



13/12/2017

OVERVIEW of CATHyOPé

Founded in 2008, GreenGT designs and develops hybrid (electric-hydrogen) propulsion systems. Our focus on high-power and long cruising range is ideally serving transport markets. To demonstrate the effectiveness of its systems, GreenGT is developing racing prototypes.

OUR CORE VALUES

- | | |
|--|---|
|  Boldness |  Scientific rigour and honesty |
|  Passion |  Necessity to innovate |
|  Independence |  Respect for confidentiality |

OUR TEAM

Christophe RICARD

*President,
Major Shareholder
Former CEO of OM Pharma
(biotech).*

Jean-François WEBER

*Co-Founder, CTO,
Head of R & D.
Ex CEO Mader Racing
(Mecachrome)*

Jean-Michel BOURESCHÉ

*Marketing Director,
In charge of Sport Activities
Founder of JMB Racing (1995)
14 international Titles*

OUR INFRASTRUCTURES

GreenGT relies on 2 entities with high added-values: GreenGT SA, Switzerland-based laboratory, and GreenGT Technologies, a research and development unit located in South of France, neighbouring the race track "circuit Paul Ricard"



DÉMONSTRATORS & CONCEPT CARS

1. GreenGT 200kW (2009)
2. Citroën Survolt (2010)
3. GreenGT 300kW (2011)
4. GreenGT H2 (2015)
5. Pininfarina H2 Speed *powered by* GreenGT (2016)



HEAVY DUTY TRUCKS

6. Renault Maxity Electric (2015)
7. H2 Range Extender @Maxity (2015)
8. GreenGT Electric Motor (2017)
300kW to 720kW for trucks



Next heavy-duty application:
Trucks, Coaches and buses



Our perception of the world of HD


- Supermarkets moving Downtown
- E-trade and new hubs
- On-line shopping : game changer

Delivery patterns are changing



Relentless TCO competition

- Fuel price fluctuating but upward trend
- Rest-on-parking time: QUICKEST Refuel
- Keep maintenance + warranty cost low


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- Carbon Tax , ETS system
 - 2030 Winter package: -40 % CO2
 - Behind CO2: dependency to fossil fuel

Future CO2 Regulations



Regulation Hurdles to enter large EU market

Ever Stricter Emission control

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- EURO 7 for trucks: investment ahead
 - Low emission zones (or ULEZ+ ZEZ)*
 - Congestion charges in Cities (London)

* Zones à faibles émissions (Low Emission Zones - LEZ) à travers l'Europe (Les) ADEME

HIGH-POWER HYDROGEN IS A KEY ENABLING TECH

- H2 trucks capable of long-range
- Flexible design to serve new markets
- Can operate quietly in resident area

Delivery patterns
are changing



- Decarbonized well to wheel balance
- Truly Zero-CO2 with green H2 (eg DK)
- Image vector + No CO2 taxation

