

SYMBIO

—
ZERO EMISSION MOBILITY
SOLUTIONS

SYMBIO: A NEW GENERATION AUTOMOTIVE EQUIPMENT SUPPLIER

January 2019

ACCESS TYPE RESTRICTED

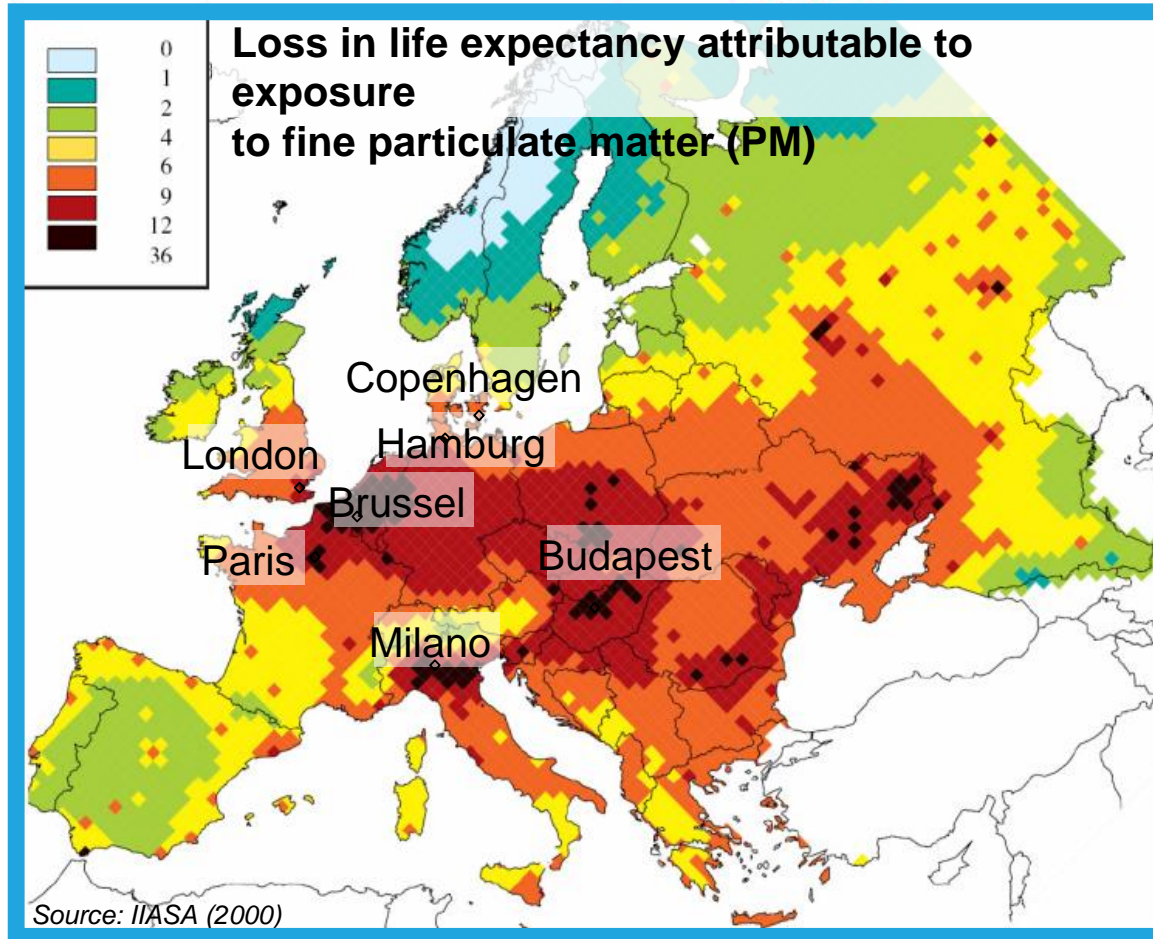


Somewhere
in Asia ?

Welcome to Paris!



Major cities cannot ignore societal need for better Air Quality



Particulate Matter is only one item on a list that also includes : Ozone, NOx, SOx, Polycyclic aromatic hydrocarbon, CO, etc. These pollutants increase the risk of cancers², asthma, emphysema, heart disease, CVA (stroke), and other potentially lethal conditions.








(1) PM: Particulate Matter
(2) IARC: Diesel Engine Exhaust is Carcinogenic (June 12, 2012)

