Infosessie ‘Rijden op waterstof’

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18 februari 2019, Air Liquide H2 station / Toyota

Programma

13.00 uur	Duurzame mobiliteitsoplossingen voor Leuven *David Dessers, Schepen van mobiliteit, klimaat en duurzaamheid van Stad Leuven*	
13.15 uur	Ontwikkelingen en perspectieven voor waterstof-mobiliteit *Stefan Neis, WaterstofNet*	
13.45 uur	Huidige status en toekomstblik van brandstofcelvoertuigen bij Toyota *Vincent Mattelaer, Toyota Motor Europe*	
14.00 uur	Renault Kangoo op waterstof	*Maxime Marset, Symbio FCell*
14.15 uur	Vuilniswagens op waterstof	*Ben Cornelis, E-Trucks Europe*
14.30 uur	Rondleiding Waterstoftankstation	
15.00 uur	Vragenronde - proefritten - netwerking	
16.00 uur	Einde programma	

Outline

- WaterstofNet organisation
- Hydrogen, how does it work?
- Mobility on H2: present status
- Infrastructure for H2 in Europe
  - ❑ Project H2 Benelux
  - ❑ Project H2ME

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- Started in 2009
- Project organisation located in Turnhout and Helmond
- Focus on projects and roadmaps:
  - zero-emission mobility
  - energy storage
- Development, management, realisation, communication
- Cooperation with companies, authorities and knowledge institutes
- Hands-on experience (5y exploitation & maintenance of H2 refuelling station in Helmond & various demonstration projects.

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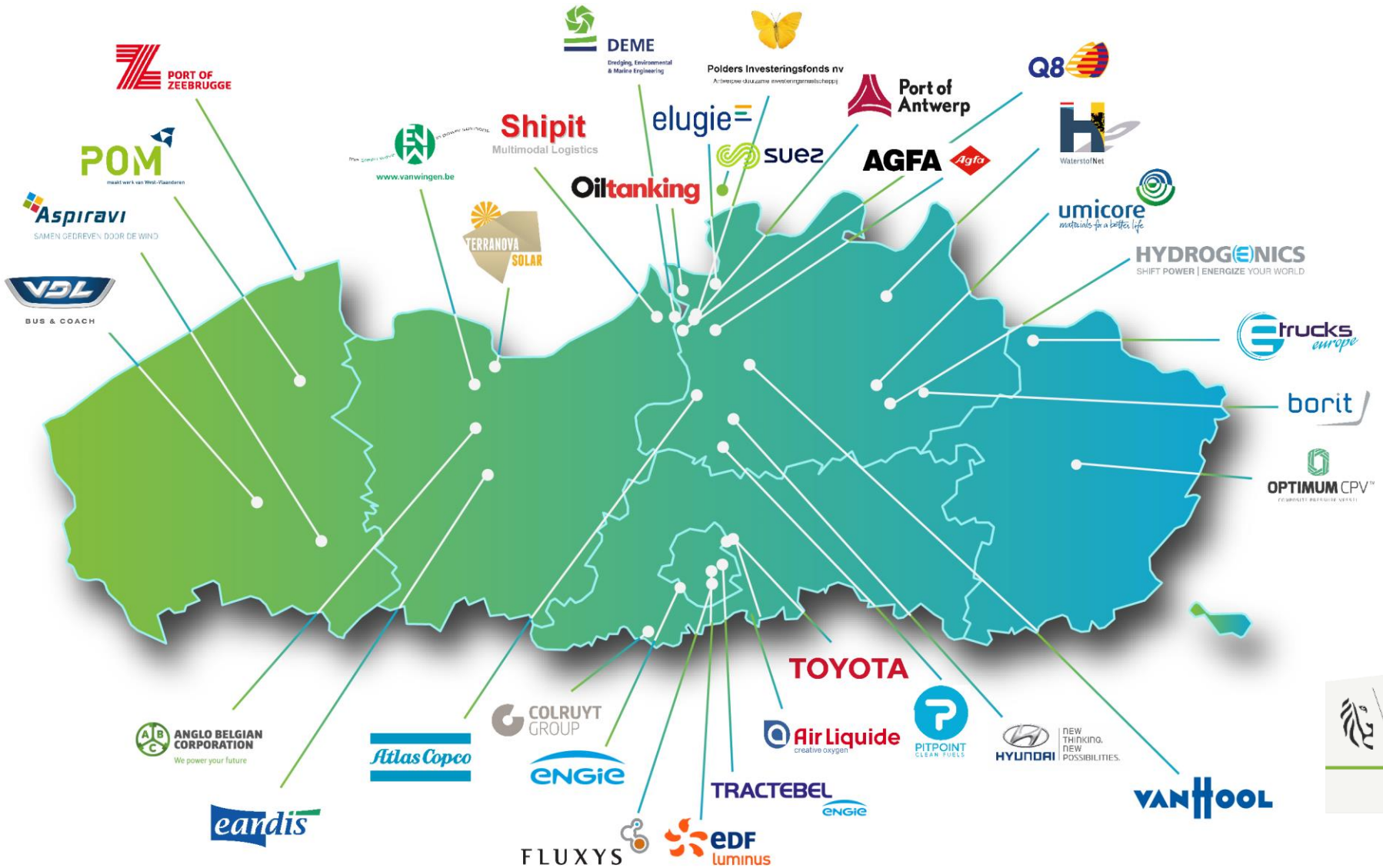