Future CO2
Regulations



**OUR SOLUTION:
HYDROGEN HIGH POWER**

Relentless TCO
competition



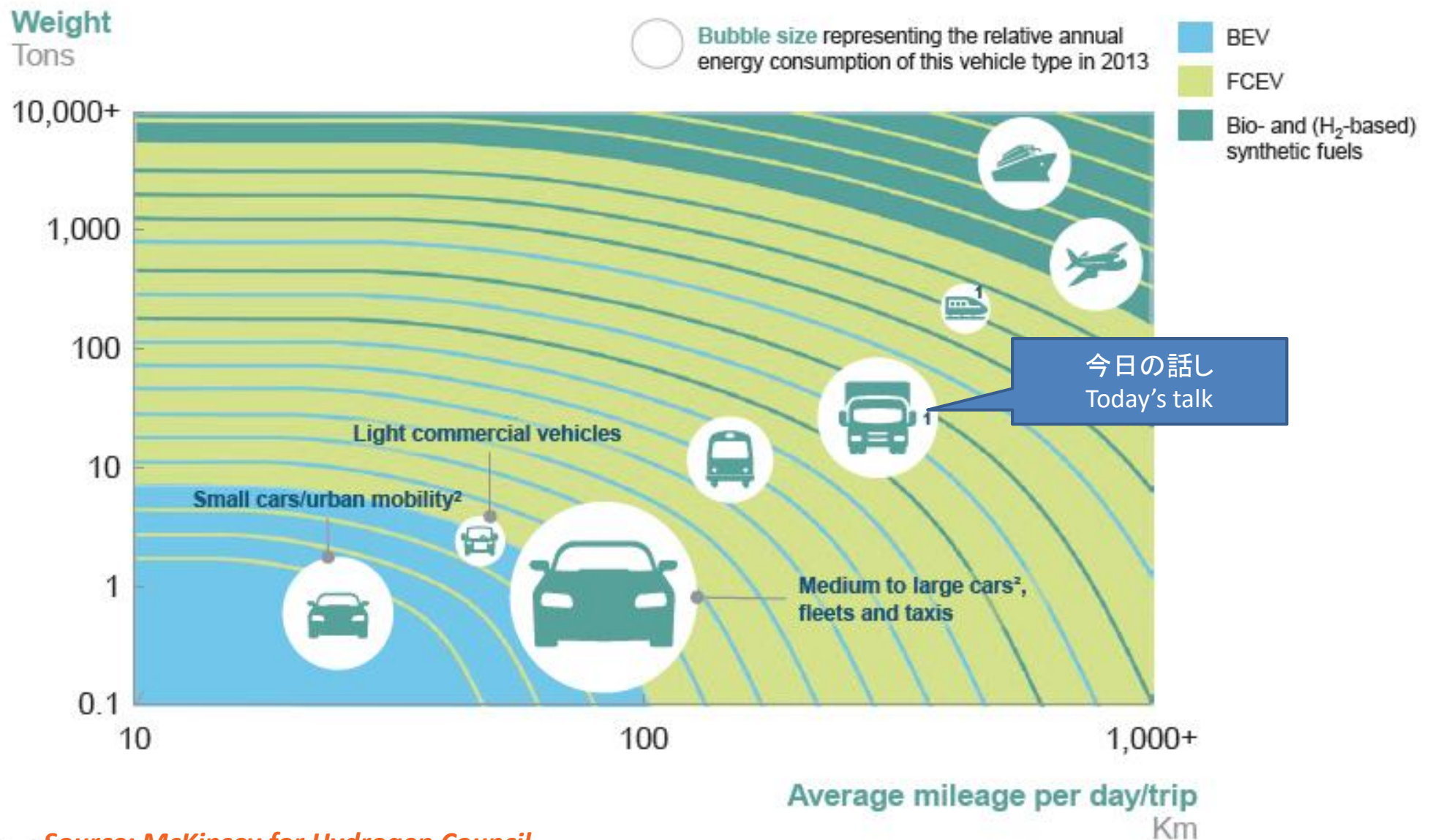
- H2 cost will get down by 2025. Diesel?
- Maintenance made simpler and cheaper
- Opportunities to use local H2 supply
- Put an end to dependency on oil

Ever Stricter
Emission control



- Zero tailpipe emissions: no EURO xxx
- Full access to any restricted area
- Ready for EU TEN-T corridors in EU

POSITION TO ALTERNATIVE DECARBONIZED TECHNOLOGIES: Biofuels, Batteries...



Source: McKinsey for Hydrogen Council

The 1st Hydrogen 44-ton truck in real operation: CATHyOPé

WHO? Consortium

- GreenGT: Engineering
- Transport Chabas: Logistics
- Carrefour

WHEN? Timeline

- Started Oct 2017
- Demo phase until end-2019
- Tech transfer for small Fleet as of 2020 onwards

WHAT FOR? Objectives

- 26t carrier + 18 t trail
- 500 km on a single refill
- Refuelling in 10 mn max
- Superior dynamics with 650 hp steady
- All safety features unchanged