The entry of duty vehicles to city centers is more and more restricted

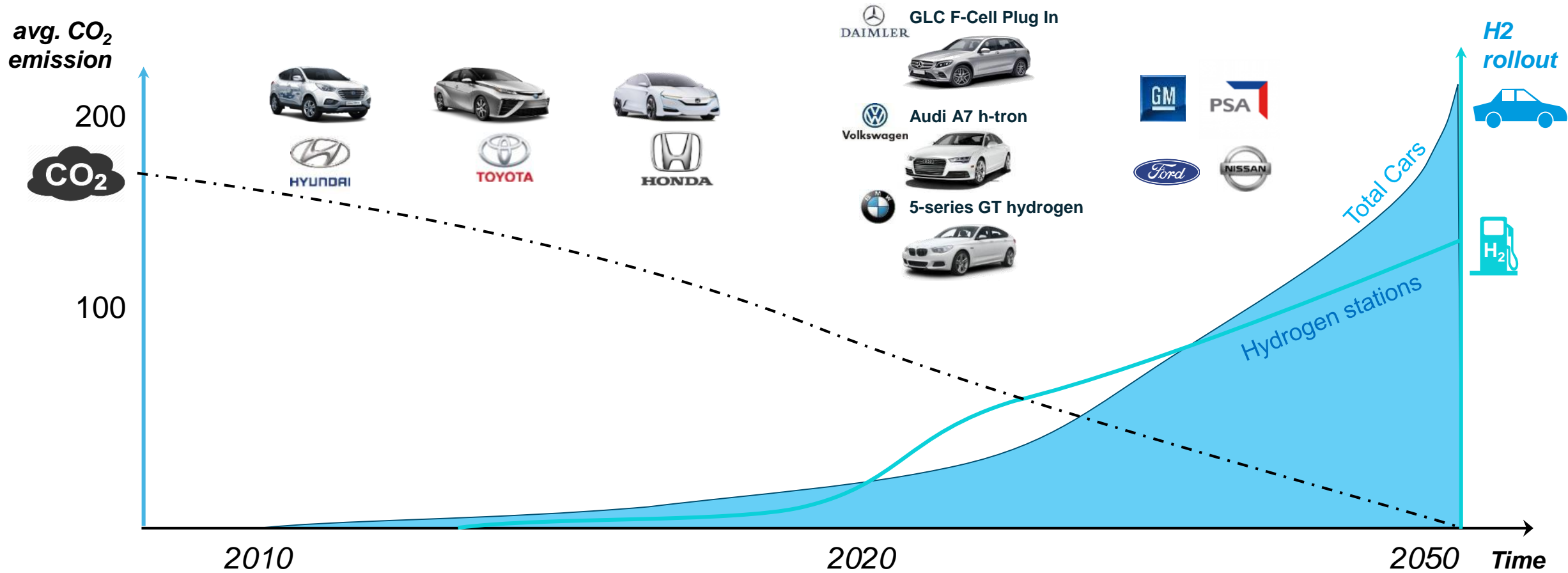


A real headache for delivery and service companies

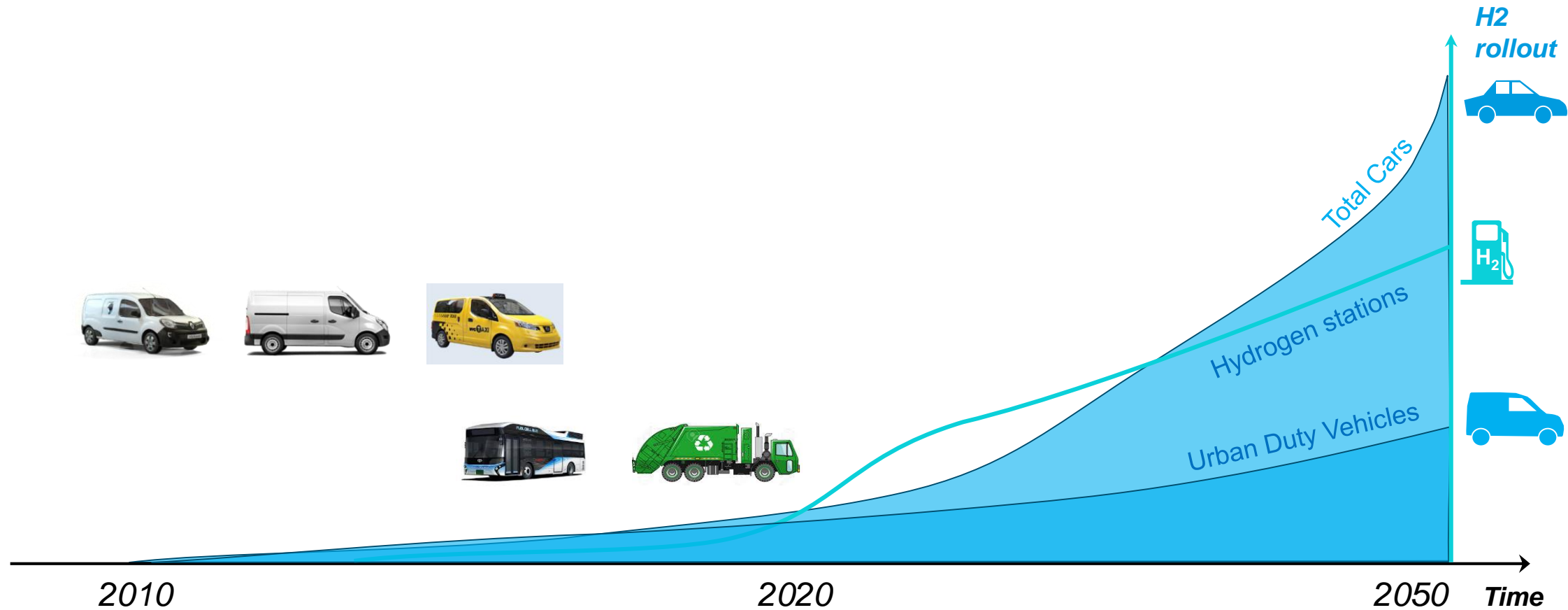
Electric Vehicles are the preferred solution to reach Zero CO₂ and Zero Emission

	Impact on vehicle platforms	French emission labelling <i>CRIT'Air</i>	Air quality	Carbon footprint Well to Wheel
	Electric platform design		 <p>Pure water only</p>	<p>Zero CO₂ With renewables</p>
				
