

- Symbio at a Glance
- H2Mobility France
approach and ZEV Project

PRESENTATION TO THE “FLEMISH P2G INDUSTRY CLUSTER”
LILLO - INOVYN MEETING OF SEPTEMBER 19TH 2018

NICOLA ZANDONÀ



SYMBIO – AT A GLANCE

Symbio at a glance

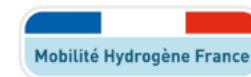
A new generation automotive supplier focused on zero emission mobility solutions for duty vehicles



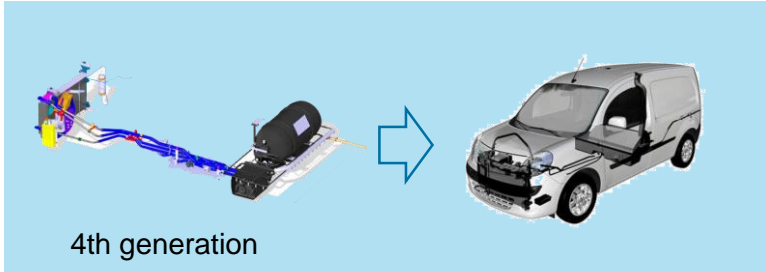
Supported by energy, mobility and utility majors



Involved in H2 ecosystems policies

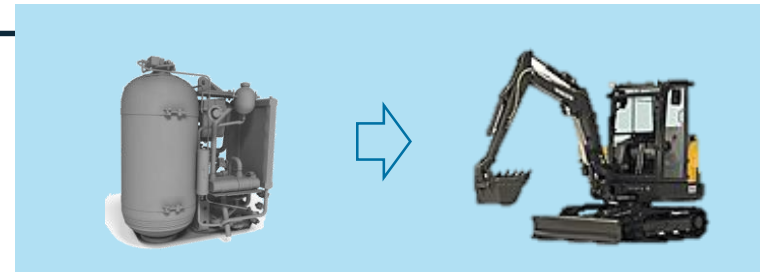


More than 10 successful Fuel Cell Systems developed and integrated

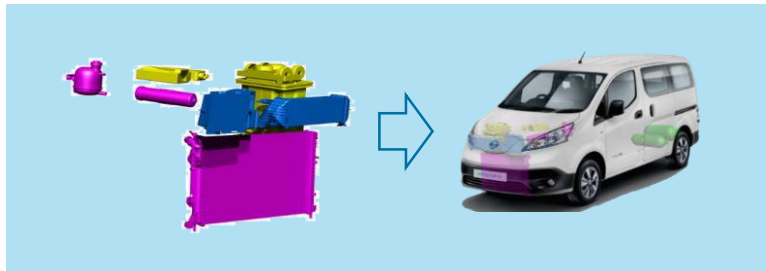


4th generation

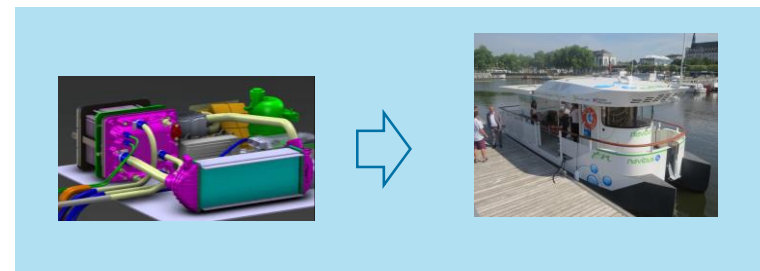
5 kW system, F stack
2 kg of H₂



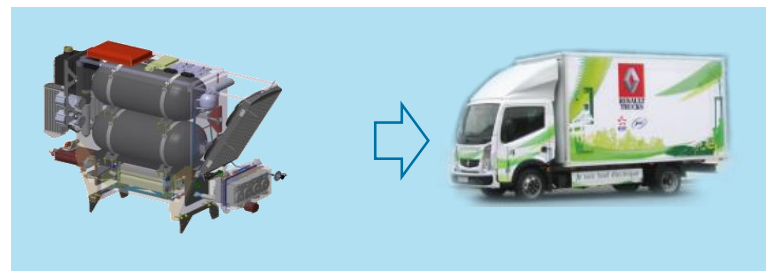
5 kW system, F stack
2 kg of H₂



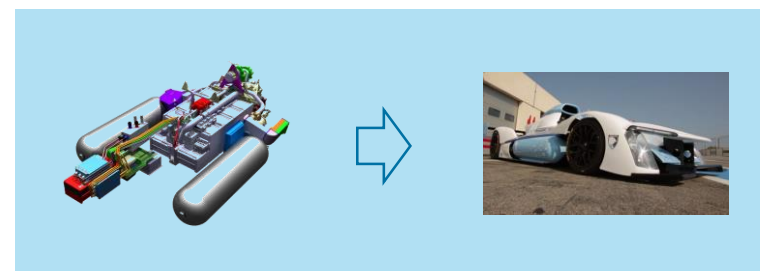
20 kW system, μ N stack
3 kg of H₂



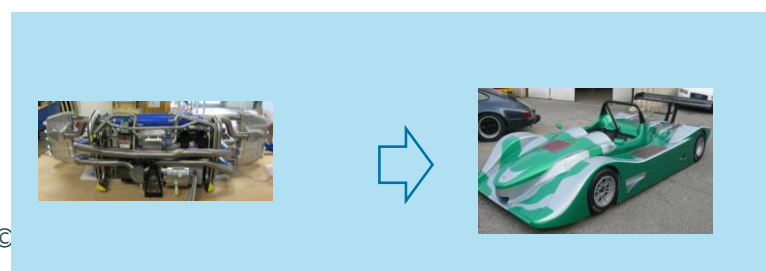
