International Partnership
for Hydrogen and Fuel Cells
in the Economy

FRANCE Update

32nd IPHE Steering Committee Meeting

23 – 24 October 2019

Seoul, Republic of Korea

Announcements and/or New Initiatives

FRANCE

Hydrogen: A national law

1. France has developed a **National Hydrogen Plan** (Hulot report 2018)

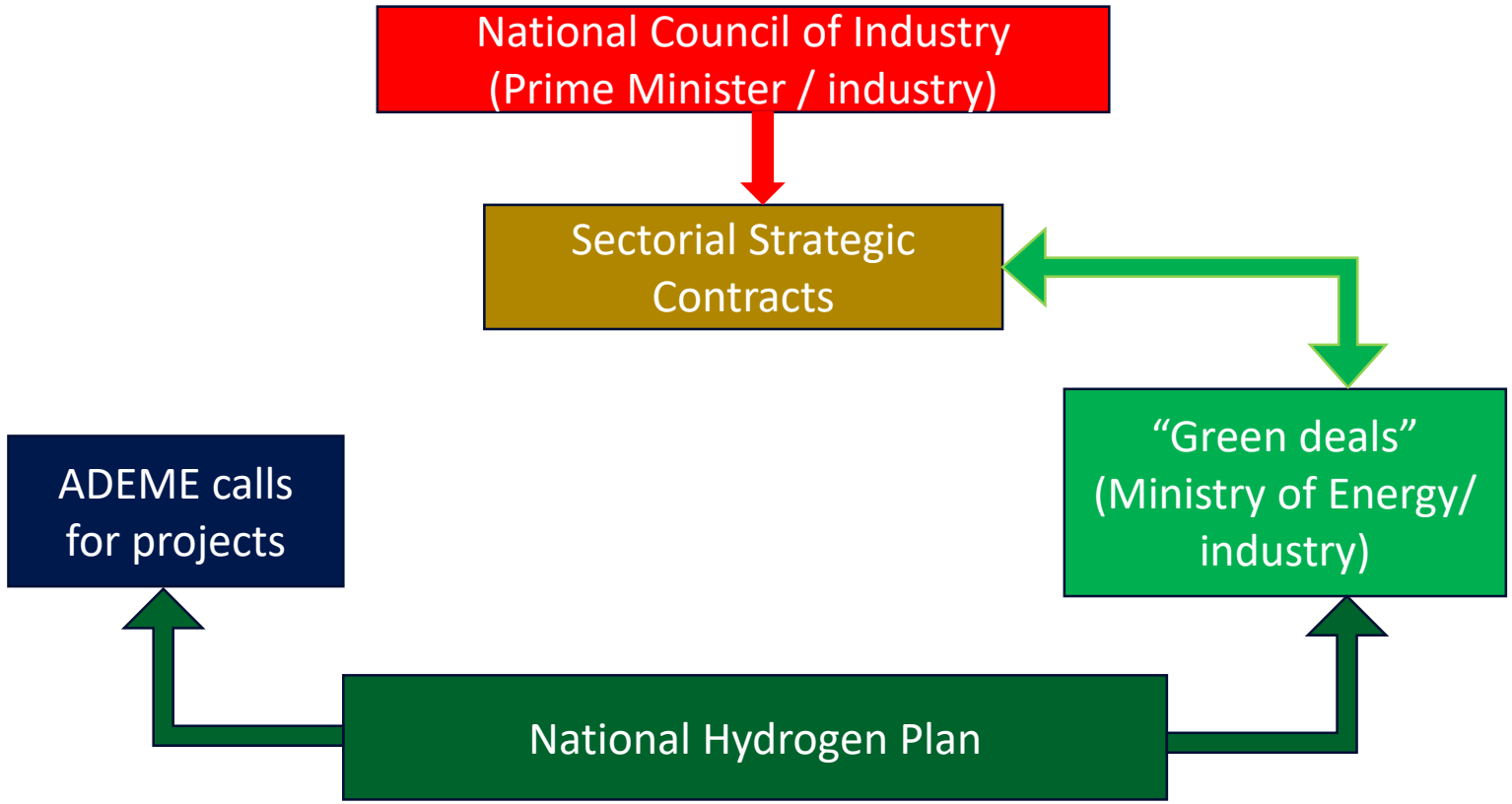
2. The **Multi-Annual Energy Plan** (2019-2028)

