vehicle energy management : reduce cost, optimize durability, improve stack efficiency</li></ul>	<ul style="list-style-type: none"><li>&gt; Reach 7.000 to 20.000 hours stack durability depending on the application</li><li>&gt; Renew the stack for a second life especially for trucks</li><li>&gt; Recycle platinum</li></ul>

## Wrap-up

- > **Hydrogen is getting recognized as a necessary technology to decarbonize the economy in general, and transportation in particular**
- > **Faurecia invests heavily to address the full Hydrogen fuel cell system value for passenger and commercial vehicles as well as off-road applications**
- > **Our current focus on fuel cell stacks and hydrogen tanks should generate €3bn in sales in 2030 – several contracts have already been signed with major OEMs**
- > **Further hydrogen products may be targeted as the market develops and new opportunities emerge**

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