10 kW system, F stack
redundent
3 kg of H₂



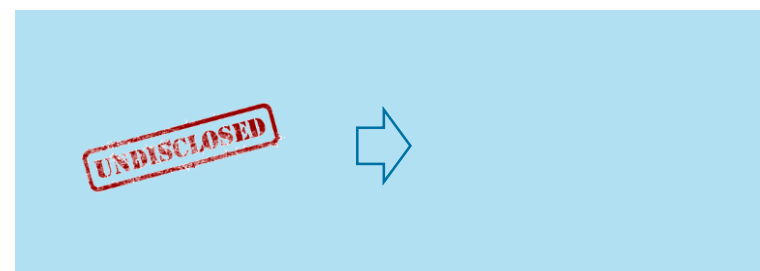
20 kW system, F stack
4 kg of H₂



300 kW system, F
stack
4 kg of H₂



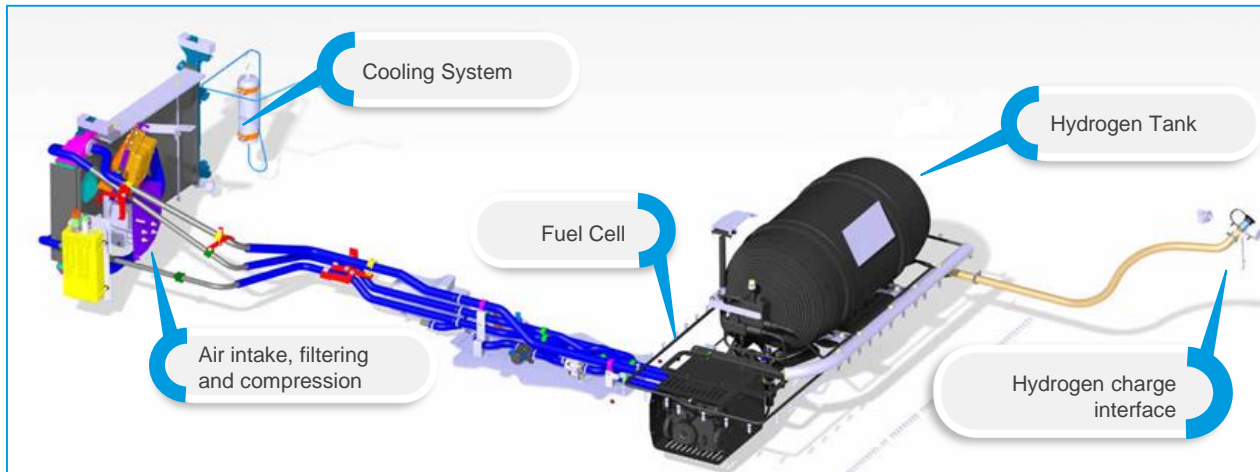
100 kW system, Ballard
stack, 4 kg of H₂



200 kW system, N stack
8 kg of H₂

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

Hydrogen Range Extender for Kangoo ZE



Kangoo ZE REH2



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*

Matr.	Statut	Changement de statut	Remarque	Indicateur de consommation	Indicateur de consommation	Indicateur de consommation	Indicateur de consommation	Indicateur de consommation	Indicateur de consommation
OP-000-001	Actif	2019-01-15	2019-01-15	10.000	100	2019-01-15	200	10	1
OP-000-002	Actif	2019-01-15	2019-01-15	7.500	100	2019-01-15	240	10	1
OP-000-003	Actif	2019-01-15	2019-01-15	2.000	100	2019-01-15	14	1	1

02

INFRASTRUCTURE ROLL-OUT : HOW TO ACCELERATE
THE SUCCESS OF THE “CAPTIVE FLEET APPROACH”?