3. **Energy-Climate law** voted on September 26, 2019
   - a target of 20 to 40 % renewable and low carbon hydrogen in the final consumption of hydrogen in 2030 (Article 1)
   - a right of access for renewable gas and low carbon hydrogen in the gas network (Article 49)
   - an ordinance and a decree from the “Conseil d’Etat” to define the terminology of the different types of hydrogen, various measures regulating its production, transport, storage and traceability, a framework to support the production of renewable and low carbon hydrogen, and guarantees of origin for renewable hydrogen (article 52);

Announcements and/or New Initiatives

FRANCE

Tools for implementation of the National Hydrogen Plan



Sectorial Strategic Contracts

Common strategic vision (State, Industry) on structuring industrial stakes at 10 years

16 signed and 4 integrating H2 (rail, automobile, sea industry and industry of new energy systems)

Green deals

« Soft law » between State and Industry with reciprocal committments

2 signed (decarbonised H2 production for industrial uses and terrestrial mobilities) and 3 in preparation

New Research & Development

FRANCE

High temperature reversible fuel cells awarded at the European level

EARTO INNOVATION AWARDS 2019
(European Association of Research & Technology Organisations)

The EARTO Innovation Awards 2019 were given October 8 to EARTO members **Fraunhofer** and **CEA**.

Fraunhofer received the award in the Impact Delivered category for the development of the Multi-Criteria Optimisation (MCO) software tool to support the radiotherapy treatment for cancer.

CEA received the award in the Impact Expected category for the development of the Smart Energy Hub, a hybrid energy storage and co-generation system, enabling buildings to use their own clean and local energy supply.

Enabling the energy transition with first local clean energy storage system

The Smart Energy Hub makes it possible to get **100% of a building's energy** directly from local and sustainable energy production.

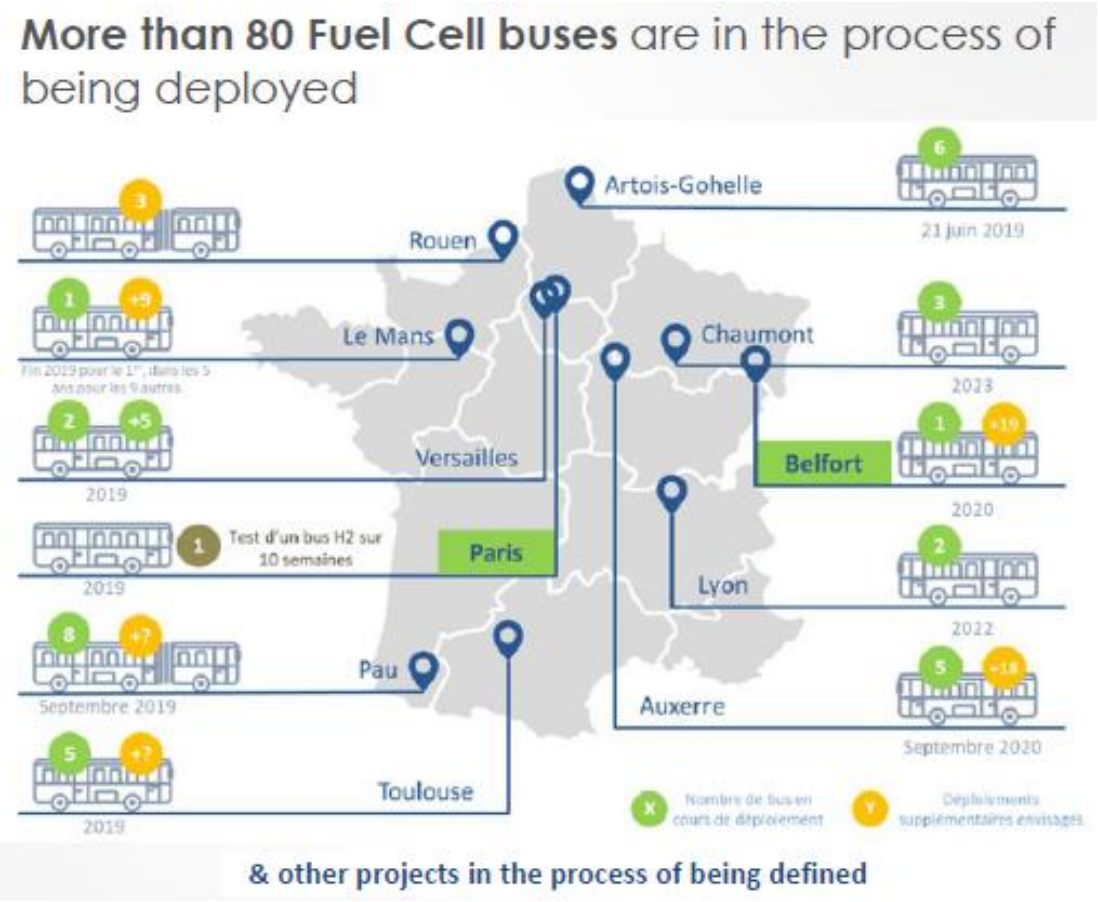
The Smart Energy Hub enables a **65%** decrease of primary energy consumption in buildings.