	Minor adaptations		 <p>Internal Combustion Engine</p>	<p>60% less CO₂</p>

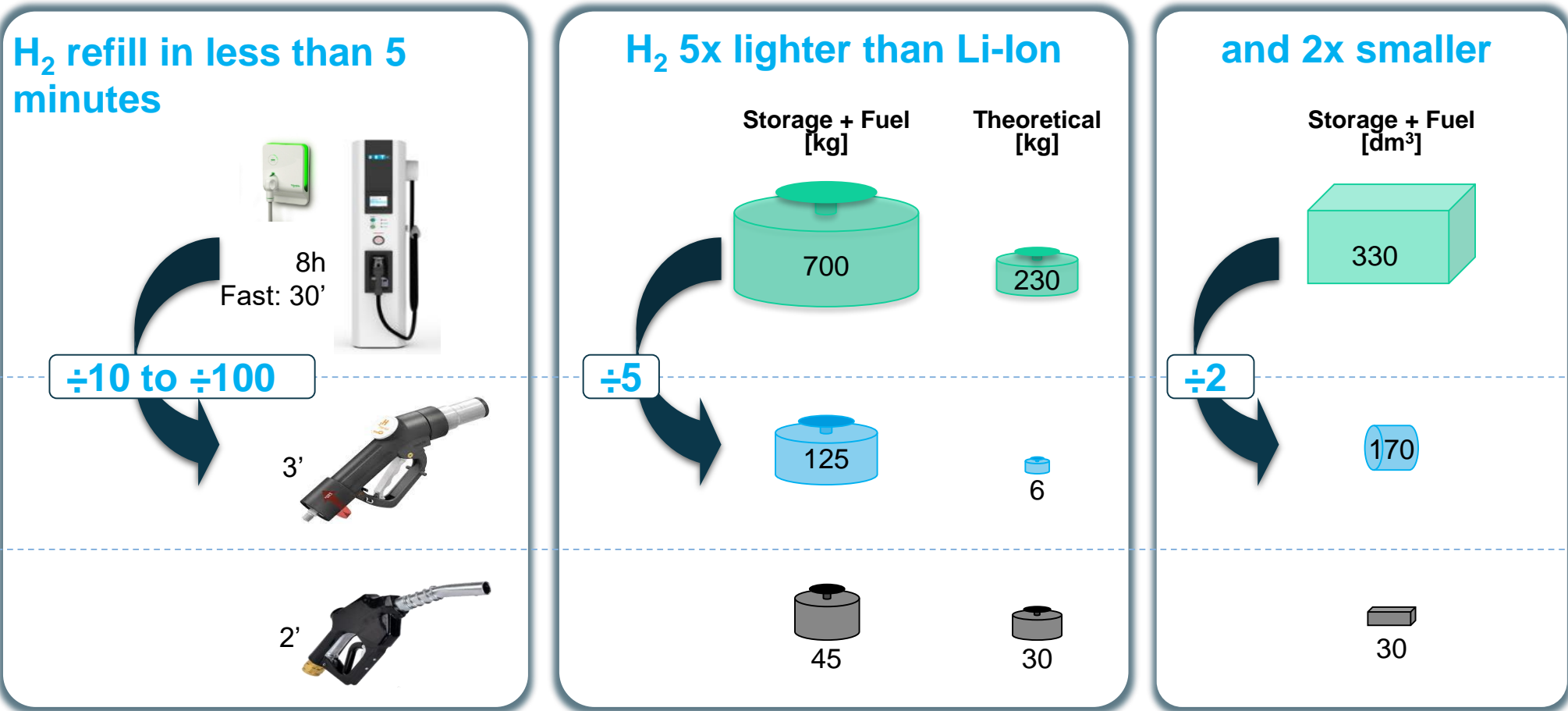
OEMs prepare for massive rollout of H2 Passenger cars...



...and market is emerging on urban duty vehicles, in line with Symbio core focus



Hydrogen Fuel Cell brings additional performances to Electric Vehicles...



for 500 km range, compressed H₂ 700 bar

Hydrogen is safe with EC 79/2009 and EU 406/2010 regulations

2 major European texts regarding safety

- ▼ EC 79/2009 : type-approval of hydrogen-powered motor vehicles
- ▼ EU 406/2010 : implementing Regulation (EC) No 79/2009

Product safety features : Illustration with Kangoo ZE H2

- ▼ H₂ kit is installed in a protected area, inside the bodywork in a low position, apart of the battery
- ▼ Safety valve TPRD in connection with an exhaust venting on the roof
- ▼ Continuous monitoring of H₂ concentration, through multiple sensors in the kit and in the vehicle
- ▼ In case of collision of the vehicle, tank valve is closed
- ▼ In case of temperature elevation, tank is emptied in less than 1 min