ADEME National Agency's support acknowledged

ADEME



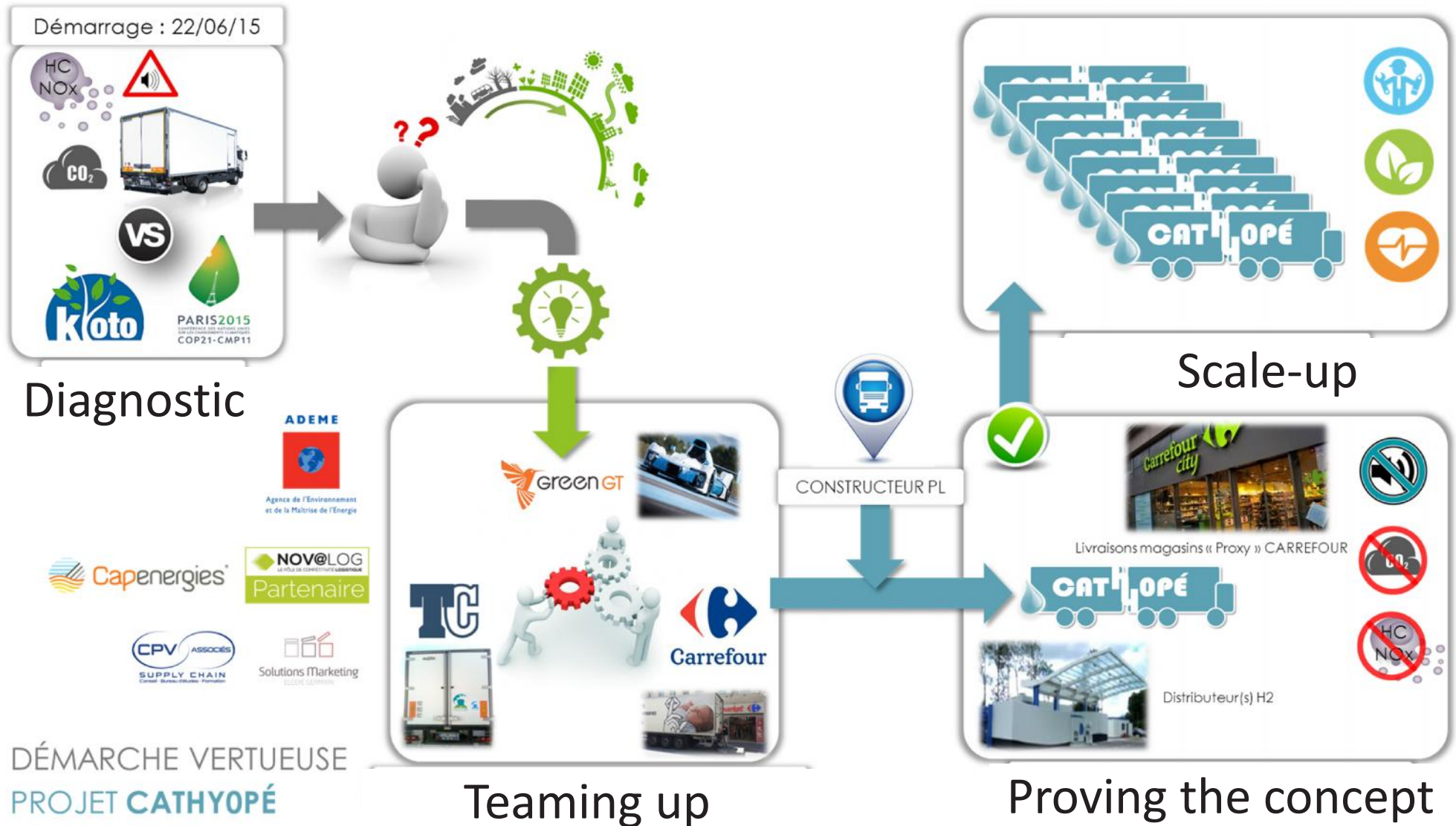
Agence de l'Environnement
et de la Maîtrise de l'Energie

Link with ADEME's 2014-2020 strategy:

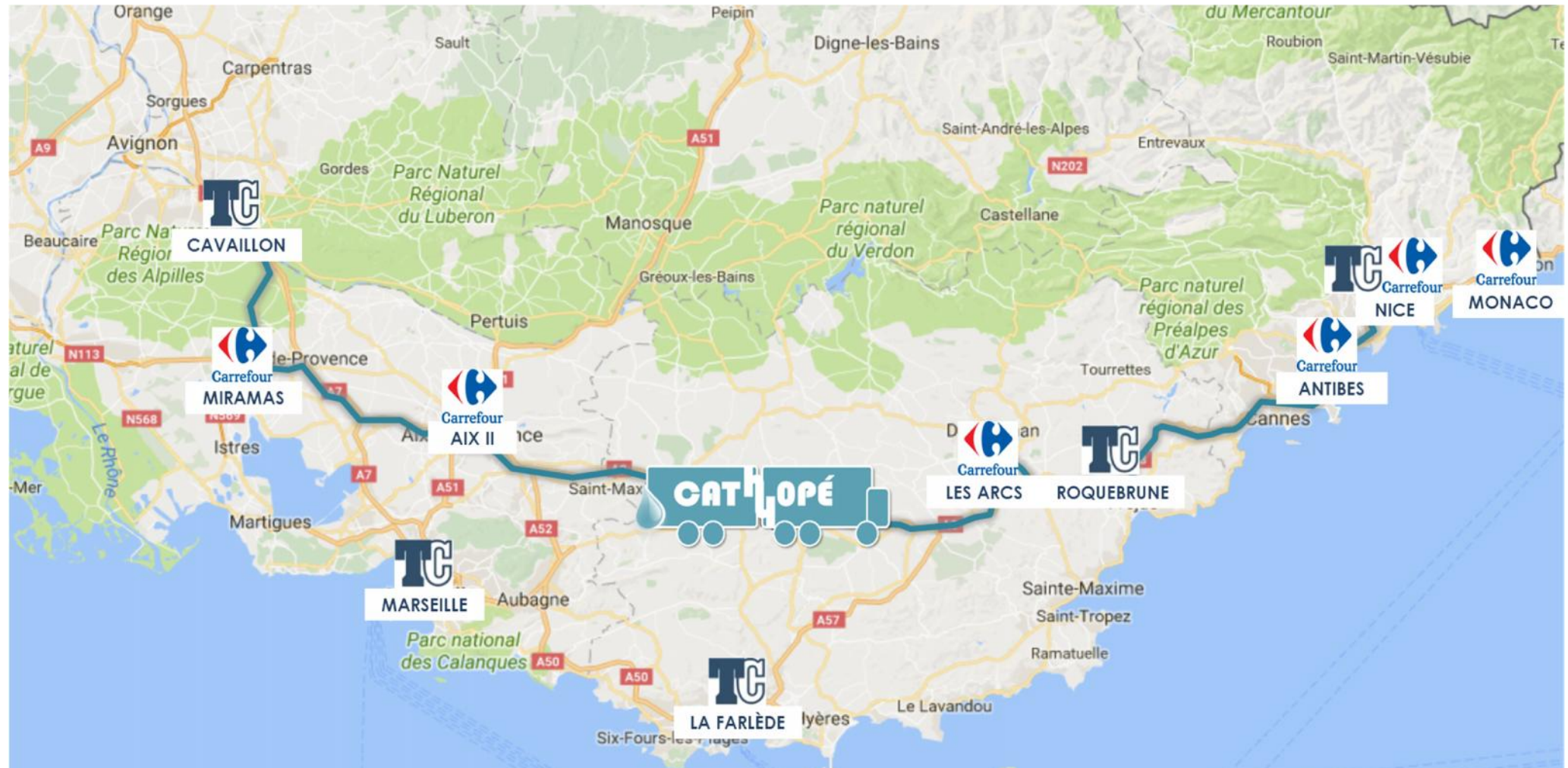
Key objective Number 2: Transferring R&D results to end-users

- Meaning for the project: ready up for future series after demonstrator phase
- Run the demo phase with a real operator, on real roads to serve real customers (現地現物フェース)

Application Pionnière : PL H2 44t (Projet CATHy0Pé)