Coordinator of IBN Power-to-Gas
Since sept. 2016

AGENTSCHAP INNOVEREN & ONDERNEMEN
POWERTOGAS Industry Cluster Flanders
Samen voor sterk innoveren

Hydrogen, what is it?

- More than 90% of all atoms on earth
- Nearly always bound to oxygen (water) or carbon (natural gas, oil..)
- Liquid at -253°C

- High energy-content per unit of mass (compared to e.g. batteries)
- Low energy-content per unit of volume (store at high pressure (200-700bar))

- Safety:
  - 14 x lighter than air
  - Specific handling, expertise needed (ignition)

Hydrogen, how does it work?

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Electricity

Hydrogen production and storage

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Electrolysis

$$2\ H_20 + \text{Electricity} \leftrightarrow 2\ H_2 + O_2$$

water *hydrogen* *oxygen*

Fuel cell or combustion engine

Fuel cell in car with electrical engine

Fuel H2-gas

Why vehicles on hydrogen?

H_2

- Large autonomy
  - 500 km - 5 kg - 5 minutes fuelling
- Fuelling speed
- Independent of ambient temperature
- No harmful emissions
- Silent
- Possible on renewable energy

Lower well to wheel efficiency

Similar to Battery Electric vehicles

Electrolysis : 70% effciency (improve to 80%?)
Fuel cell: 50% efficiency (improve to 70%?)