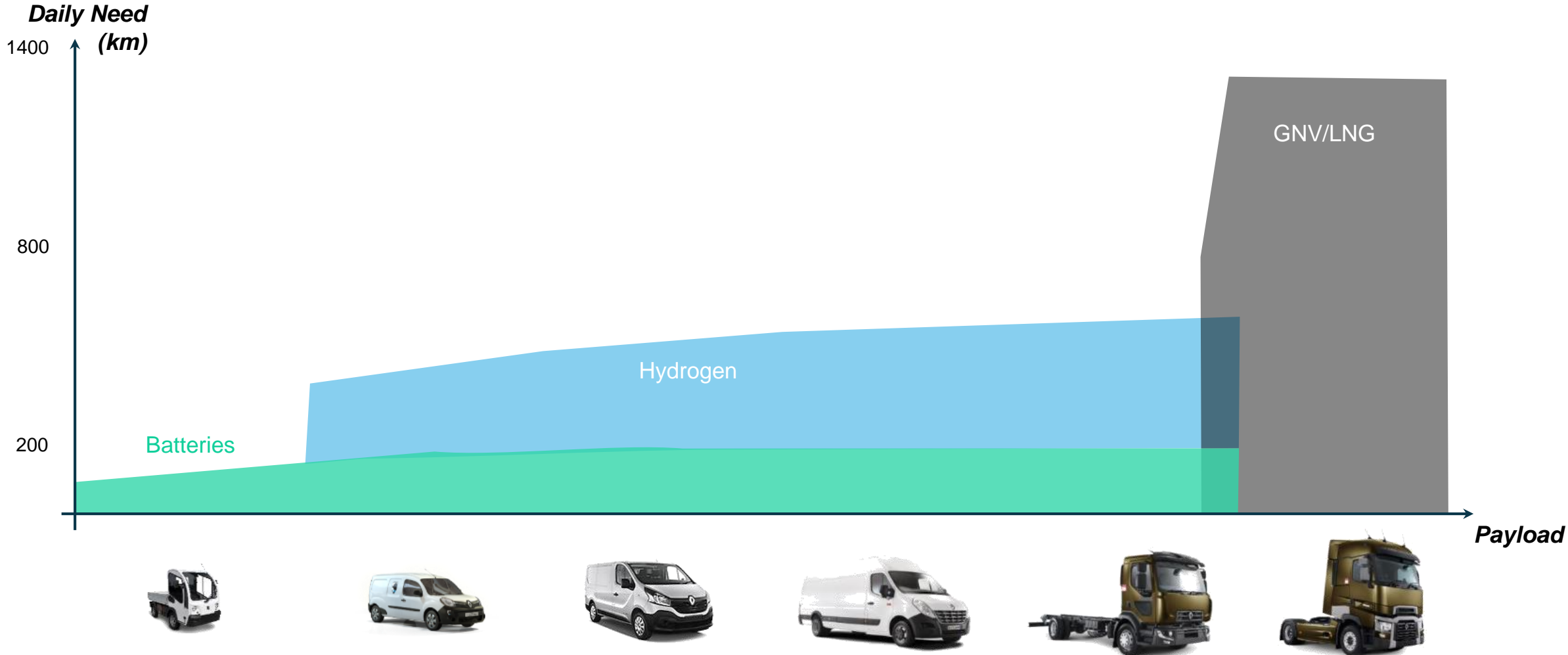


Firemen as well drive Hydrogen !

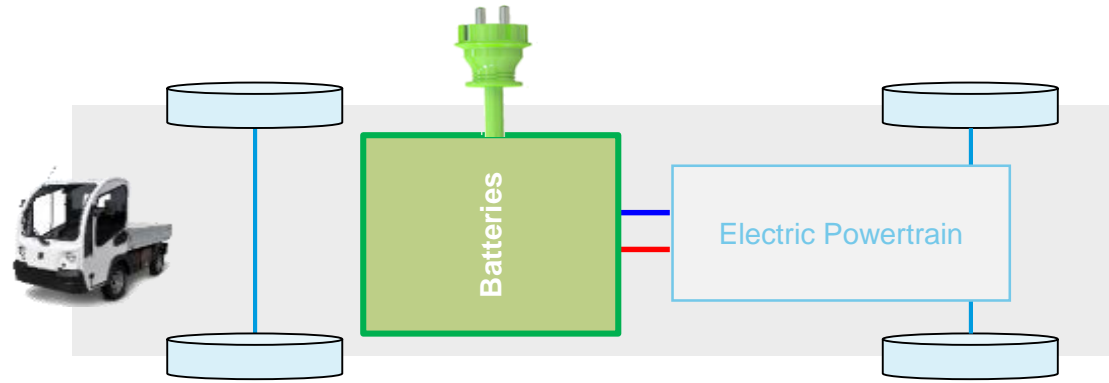


SYMBIO: ADD THE RELEVANT HYDROGEN SOLUTION TO
YOUR ELECTRIC VEHICLE

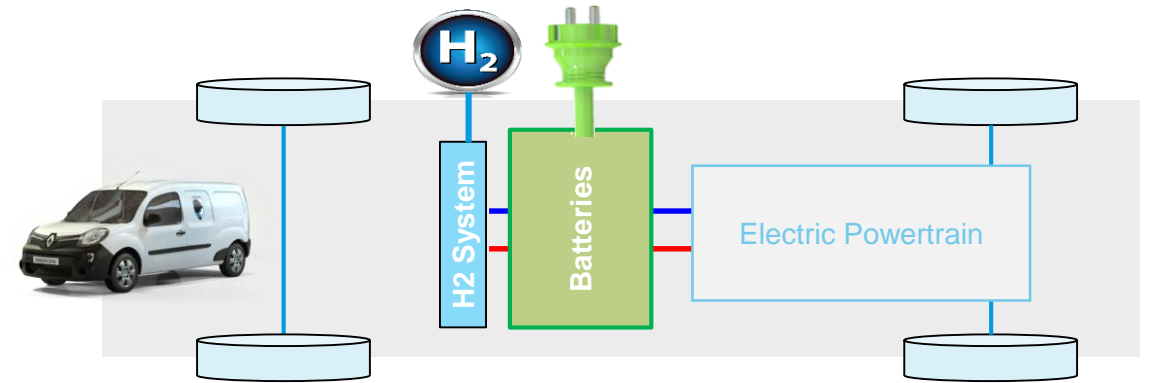
For duty vehicles, Hydrogen is relevant from small vans up to city Trucks...



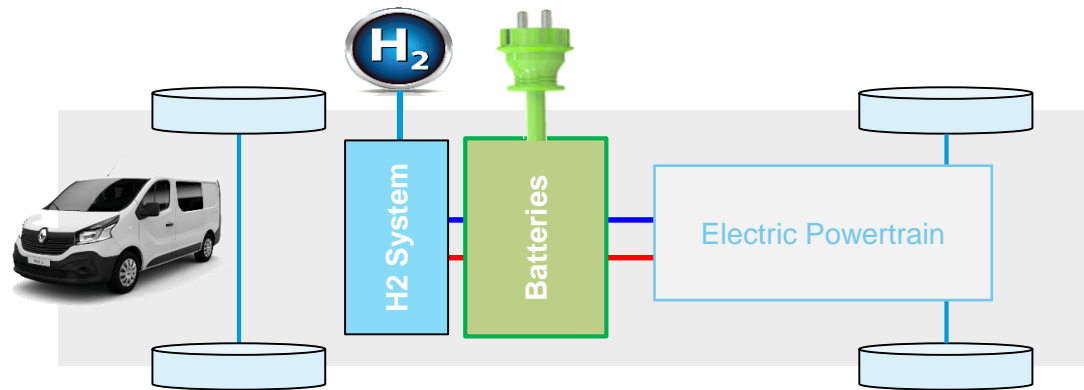
...with the appropriate architecture, from Range Extender to Full Power