THE ACTION OF H2 MOBILITY FRANCE

France defined its Hydrogen Mobility Implementation Plan

Part of the Hydrogen Infrastructure for Transport (HIT) project

- ▼ European project financed by the EU (TEN-T program)
- ▼ 4 Member States, 7 partners:
 - ▼ Dutch ministry of Infrastructure and the Environment, Air Liquide, AFHYPAC, Copenhagen Hydrogen Network, HyER, Hydrogen Link Denmark, and Hydrogen Sweden

Supported by the Ministry of Environment and Energy

- ▼ DGEC + ADEME
- ▼ Endorsed by the whole Government
 - ▼ NFI plans « Energy Storage »

Developed by the H2 Mobilité France Consortium

- ▼ A strong and wide coalition
- ▼ Analytical support provided by Element Energy

Market Driven Approach aiming to minimize risks in the early years

For a final passenger car market, a nation-wide infrastructure is needed from the very start

This requires large investments and generates operating losses the early years (study carried out thanks to UK and Germany data and methodologies)

An alternative market driven approach is therefore proposed aiming to minimize risks and consisting in the early years to focus the infrastructure roll-out on specific mobility market segments

Identified suitable market segments₍₁₎:



Delivery/utility



Taxis



Regional Urban Duty Logistics



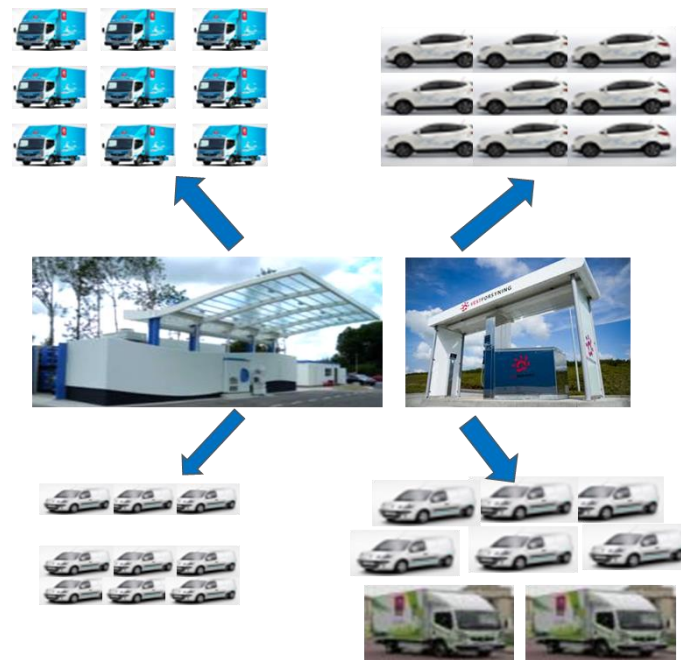
Fleet cars

(1) Buses were not considered among the earliest market due to the current high cost premium and refueling patterns in private bus depots

Captive fleets & Clusters to support HRS roll-out in its early phase

Captive Fleet definition

Fleet vehicles with predictable driving and refueling patterns
Vehicles making regular visits to or overnight parking at a depot



Cluster definition

Multiple fleets of customers within a defined area
One or a few Hydrogen Refueling Stations (HRS) per cluster

Vehicles (FCEV and RE-FCEV) and HRS are deployed once enough local clients are identified

Small HRS should be enough to comply with customers needs and good load factor may be achievable from the beginning

Initial investment and risk of under-utilization are greatly reduced

Starting with 350 bar HRS enables lower HRS costs, but HRS remains compatible with 700 bar FCEV

Captive fleet approach: a way of starting the market, ahead of a 3 phase national rollout