In tests, CO_2 emissions were reduced by **26%** for an office building in France and **70%** for residential buildings in Germany.

The global market for the new system is estimated to be **€ 10B** by 2020.

Demonstration and/or Deployment Activities
FRANCE

Deployment of FC Buses in France



Artois Gohelle (June)

French bus (Safra, Michelin)

Versailles (September)

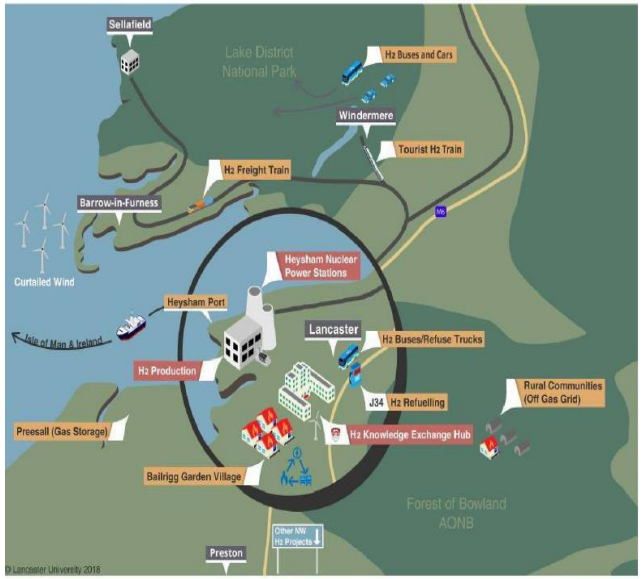
Pau (October 17) : 2 awards at BusWorld Europe

Demonstration and/or Deployment Activities
FRANCE

- ✓ **Renault extends its utility vehicle offer with a FC van using a Symbio/Michelin FC system**
- ✓ **PSA Peugeot Citroen will commercialize a FC utility vehicle from 2021**
- ✓ **Hydrogen bikes: from 200 at G7 in Biarritz to 1000 ordered for COP 25 in Chile**

Demonstration and/or Deployment Activities

FRANCE



H2H: Hydrogen at Heysham (UK)

The H2H project consists in the coupling of a nuclear power plant and a 1 MW electrolyzer to produce and distribute Hydrogen on the site of the nuclear power plant of Heysham.