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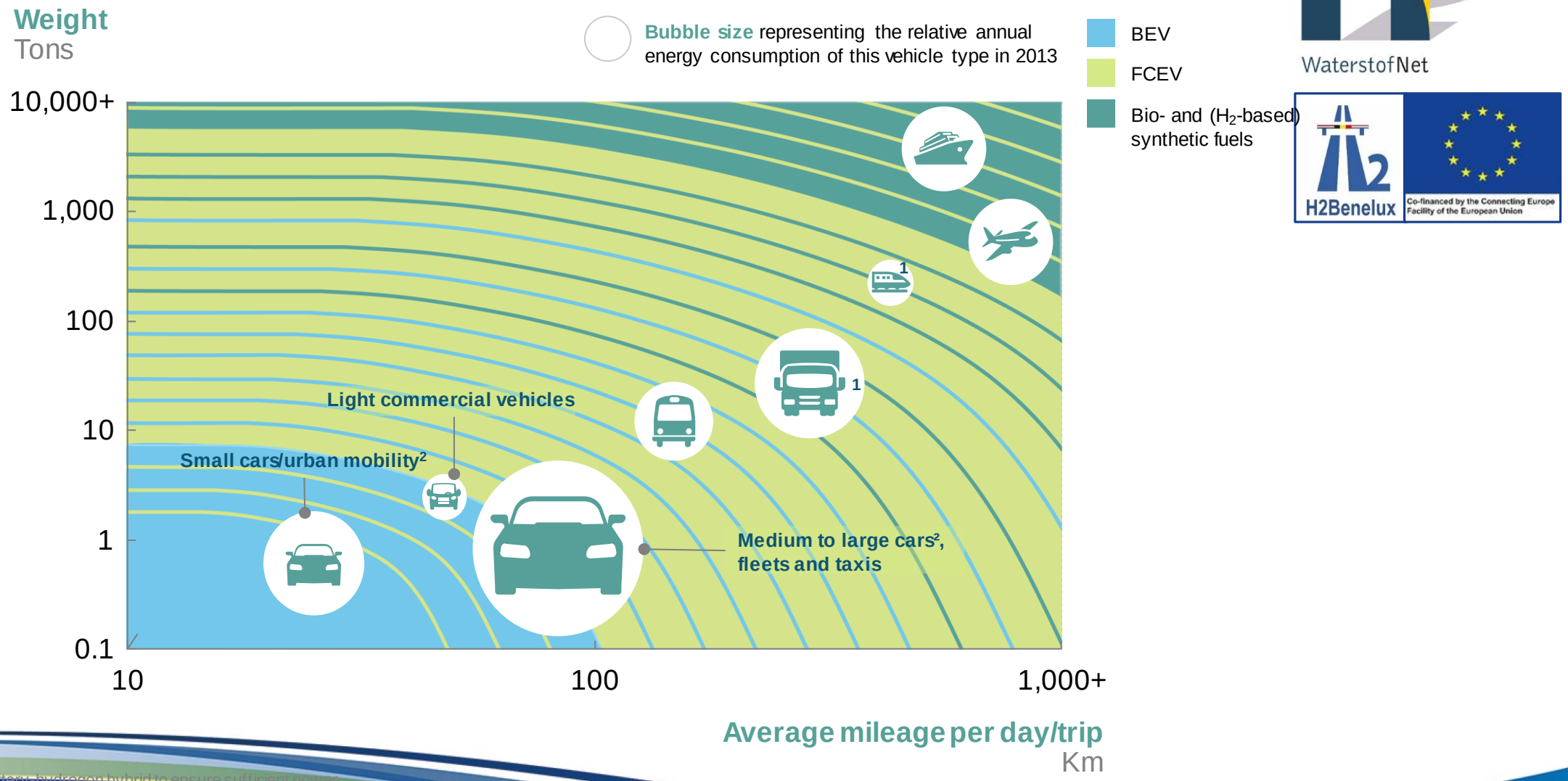
Which segment for H2?



1 Battery-hydrogen hybrid to ensure sufficient power
2 Split in A- and B-segment LDVs (small cars) and C+-segment LDVs (medium to large cars) based on a 30% market share of A/B-segment cars and a 50% less energy demand

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Hydrogen fuelling infrastructure in Belgium

Zaventem


Colruyt /Halle; sinds 8 oktober 2018

Colruyt Halle, voor heftrucks


Haven Antwerpen, voor bussen

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<u>+ planned 2019-2020</u>:

- Antwerpen
- Gent
- Leuven
- Luik

Status vehicles H_2 in Belgium

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Private cars
- 2018: Toyota & Hyundai
- 2019-2020: BMW, Mercedes
- 30 cars in Belgium

Buses
- Van Hool- 5 buses in Antwerp

Waste collecting vehicles
- E-trucks, production Lommel
- First demo in Eindhoven 2013
- Demonstrations 2019 in BE

Trucks
- VDL (NL)
- Demonstrations 2019 in BE

Schips
- 2018: Hydroville, CMB
- Prototype developments

H2BeNeLux

“A real life trial preparing hydrogen mobility along the TEN-T corridors in Belgium, the Netherlands and Luxembourg”

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Project information:

Project ID:	2016-EU-TM-0175-S
Maximum grant:	7.2 M€
Total budget:	17.4 M€
Co-funding:	European Unions’ Connecting Europe Facilities (CEF) Demonstratieregeling Klimaattechnologieën en -innovaties in transport (DKTI Transport) van de Rijksdienst voor Ondernemend Nederland
End date:	31 December 2020

Main objective

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Initiate the roll out of a basic network of hydrogen refuelling stations in the BeNeLux through the deployment of…

- **8 hydrogen refuelling stations**
- **80 fuel cell electric vehicles**

…in 2020 along the BeNeLux sections of the Trans-European Transport (TEN-T) Network Corridors, thereby interconnecting the neighbouring hydrogen refuelling station networks (Germany, United Kingdom, France) to enable the creation of a sufficiently covered, European wide network of hydrogen refuelling stations.

Partners

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COLRUYT GROUP

PITPOINT CLEAN FUELS

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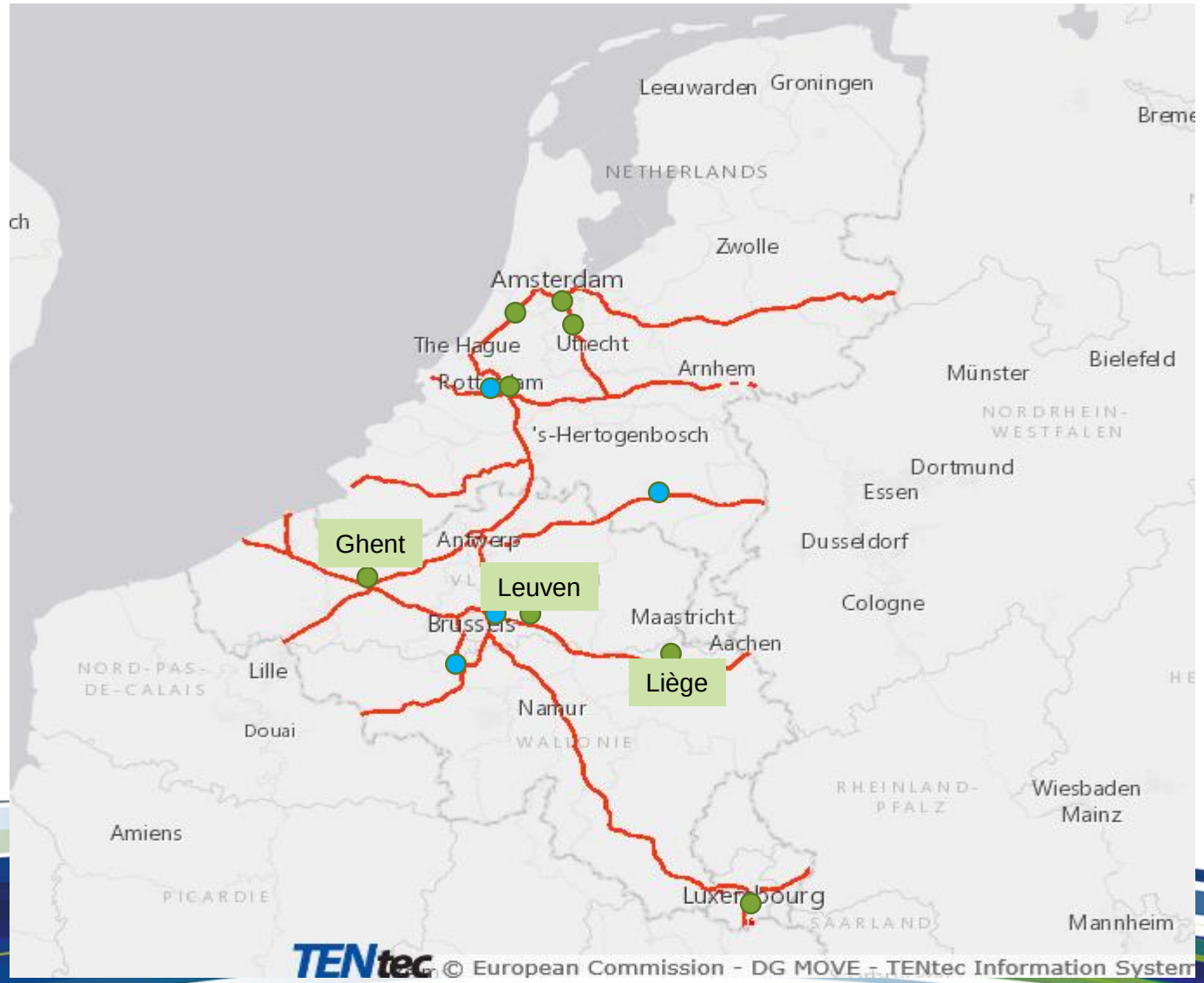
Rijkswaterstaat
Ministry of Infrastructure and the Environment