Clusters

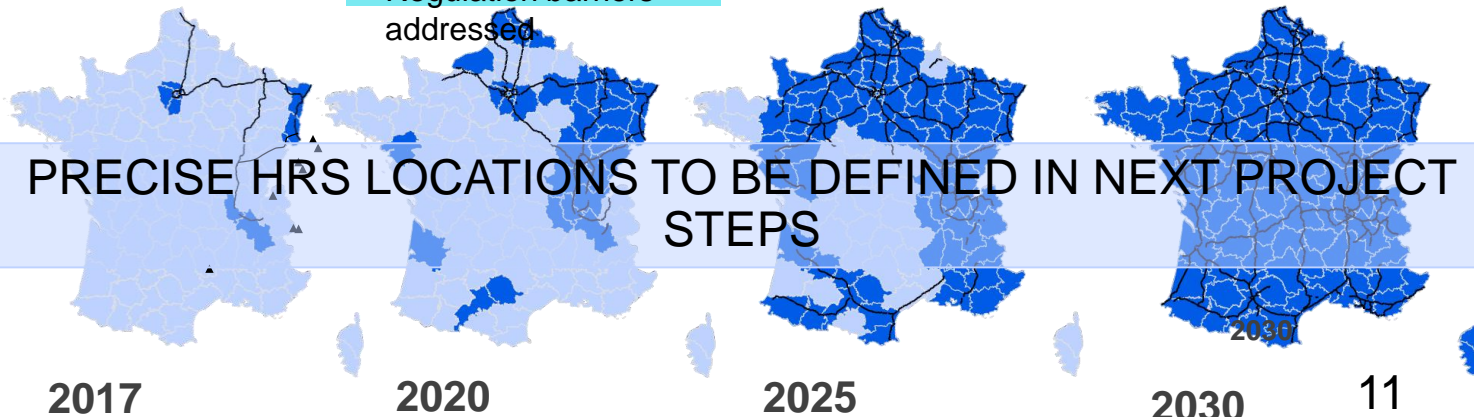
- Affordable investments
- Maximize HRS utilization rate

Investment TRIGGERS

- Supply of series FCEVs
- 2nd generation FCEV drives cost decrease
- Policy support
- Evidence consumers will buy
- Regulation barriers addressed

National-Scale Deployment

- Widespread network for passenger car drivers
- Sufficient vehicles to create viable business case for refueling stations



Confidential

Today



- ▼ 250 LDV (most used vehicle)
- ▼ 23 HRS (mainly 350 bar)
- ▼ H2 price : roughly €10/kg (for 100 km)

A new dynamism both at a regional and national levels



June 2018 : National Hydrogen Plan – 100 Million Euros



A unique model : H2 ecosystem business models & captive fleet approach



Hydrogen ecosystems

Local Renewable Resources



H2 Production & Distribution



Mobility market – Captive fleets

- Urban Duty, Public Transport, Taxi...



