International Conference on Mobility Challenges

The role of European and national funding bodies in the development of the first large-scale hydrogen mobility projects

December 9th, 2021

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<td>Overview of European and national funding bodies</td>
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<td>Two flagship hydrogen mobility projects</td>
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Element Energy have been providing consultancy and management services at all points along the hydrogen technology value chain since formation in 2003.

**Government policy design and national strategy development**
Stakeholder engagement and management, rollout strategy development, policy design modelling and guidance.

**Business strategy development**
Market sizing, business model and pricing strategies, financial forecasts, etc.

**Understanding the technology**
Due diligence, performance and economic assessments, market assessment, competitor analysis, etc.

**Project funding and development**
Consortium forming, project creation, national and EU funding applications.

**Implementation and management**
Project management, safety assessments, planning applications, budget management, performance analysis, etc.

**End-to-end consultancy services**
Element Energy (EE) has initiated or is involved in the flagship hydrogen mobility deployment projects to date in Europe.

### Hydrogen mobility projects initiated by Element Energy

<table>
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<tr>
<th>Project</th>
<th>Target</th>
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<tr>
<td><strong>ZEFER</strong></td>
<td>180 high use fleet vehicles in Paris, London and Copenhagen</td>
</tr>
<tr>
<td><strong>Hydrogen Mobility Europe</strong></td>
<td>1,400 cars and vans</td>
</tr>
<tr>
<td><strong>JIVE</strong></td>
<td>45 HRS</td>
</tr>
<tr>
<td><strong>H2HAUL</strong></td>
<td>306 buses</td>
</tr>
<tr>
<td><strong>H2BUS</strong></td>
<td>18 cities and regions</td>
</tr>
<tr>
<td><strong>H2HAUL</strong></td>
<td>16 long haul heavy duty trucks</td>
</tr>
<tr>
<td><strong>H2BUS</strong></td>
<td>4 locations</td>
</tr>
<tr>
<td><strong>H2HAUL</strong></td>
<td>600 fuel cell buses</td>
</tr>
<tr>
<td><strong>H2BUS</strong></td>
<td>3 locations</td>
</tr>
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### Other H₂ mobility projects supported by EE

<table>
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<th>Target</th>
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<tr>
<td><strong>REVIVE</strong></td>
<td>16 refuse trucks</td>
</tr>
<tr>
<td><strong>H2Accelerate</strong></td>
<td>4 locations</td>
</tr>
<tr>
<td><strong>UKH₂MOBILITY</strong></td>
<td>EU wide roll-out of H₂ trucks and infrastructure</td>
</tr>
<tr>
<td><strong>Hydrogen Mobility Ireland</strong></td>
<td>Support for H₂ mobility industry groupings</td>
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+ others and more in development...
EE has been acquired by ERM the world’s largest pure play environmental, health and safety, risk and sustainability consultancy

Introduction to ERM

**History**
Leading sustainability consultancy providing environment, social and governance services for 40+ years to global corporate clients and the financial services industry

**People**
Unique blend of 5,500 staff i.e. technical, strategy, commercial and financial experience, in over 160 offices in 40 countries

**Sustainability Services**
We understand business and provide transaction and financing environmental and social risk management support, at the assessment and implementation stages

**Thought Leader**
Based on over 10 years of climate change scenario analysis, we supported the Taskforce on Climate-related Financial Disclosure to develop its recommendations for applying scenarios

With EE and ERM’s combined skills, experience and expertise we are now supporting hydrogen project development globally
### Introduction

#### Overview of European and national funding bodies

- European public funding bodies
- National public funding bodies
- Two flagship hydrogen mobility projects
To date, the FCH JU has funded the majority of R&D and demonstration projects for light duty and heavy-duty vehicles.

- To date, the **Fuel Cells and Hydrogen Joint Undertaking (FCH JU)** has funded most of the **R&D and demonstration projects**.
- The **successive projects** have progressed **towards pre-commercialisation levels**.