Locations



- H2Benelux 70 MPa hydrogen refuelling stations
- Existing 70 MPa hydrogen refuelling stations

H2Benelux will as well...

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... assess the techno-economic performance of the stations under daily utilization

... assess the environmental performance of the use of hydrogen produced from conventional energy sources: trucked in or on-site produced from renewable sources

... monitor and improve the technical viability and operational efficiency of the stations

... optimise business client relationship to prepare the basis for the roll-out in the market

... develop a business case for each station using a demand-led business model to further boost the deployment of hydrogen as alternative fuel in the BeNeLux and to finance the future roll out of the stations

.... and ...

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H2Benelux will as well...

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... identify and incorporate focus groups of end-users in order to accomodate for the 10 fuel cell electric vehicles per station

Therefore, we would like that those serious end-users,
who are interested in acquiring a fuel cell electric vehicle,
knowing that a hydrogen station will be opened in 2020,
to make themselves known to us,
so that we can follow-up on your interest

Contact details

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Project information and status update H2ME 1&2

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- WaterstofNet is the observer coordination partner for:
  - BeNeLux
  - Austria
  - Italy

Hydrogen Mobility Europe

A project co-funded by under the Grant Agreement n.671438

FCH | FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

H2ME brings together high level partners from different initiatives in a European approach