Other Markets

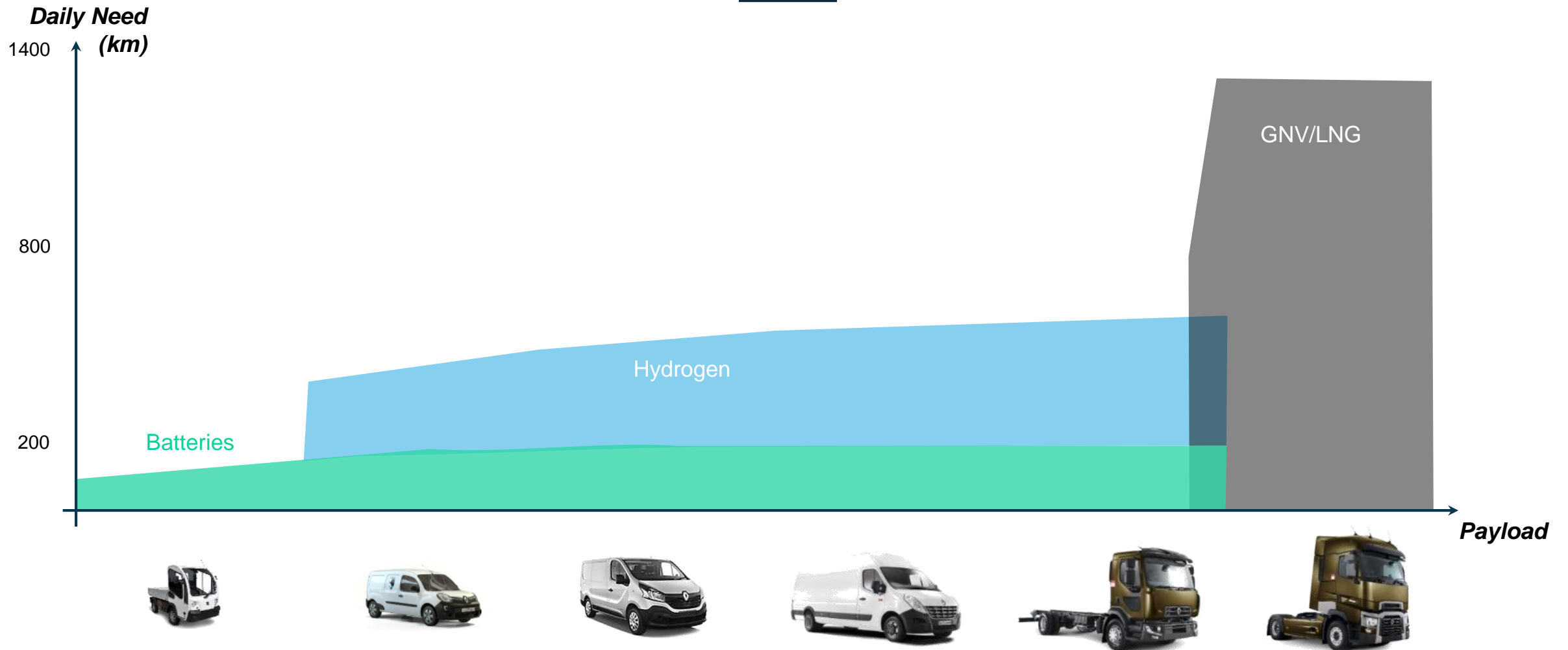
- Industrial applications
- Power to Gas

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



A real headache for delivery and service companies

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





03

ZEV PROJECT

THE AUVERGNE RHONE ALPES REGION IN A FEW WORDS



Central and eastern parts of southern France

The 3rd largest region of France: 70 000 km²



8 millions inhabitants

Lyon, Grenoble, Clermont-Ferrand

1st industrial region in France

80% of hydrogen sector of France:



ORIGINS OF THE PROJECT



From a pilot program...

HYWAY project 2014/2017: 50 fuel cell electric vehicles in Grenoble and Lyon around 2 charging stations

- 345,000 km traveled (86 tonnes CO2 avoided)
- 1,600 refills made at stations
- 367 km of autonomy (with an H2 recharge, and an electric recharge).

- ❖ co-financed by: ADEME, Regional Council and European regional development funds (ERDF)
- ❖ An innovative and pioneering project coordinated by Tennerdis

... To the French roadmap:

H2Mobilité program: ZEV is aligned with the French roadmap to a national roll-out for hydrogen which aims to deploy 600 hydrogen refuelling stations in the country by 2030.