**Timeline**

- **2010**: First small-scale demo projects for HRS, passenger cars & buses
- **2015**: Pre-commercial deployment with hundreds of HRS, passenger cars & buses
- **2022/2025**

**Light duty vehicle demonstration**

- **FCEV**: Fuel Cell Electric Vehicles
- **HRS**: Hydrogen Refuelling Stations
- **TRL**: Technology Readiness Levels
A quick focus on buses helps us to understand the impact of these demonstration projects on the industry: they enable a significant acceleration of the market.

Between 2010 and 2020 capital costs of fuel cell buses fell by more than 300%, further reductions are needed for commercially viable offers and large-scale deployments in France, and in Europe.

Capital costs of fuel cell buses ordered in different years (non-articulated single deck buses)

*Post-2020: Some OEMs considering commercial rollout indicate capital costs of <€375k/bus are possible, assuming orders of 100 buses per year and continuity of demand.
As the hydrogen industry matures, European funding bodies are adapting their support schemes, with a greater focus on production and HRS at the European level.

First European support schemes were designed to support complete hydrogen ecosystems.

Funding scopes used to include different parts of the value chain, sometimes from production to vehicles, in order to enable the development of complete hydrogen ecosystem.

Recently released European Calls suggest a greater focus on developing H2 production and the infrastructure network.

Large-scale production
HRS network
Vehicles

Although some European Calls still support vehicles for specific applications (e.g. port vehicles in the new CEF), the focus seems to be increasingly on infrastructure support.
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France has one of the most ambitious strategies at the European level regarding the development of renewable hydrogen.

- **September 2020,**
  - = 7.2 billion euros
  - AAP “Ecosystèmes territoriaux hydrogène”
  - AAP “Briques technologiques et démonstrateurs”
  - IPCEI (Important Project of Common European Interest)
  - PPR (Programme Prioritaire de Recherche) – R&D

- **November 2021,**
  - = 1.9 billion euros
  - 5 electrolyser “gigafactories”

€9.1b
The ADEME Call for proposals “Ecosystèmes territoriaux hydrogène” supports the development of complete hydrogen ecosystem, from production to all applications.

Hydrogen projects supported by ADEME

- ADEME calls are designed to support complete hydrogen ecosystems at the local level. The ambition is to create the conditions to develop a viable market.

- All the components of the value chain can be funded with the scheme (with the exception of renewable electricity generation):
  - Production (electrolysers);
  - Distribution (HRS, trailers, etc.);
  - Applications (vehicles, stationary equipment, etc.).

- Combination with European fundings possible, subject to state-aid limits.

(1) Renewable electricity generation can be funded in areas that are not connected to the national grid.
Introduction

Overview of European and national funding bodies

Two flagship hydrogen mobility projects

ZEFER and HYPE

Corridor H2
ZEFER aims to demonstrate viable business cases for captive fleets of FCEVs with 180 cars deployed in 3 countries

ZEFER vehicles deployed

- Q2 2018: 25 vehicles
- Q3 2018: 8 vehicles
- Q4 2018: 17 vehicles
- Q1 2019: 21 vehicles
- Q2 2019: 10 vehicles
- Q3 2019: 29 vehicles
- Q4 2019: 4 vehicles
- Q1 2020: 10 vehicles
- Q2 2020: 25 vehicles
- Q3 2020: 10 vehicles
- Q4 2020: 60 vehicles
- Q1 2021: 25 vehicles
- Q2 2021: 21 vehicles
- Q3 2021: 10 vehicles
- Q4 2021: 4 vehicles

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 779538. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.
Even with decreasing vehicle costs, national and regional grants are needed to further reduce the cost premium of the FCEVs.