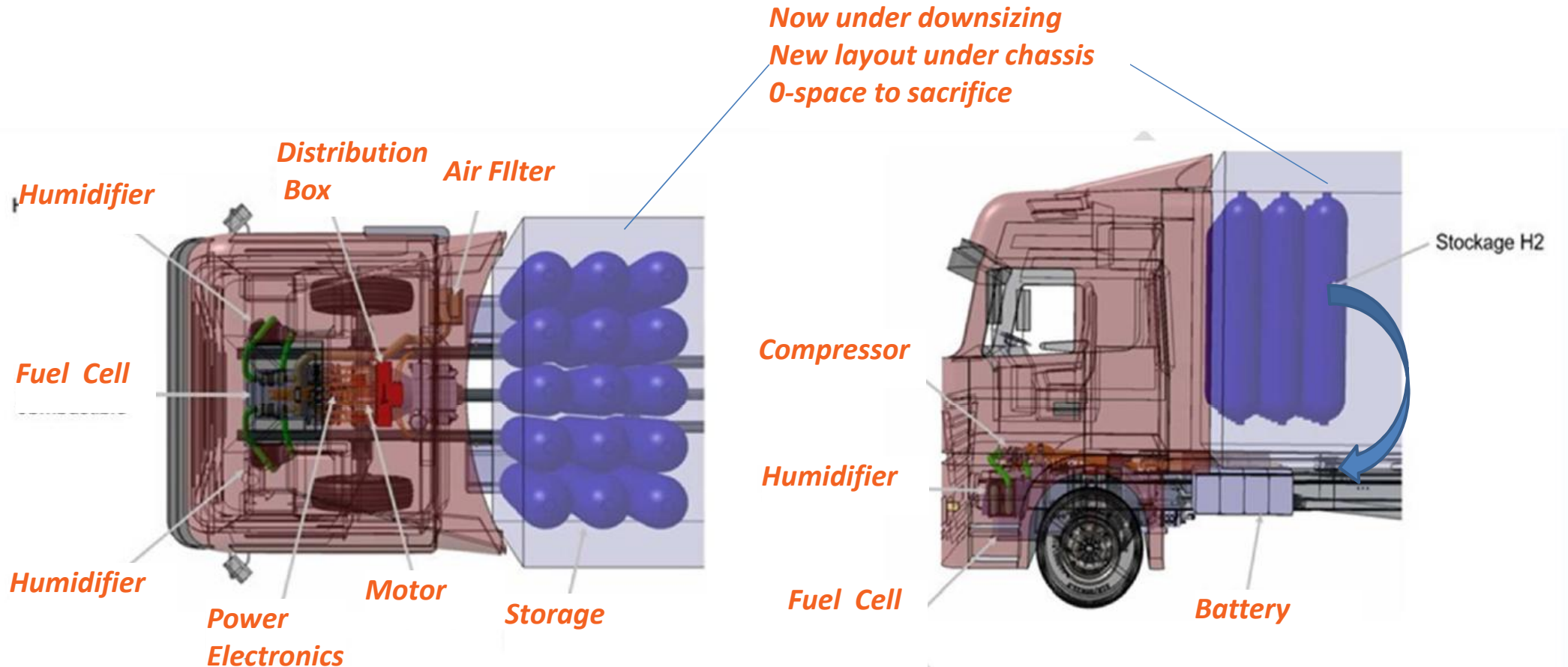


Mapping Projet CATHy0Pé



- Initial Test and Validation: Bench + private ground
- Test in operational conditions: Existing lines for **CARREFOUR** exploited by **Transports CHABAS**
 => Salon-Nice/Monaco (x2 loops 500km/day => 1 000Km/day)
 => Severe conditions, harshest motorway hills, Fresh cargo

What the 44-ton truck will be like...coming up next



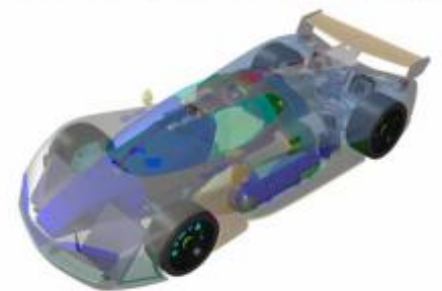
- A 1st demonstrator will prove the concept using vertical racks of 350 bar cylinders
- The 2nd phase plans to integrate the cylinders with no impact on space
- Cost, volume, weight and center of gravity are part of the optimum solution