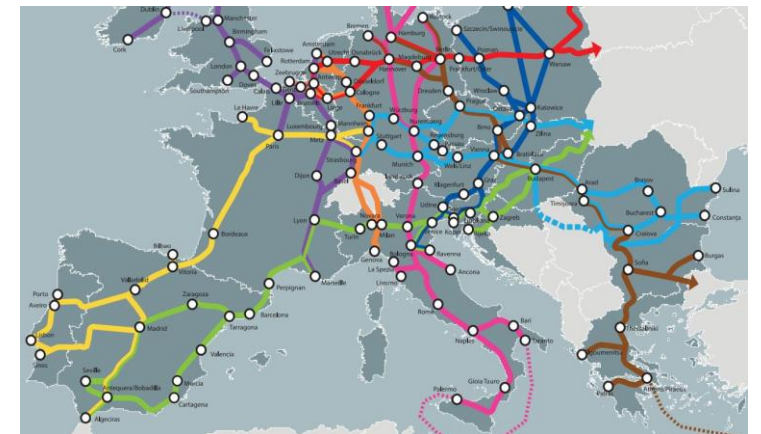


THE PROJECT WITHIN THE EUROPEAN APPROACH

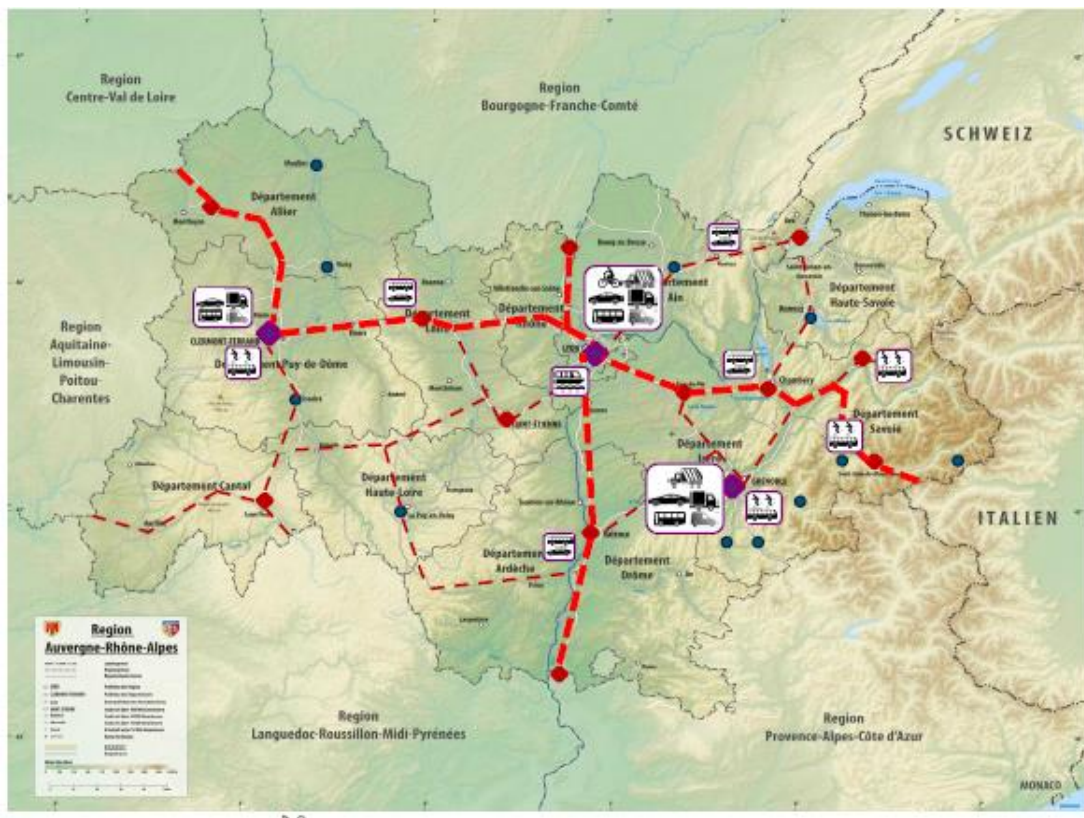
- Part of the **European Union's approach** to minimise dependence on oil and to mitigate the environmental impact of transport by deploying alternative fuels infrastructure.
- Located on the **Mediterranean and the North Sea-Mediterranean core network** corridors as well as on the road core TEN-T network.
- Financed by 2017 **CEF Transport Blending Call: Innovation & new technologies**



Co-financed by the Connecting Europe
Facility of the European Union



MAIN OBJECTIVES OF THE PROJECT BY 2023



within the Auvergne-Rhône-Alpes region

**20 hydrogen
refuelling
stations**



**1000 fuel cell
electric vehicles**





20 HYDROGEN REFUELLING STATIONS DEPLOYMENT

15 refuelling stations will be equipped with on-site electrolysers
5 stations will be supplied via delivered hydrogen (by truck or pipeline)

Station specifications :

- **Dispensing capability:** equipped with both 350 and 700 bar dispensers up to 200 kg/day
- **Industry standards:** f.i.SAE J2601 and J2719
- **Electrolyser equipment:** 500kW maximum electrolyser
- **Payment system:** debit/credit bank cards and fuel cards for fleet users
- **CO2 footprint:** it is expected that 100% certified renewable electricity
- **Availability:** Commercial access will be ensured 24/7

Operating model:

- **private company** to be created by industrial partners and partially capitalized by the Region.
- The stations will be owned by the project company

1000 VEHICLE DEPLOYMENT

Objective to deploy a **captive fleet of 1000 fuel cell electric vehicles** within the region

- **Grant scheme** for hydrogen vehicles with a regional call for expression of interest
- Agreements to be signed with **car rental companies, private companies or local communities**
- **Light commercial or passenger vehicles**