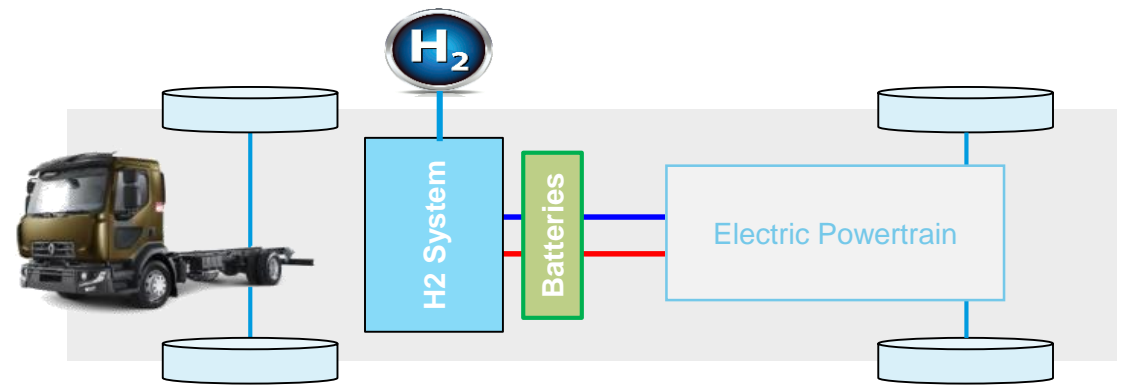
Battery Electric Vehicle (BEV)



Fuel Cell Range Extender (FCREEV)



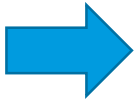
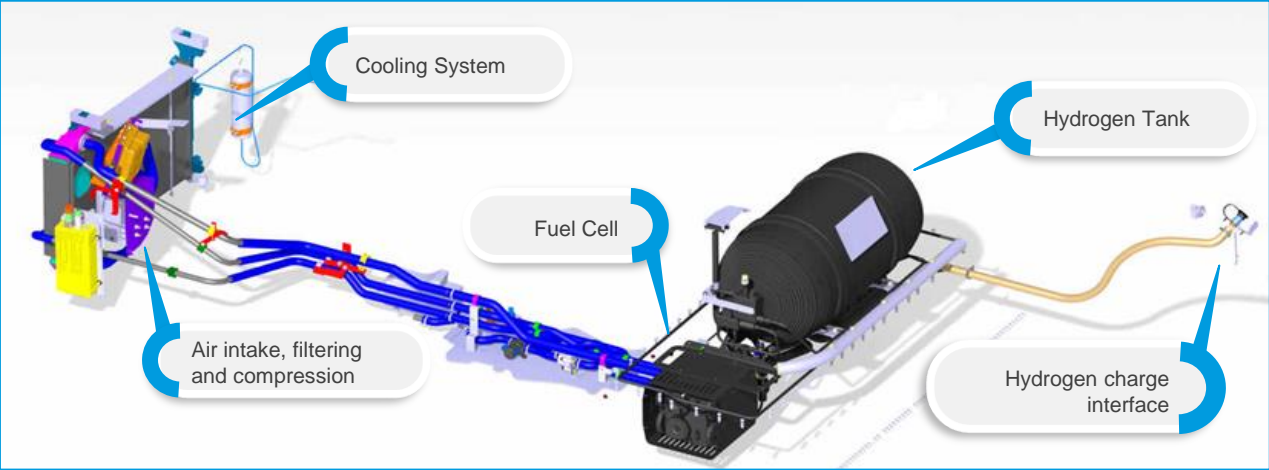
Plug-In Fuel Cell Electric Vehicle (PFCEV)



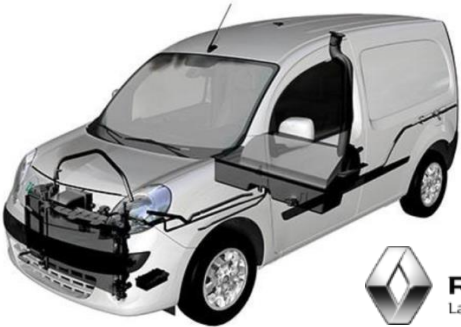
Full Power Hydrogen Vehicle (FCEV)

Symbio designs Fuel Cell Systems, to be specifically integrated in each Electric Vehicle

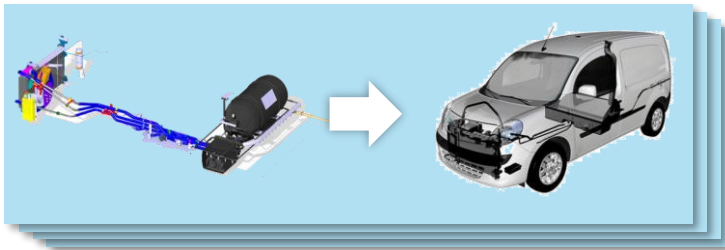
Hydrogen Range Extender for Kangoo ZE



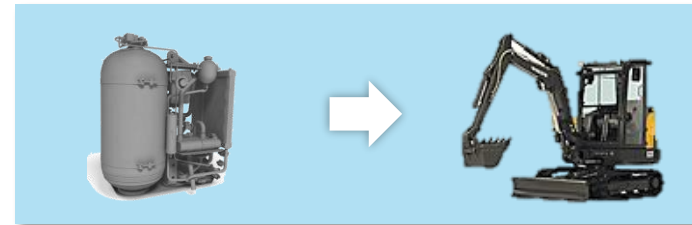
Kangoo ZE H2



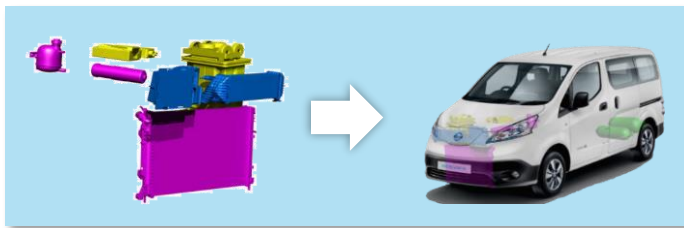
More than 10 successful Fuel Cell Systems developed and integrated