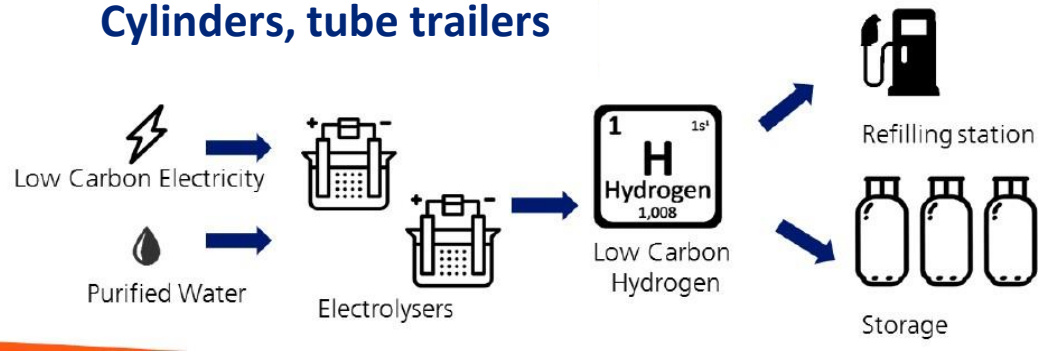
2 x 1 MW Electrolysers

- **1 Proton Exchange Membrane**
- **1 Alkaline**

1 Hydrogen Refuelling Station for on site use

Storage (Cylinders, tube trailers)

Cylinders, tube trailers



Key Collaborations

FRANCE

France and Japan strengthen their industrial cooperation, particularly on FC vehicles

Following first announcements in June at the G20 in Osaka, Bruno Le Maire, French Minister of Economy and Finance, and Hiroshige Seko, Japanese Minister of Economy, Trade and Industry have announced on 2 September, a French-Japanese cooperation agreement on the automotive industry was agreed.

This cooperation should make it possible to better share information between the two countries, to support significant changes in the environment of the automotive industry, and to prepare for any reinforced cooperation.

The agreement includes five areas: autonomous vehicle, battery, electric vehicle, **hydrogen vehicle**, and supplier support.

Examples of Lessons Learned and Impact

FRANCE

Program initiative, policy, regulation or mandate	Lessons Learned/Outcomes
National Hydrogen Plan	• 3 main directions: 1/ H2 for industrial use 2/ H2 for mobility 3/ H2 for RE storage • AAP H2 Mobility : closed on 11/01 and 18/10 For 1st closure: 24 projects received, 11 in granting phase. Budget : around 35 M€ for 2019 for the 1st projects signed. The other projects will be funded on ADEME 2020 budget. • AAP H2 Industry: closure 18/06. Instruction and granting on going. Result announcement by the end of the year. • AAP H2 ZNI (Outre-Mer): call in 2020
H2 Mobility France	• Structuration of the French ecosystem from H2 production to H2 mobility • Proposition of a coordinated HRS/FC vehicles deployment plan and release of position papers
Regional Hydrogen developments	• Strong emulations between the French regions to integrate hydrogen technologies in their strategic visions/roadmaps and to accelerate the regional deployments

FRANCE– Profile October 2019

Status of Deployments

- ✓ Electrolyzers: > 1MW
- ✓ FCEVs: ~340
- ✓ FC Bus : 3
- ✓ Forklifts: ~180
- ✓ HRS: 23 for vehicles
- ✓ 7 for bikes

Leading Government Initiatives

- ✓ National Hydrogen Plan
- ✓ Multi-annual Energy Plan (2019-2018)
- ✓ Energy-Climate law
- ✓ Sectorial Strategic Contracts between State and Industry

Goals or Focus Areas

3 main directions:

1/ H2 for industrial use
2/ H2 for mobility
3/ H2 for RE storage

Deployment Goals

By 2028 Vehicles: 20,000 – 50,000 vehicles
FC Bus and trucks: 800 - 2,000 by 2028
HRS: 400 - 1,000 by 2028
20-40% of decarbonised H2

Funding

100 M€/year

Thank you

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Status of Applications and Goals *FRANCE*

Application	Status (As of September 2019)	Goal (For *Year*)
1) H_2 Applications		
a. Energy Storage (e.g. MW, GW of capacity)		-
b. Electrolyzers	*>1 MW*	*1 GW by 2023* *2-4 GW by 2028*
c. Other (e.g., Steel, Marine, Fertilizer, etc.)		-
2) Transportation		
a. Light Duty Vehicles	*340*	*5,000 by 2023* *20,000 – 50,000 by 2028*
b. Medium and Heavy Duty Vehicles	*1*	*200 by 2023* *800 - 2,000 by 2028*
c. Buses	*3*	
d. Trains	*-*	
e. Forklifts	*~180*	-
3) Stationary		
a. Residential	*110*	-
b. Commercial	*1*	-
c. Back Up Power		-
4) Other (applicable to your country and not covered in the categories listed above)		*Insert number*