Contact

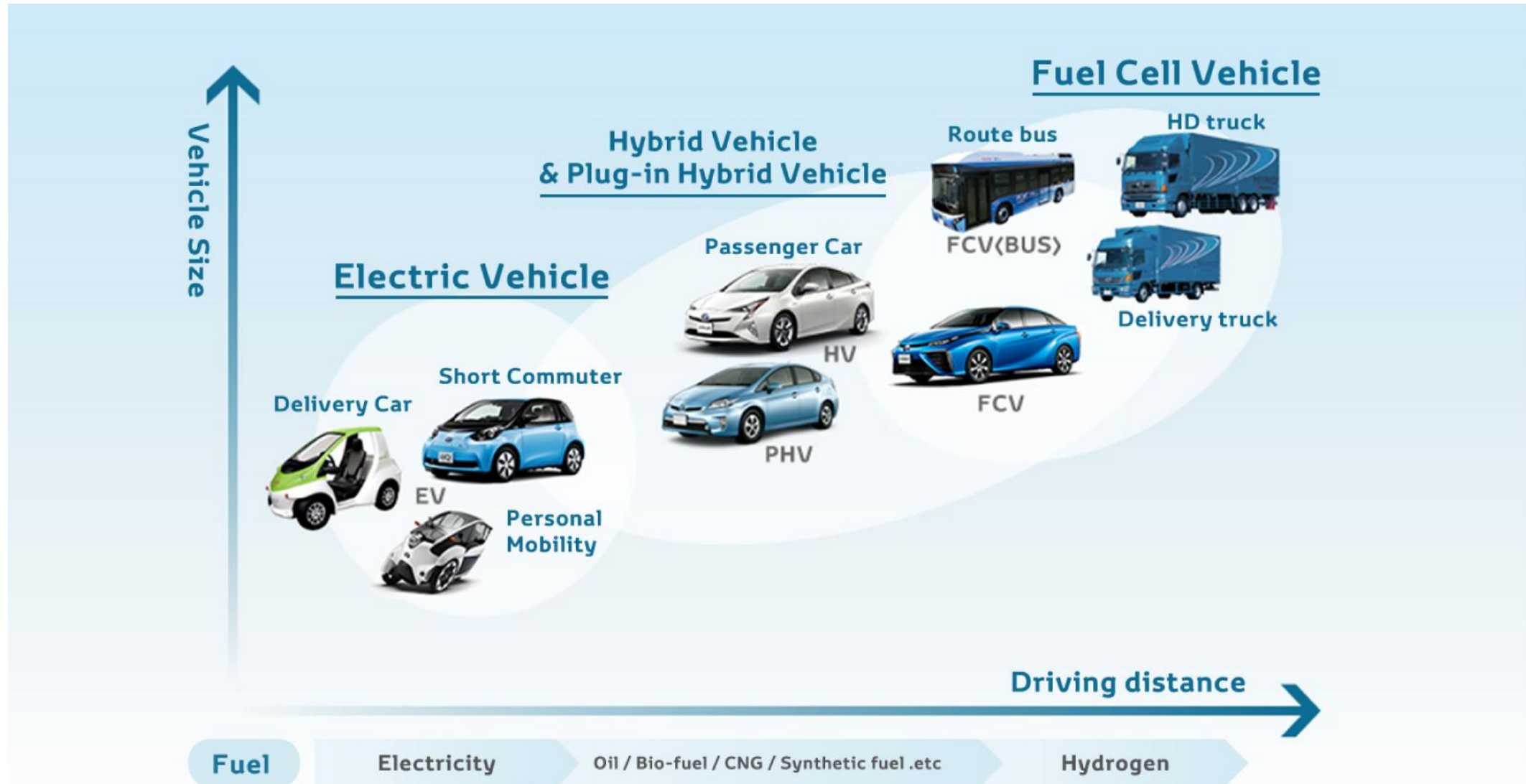
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Source: Toyota Motor Corporate Site