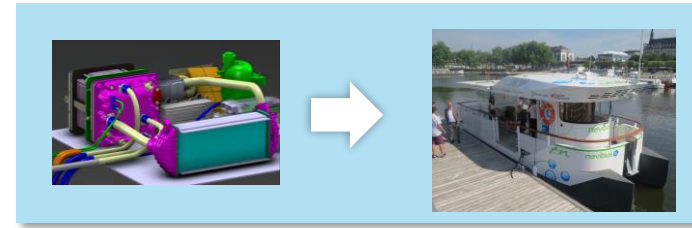
5 kW / 30kWh
(2 kg of H2)



5 kW / 30kWh
(2 kg of H2)



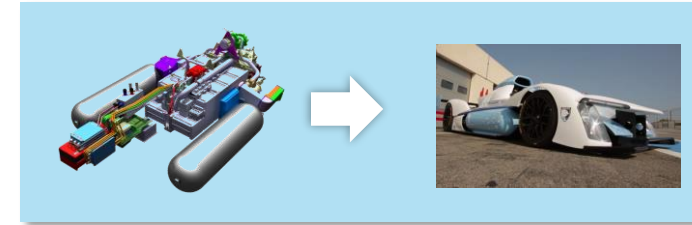
20kW / 45kWh
(3 kg of H2)



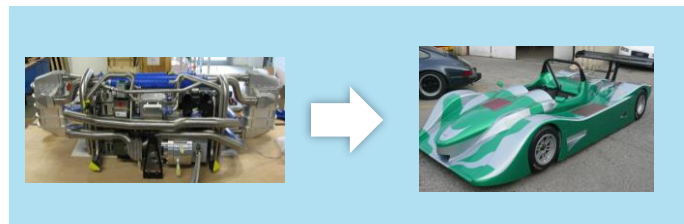
10 kW / 45kWh
(3 kg of H2)



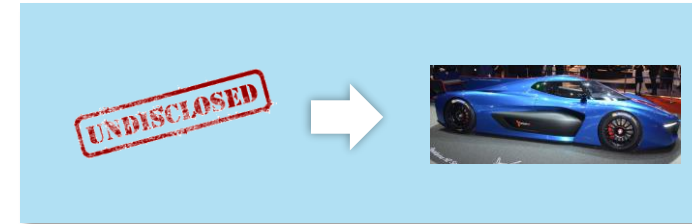
20kW / 60kWh
(4 kg of H2)



300 kW / 60kWh
(4 kg of H2)



100kW / 60 kWh
(4 kg of H2)



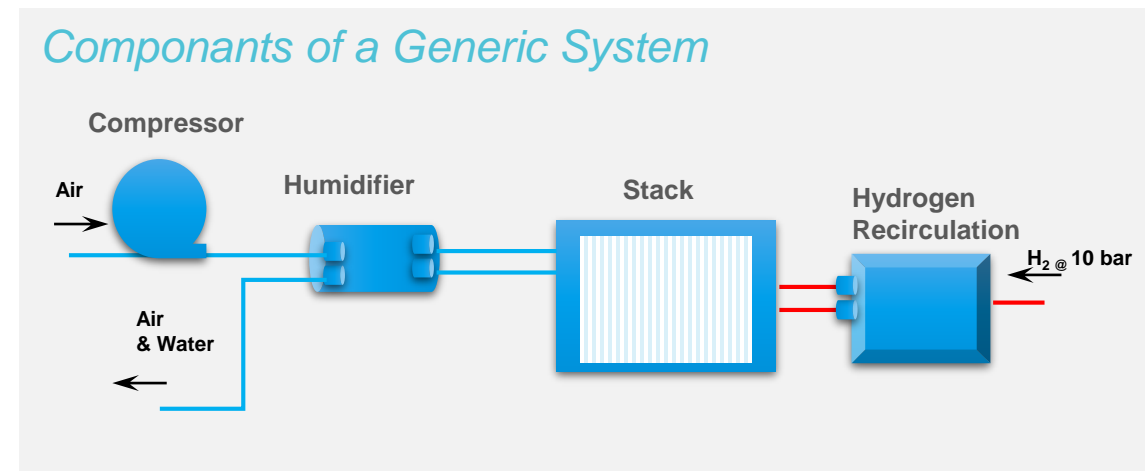
200 kW / 120kWh
(8 kg of H2)