GOVERNANCE

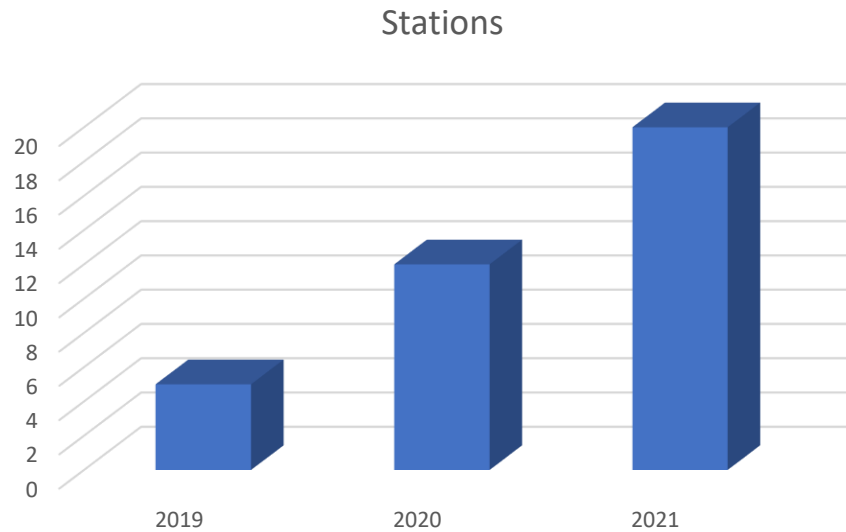
- **Coordination : by the Region** interfacing with external stakeholders, H2Mobility France, representatives of local authorities and competitiveness clusters.
 - Synchronization of the planning : territorial meetings to present the project
 - Leading of a steering committee associating the industrial partners and working groups with all the partners
- **Deployment of the stations:** A **private company** created by industrial partners and partially capitalized by the Region.



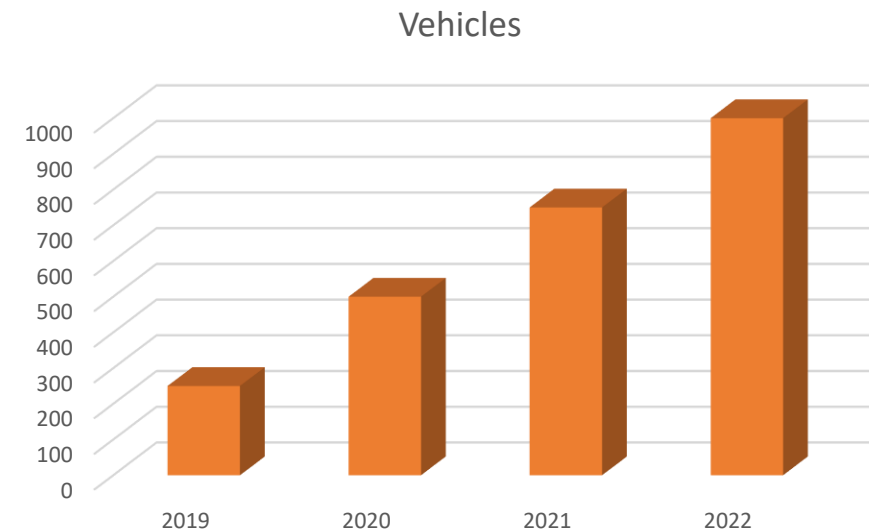
- **Deployment of the vehicles:** The Region will launch a regional project call