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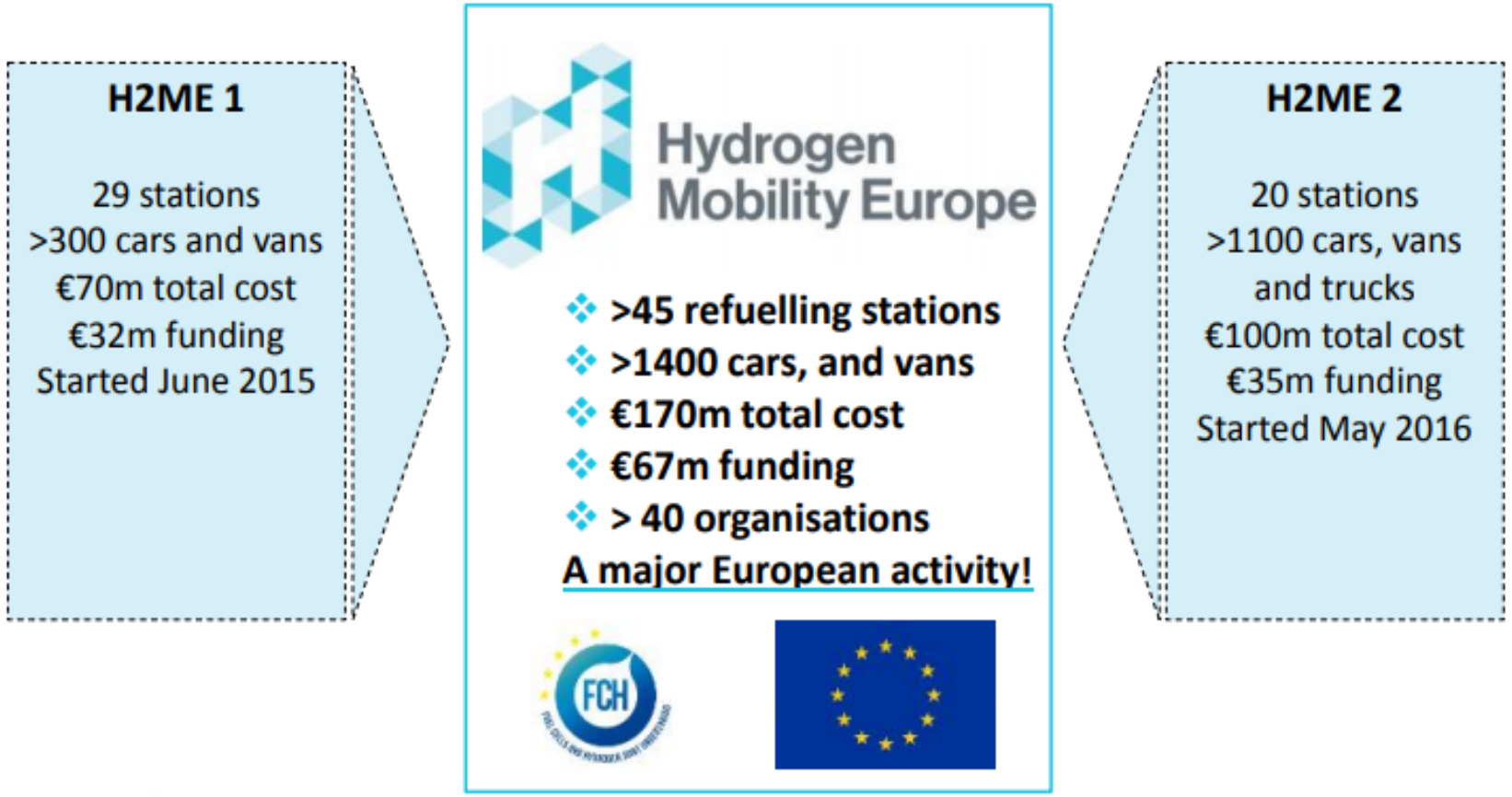
Hydrogen Mobility Europe

H2ME – a major pan-European effort to support commercialization. These activities are part of a much larger vehicle and HRS rollout in Europe



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Hydrogen Mobility Europe

H2ME initiative (2015 – 2022)
Project overview

New hydrogen refuelling stations:

- **20** - 700bar HRS in Germany
- **11** - 350bar and 700bar HRS in France
- **11** - 700bar HRS in Scandinavia
- **6** – 350bar and 700bar HRS in the UK
- **1** - 700bar HRS in NL

Fuel cell vehicles:

- **500** OEM* FCEVs
- **900** fuel cell RE-EV vans

Hydrogen rollout areas:

- Scandinavia, Germany, France, UK, The Netherlands

Observer coalitions:

- Belgium, Luxembourg, and Italy

Industry observer partners:

- Audi, BMW, Nissan, Renault, Renault Trucks, AGA, OMV

Proposed HRS locations under H2ME-1
Proposed HRS locations under H2ME-2

*OEM refers to original equipment manufacturer

HRS: Hydrogen Refuelling Station
FCEV: Fuel Cell Electric Vehicle
RE-EV : Range-Extended Electric Vehicle

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Hydrogen Mobility Europe

Vehicles deployed under H2ME initiative

Deployment of partner models

Daimler B-Class F-CELL

- 700 bar hydrogen tank
- 40 already deployed

Daimler GLC F-CELL

- 700 bar hydrogen tank
- 150 being deployed

Toyota Mirai

- 700 bar hydrogen tank
- 100 being deployed

Honda Clarity Fuel Cell

- 700bar hydrogen tank
- 10 already deployed

Renault Kangoo ZE RE H2

- 5kW fuel cell module with 350-bar
- >900 being deployed

Symbio 3.1t light commercial vehicle

- 350bar hydrogen tank
- 3 being deployed

Other vehicles procured

300 other vehicles will be procured by project partners e.g. in Paris and in Hamburg