-14%

Mirai 1st generation from €79K

Mirai 2nd generation from €68K

Taxi TCO compared to alternatives (€/year)
45 000 km annual mileage, 3 year ownership beginning in 2021

-14%

Annual Cost (Euros)

Petrol hybrid: €1.37/L
PHEV: €1.37/L, €0.34/kWh
BEV: €0.34/kWh
2021 FCEV: €12/kg
In France, HYPE successfully mobilised European and national fundings to accelerate the deployment of the biggest FCEVs taxi fleet in Paris.

~150 vehicles deployed in Paris
>8,2 million kilometers
>1,2 million passengers

French and European public support
Large scale follow-on projects are emerging across Europe in taxi applications

HysetCo moves to run 600 hydrogen cabs in Paris

Paris will eventually see 600 fuel cell taxis. The long-run giver just acquired the cab operator Slota and plans to replace the fleet with the Toyota Mirai gradually. They also started filling stations this year.

The company has been on the scene. We first heard about it when Air Liquide, Idex, Société du Taxi Électrique Parisien launched the joint venture. Back then, they considered it the world’s first hybrid electric taxi service.

Hydrogen retail stations in Copenhagen

- enabling ZE transport for FC Taxis

Copenhagen has a clear ambition to be a leader within Carbon neutral cities. It is a privilege for Everfuel to support the ZE ambition of Copenhagen. Everfuel currently services a FCEV’s taxi fleet with green hydrogen at the current two retail Hydrogen Stations. The solution is so successful and demand for FCEV taxis so big, that Everfuel is currently constructing a high-capacity station in Copenhagen to meet the demand. This station can support +150 FCEV taxis and as all Copenhagen taxis turn to ZE, the station will soon be followed by more stations to make the choice for taxi drivers easy.

Madrid to replace 1,000 cabs with hydrogen fuel cell taxis

09/07/2021

The taxi association Federación Profesional del Taxi de Madrid (FPTM) wants to replace at least 1,000 internal combustion vehicles with fuel-cell-electric taxis in the Spanish capital by 2026 and build the corresponding hydrogen infrastructure including production.

Madrid is to see the first FCEVs for hire hitting the road in 2022. FPTM is joined in the effort by Toyota, Madrileña Red de Gas, Fotowatio Renewable Ventures (FRV), Grupo Ruiz and PwC, which involves 100 million euros. The investment includes fleet vehicles and charging infrastructure, known as “hidroveneras.”
Introduction

Overview of European and national funding bodies

Two flagship hydrogen mobility projects

ZEFER and HYPE

Corridor H2
The Corridor H2 project is successfully driven by the public sector since day one

- Project developed and financed by Occitanie Region as part of their hydrogen strategy
- Project dates: **beginning 2021 – end 2023**
- Total project budget (private & public): **109 M€**
- EIB funding: **40 M€**
- CEF funding: **14,5 M€**
- Partners: Public entities / H2 Producers / H2 distributors / H2 trucks – refrigerated trailer and coach suppliers / Logistic operators
The Corridor H2 project aims to decarbonize heavy-duty mobility in the Occitanie region but also on major European corridors.

Project anchor: Occitanie

30 million vehicles/year...
9 million trucks!

First Cluster of a wider European network

Next targeted connecting regions
The Occitanie Region will bolster the development of the local hydrogen market, creating the conditions to attract stakeholders along the entire value chain.
The Occitanie Region participates actively in the development of the ecosystem

**Call for projects**
- Production
- Supply
- HRS

Has been closed

**1st "Consortium Meeting" in November**
- Hydrogen suppliers and producers
  - I propose my project

**Call for interest**
- Trucks
- Refrigerated units

Selected transporters will be added to the Consortium at a latter stage

Open on April 18th
Session 1: closed on September 10th
Session 2: closed on December 10th
Thank you for your attention

Sectors

The sectors in which we operate:

- Built Environment
- CCUS and Industrial Decarbonisation
- Energy Networks
- Hydrogen and Fuel Cells
- Low Carbon Transport
- Smart Energy Systems