MAIN STAGES OF THE PROJECT

2018: Creation of the company



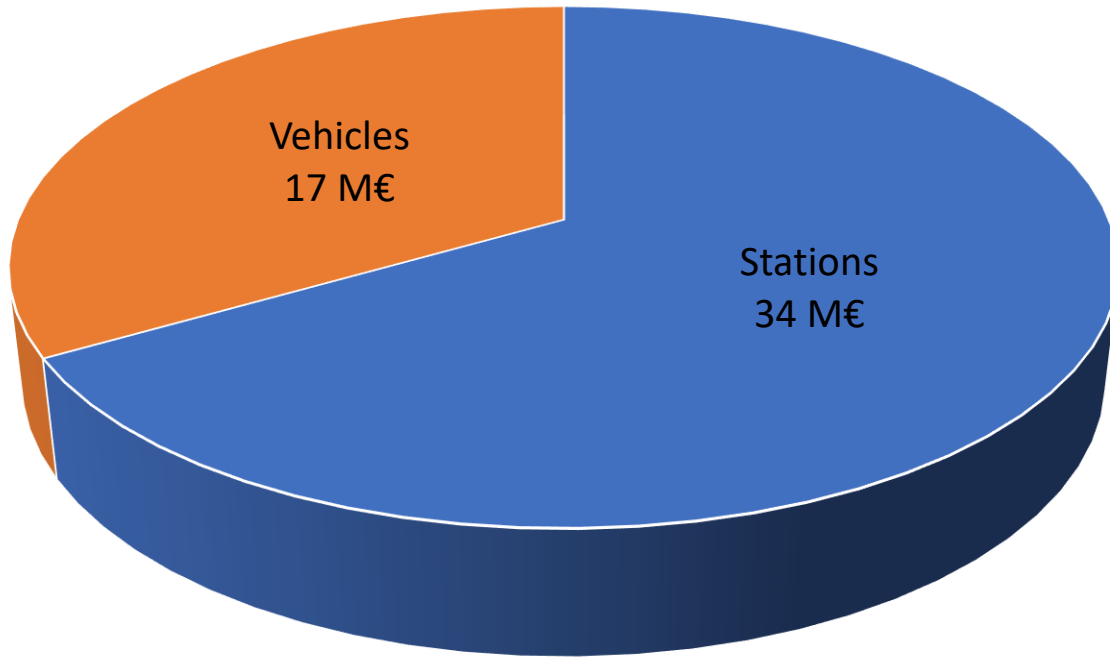
2018: call for expression of interest





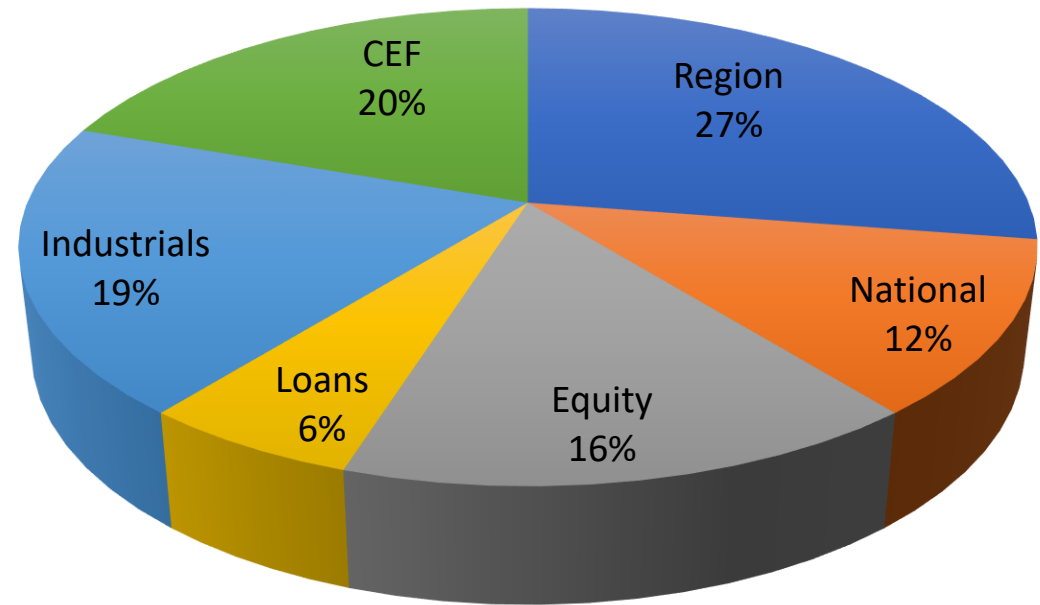
PROJECT FINANCING PLAN

COSTS



Total costs: 51 M€

FUNDING



CHALLENGES AND SUCCESS FACTORS

Main challenges:

- **3 months to build** and submit the project to the European Commission (April to July 2017)
- **Innovative and challenging project**
- Private investors and public **acceptance** needed



Main success factors:

- Strong **political support**
- **Great mobilisation** and support of **private and public partners** (300 supports) to complement agility and skills
- From HyWay pilot project to a **hydrogen valley**





AND THE FUTURE ...



Mobility :

- Coordination with cities to work on **hydrogen buses** and **garbage trucks**
- Studies for the possibility of hydrogen for **regional passenger transport**
- Longer term interest for hydrogen **trains**

Recommendations to the coalition:

- **strong political will**, to cope with periods of acceleration
- **Dedicated human resources** for the project
- working in a **public-private partnership** to increase skills and agility



La Région

Auvergne-Rhône-Alpes

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Thanks !



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—
ZERO EMISSION MOBILITY
SOLUTIONS

SYMBIO.FR

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