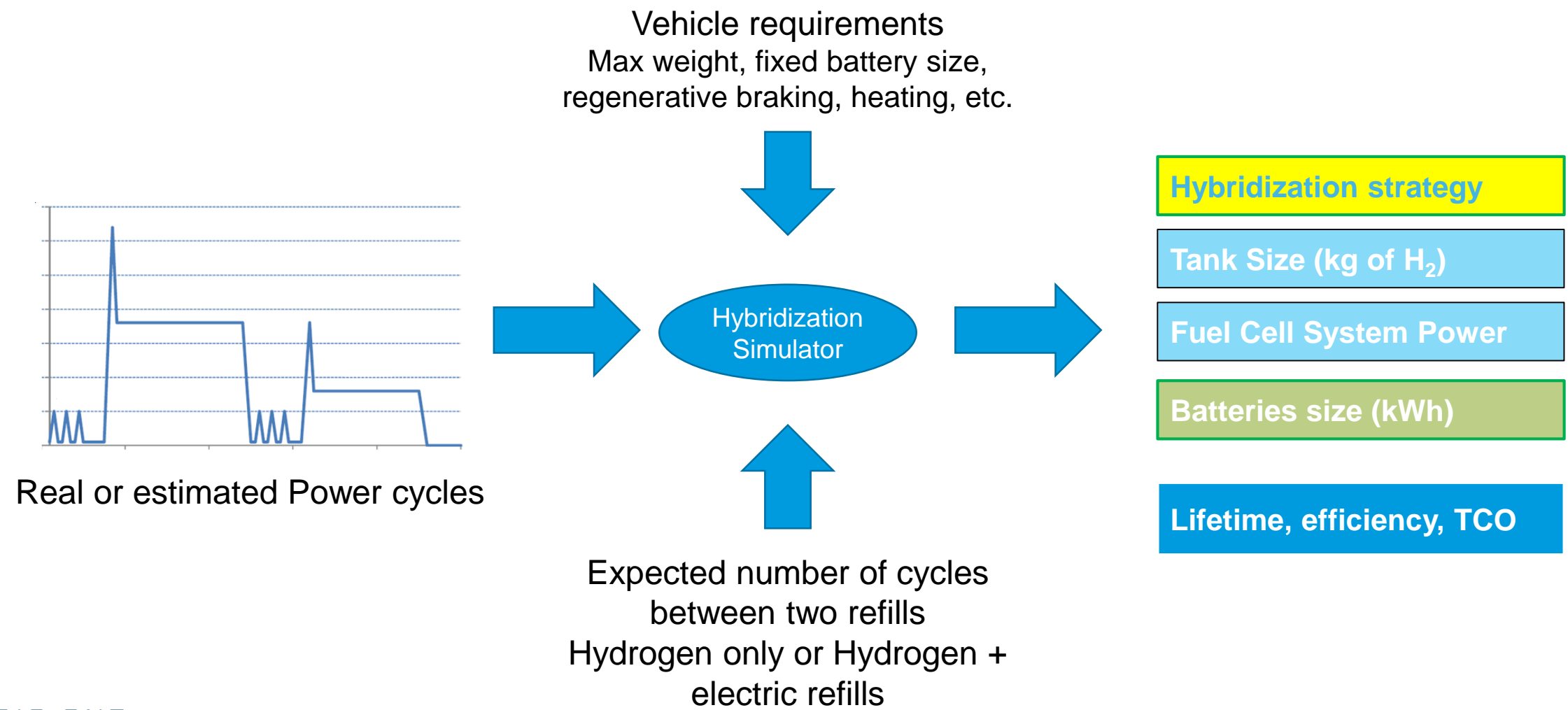
To reduce Fuel Cell System integration time, Symbio developed Generic Systems

Validated Generic Systems :

- ▼ 5 kW
- ▼ 10 kW
- ▼ 20 kW
- ▼ 40 kW
- ▼ 100 kW
- ▼ 200 kW
- ▼ 300 kW



Symbio developed hybrid simulation tools, methodology and software to fit each vehicle and customer



On top of H2Motiv Modules, Symbio proposes a panel of added value digital services

Symbio Digital Architecture:

- ▼ All Symbio Systems are connected in Wifi and 4G
- ▼ Cloud management for fleet data and services



Symbio Added Value Digital Services:

- ▼ Advanced Energy Management
 - ▼ Energy hybridization follow-up
 - ▼ Optimization of operational business Scheme
- ▼ Advanced Maintenance
 - ▼ Remote Software Support
 - ▼ Centralized statistics
 - ▼ Predictive maintenance

My Symbio Fleet

Fleets

Periode d'aggrégation des données

POUR TOUTES LES FLEETS

FLEET	Statut	Changement de statut	Changement de statut	Changement de statut	Changement de statut	Changement de statut	Changement de statut	Changement de statut
OP-000-001	Actif	2019-01-01	2019-01-01	10 000	100	2019-01-01	200	10
OP-000-002	Actif	2019-01-01	2019-01-01	7 500	100	2019-01-01	240	8
OP-000-003	Actif	2019-01-01	2019-01-01	2 000	100	2019-01-01	14	1

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Hydrogen mobility at a glance



100 % Zero Emission

Hybrid Electric + Hydrogen

High energy density

Augmented operational autonomy > 300 kms

Filling time <5 min

UE homologation et manufactured in France

250+ cars on road in France and Europe





02

CREDENTIALS

Symbio is the world's leading provider of Fuel-cell Systems for Light Commercial Vehicle fleets

Full package with high level of service

- ▼ Same daily range, no winter effect
- ▼ No pollutant, no CO₂
- ▼ Availability equivalent to diesel
- ▼ Symbio service support
- ▼ Automatic Hydrogen Billing
- ▼ Predictive maintenance

With no change in Cost of Ownership

Based on a kit integrated in **standard, mass-produced electric vehicles** starting with Renault Kangoo ZE



European Certification
Product available within Renault dealers

As of today, more than 30 fleets, about 250 vehicles on the road

Transport



Public Services



Services & Bank



Industry & Construction



Leasing Companies



ZE Market perspectives – Voice of the Customer (verbatimims from our First 250 End-Users)



Urban access constraints will make ZE mandatory for LCVs customers in 2020

BEVs have noticeable usage benefits in terms of driving...

... but they will still have blocking weaknesses for some usages

- ▼ Range in cold weather conditions
 - ▼ Battery performances – 30% range
 - ▼ Heating -10% range
- ▼ Charging
 - ▼ 1h charge = only 35 kms
 - ▼ Investments on charging spots too heavy for rented facilities and not always compliant with the working mode (DHL vehicles « at wharf » for the night, or vehicle at the driver's home, ...)

ZE will also be necessary for medium and large vans with higher constraints in terms of range and charging, and H2 Range Extender looks as a good solution



PARTNERS

Symbio's business model is based on 4 Pillars, supported by strong industrial partners



System design, Control command & Digital services

Fuel Cell Syst.
Components



Vehicle
integration



Kit
manufacturing

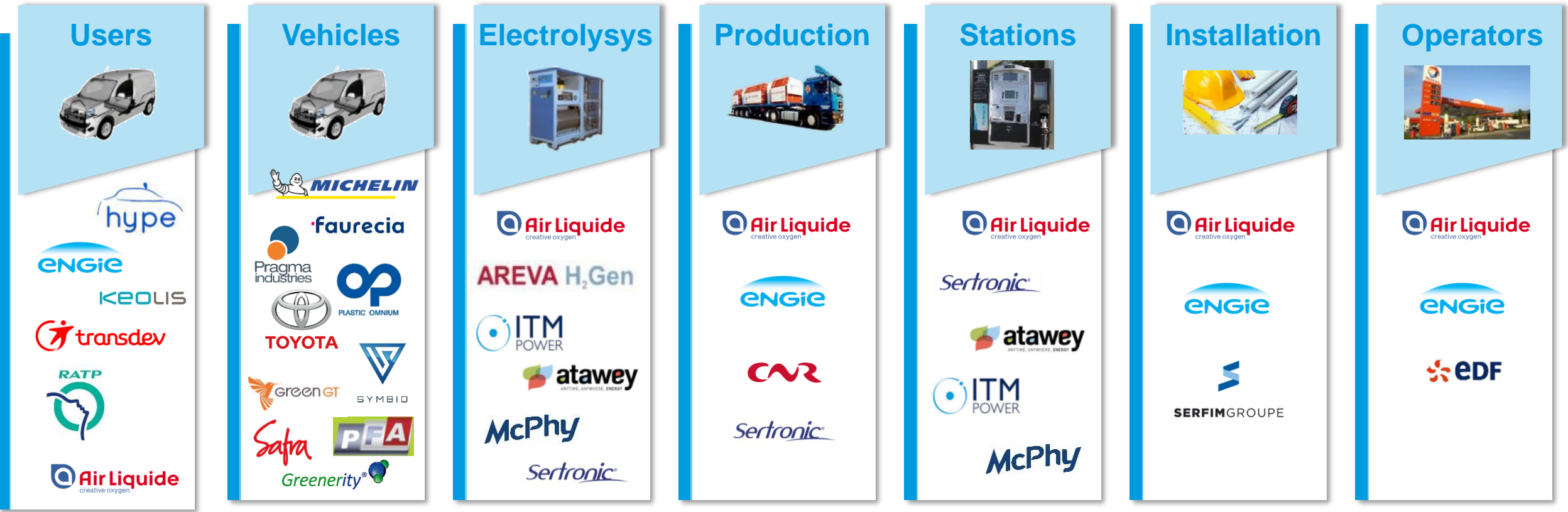
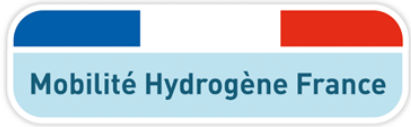


Vehicle
installation



Hydrogen production & infrastructure

The industrial consortium H2 Mobility France develop the H2 ecosystem



Laboratories, Consultants and Associations

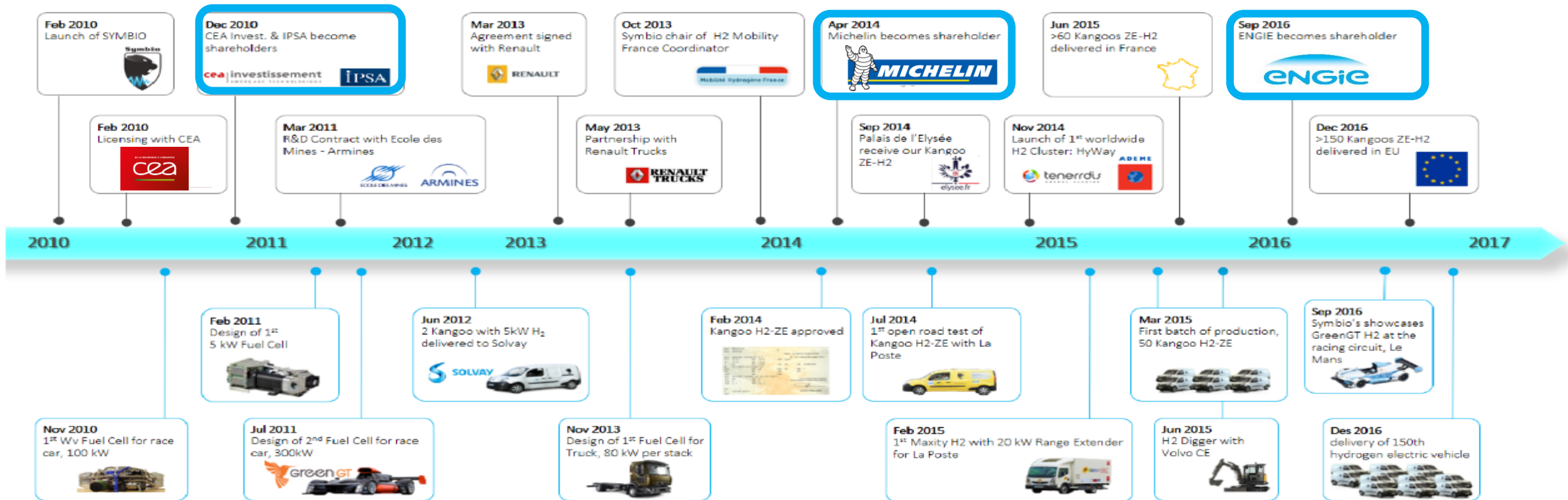




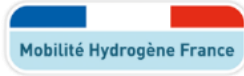
04

BACKGROUND

Created in 2010, Symbio based its developments on key players partnerships



Our strong French and EU public affairs help H₂ market ramp-up through regulation and EU Programs





MERCI !



SYMBIO

—
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SOLUTIONS

SYMBIO.FR

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