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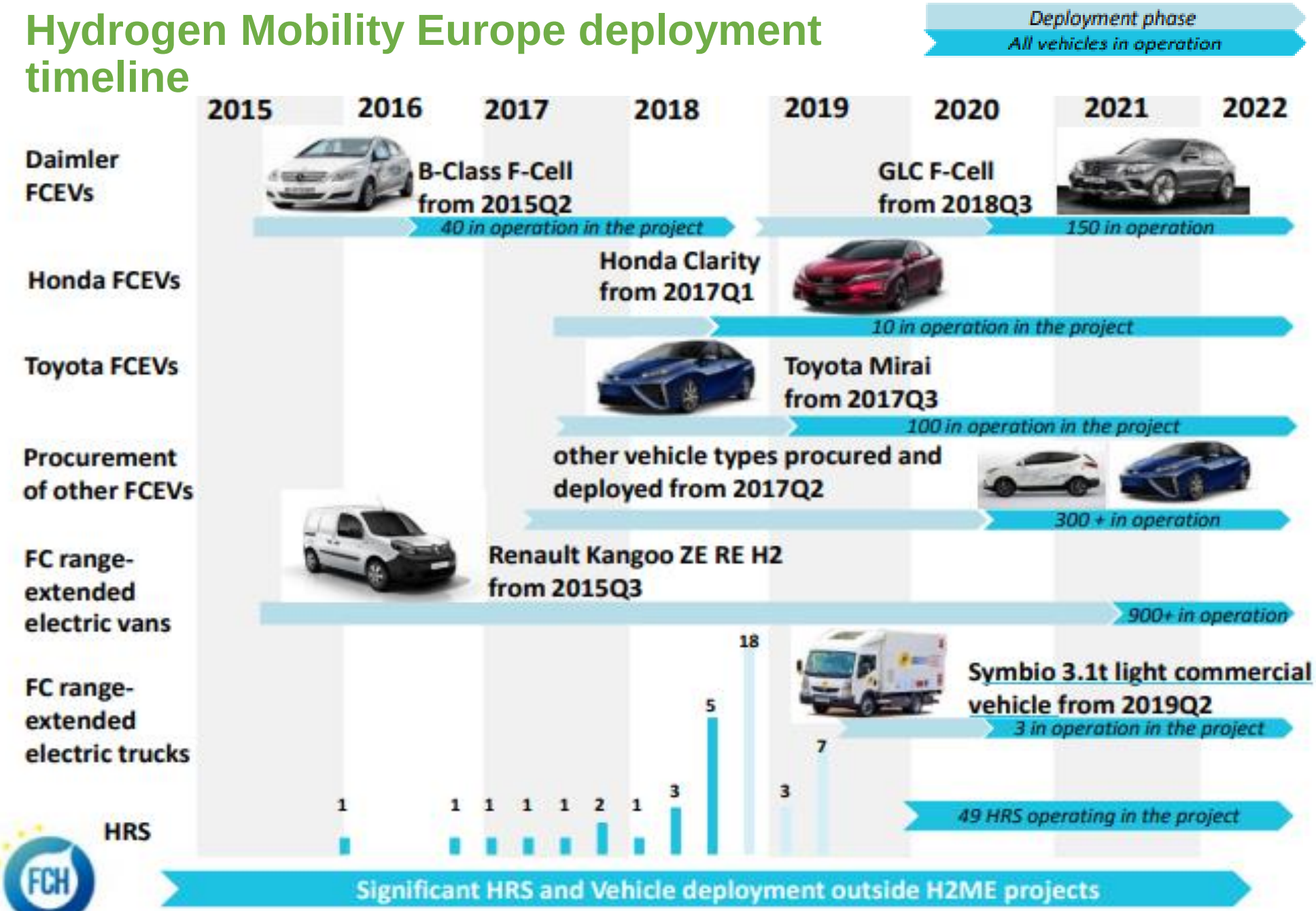
Hydrogen Mobility Europe deployment timeline



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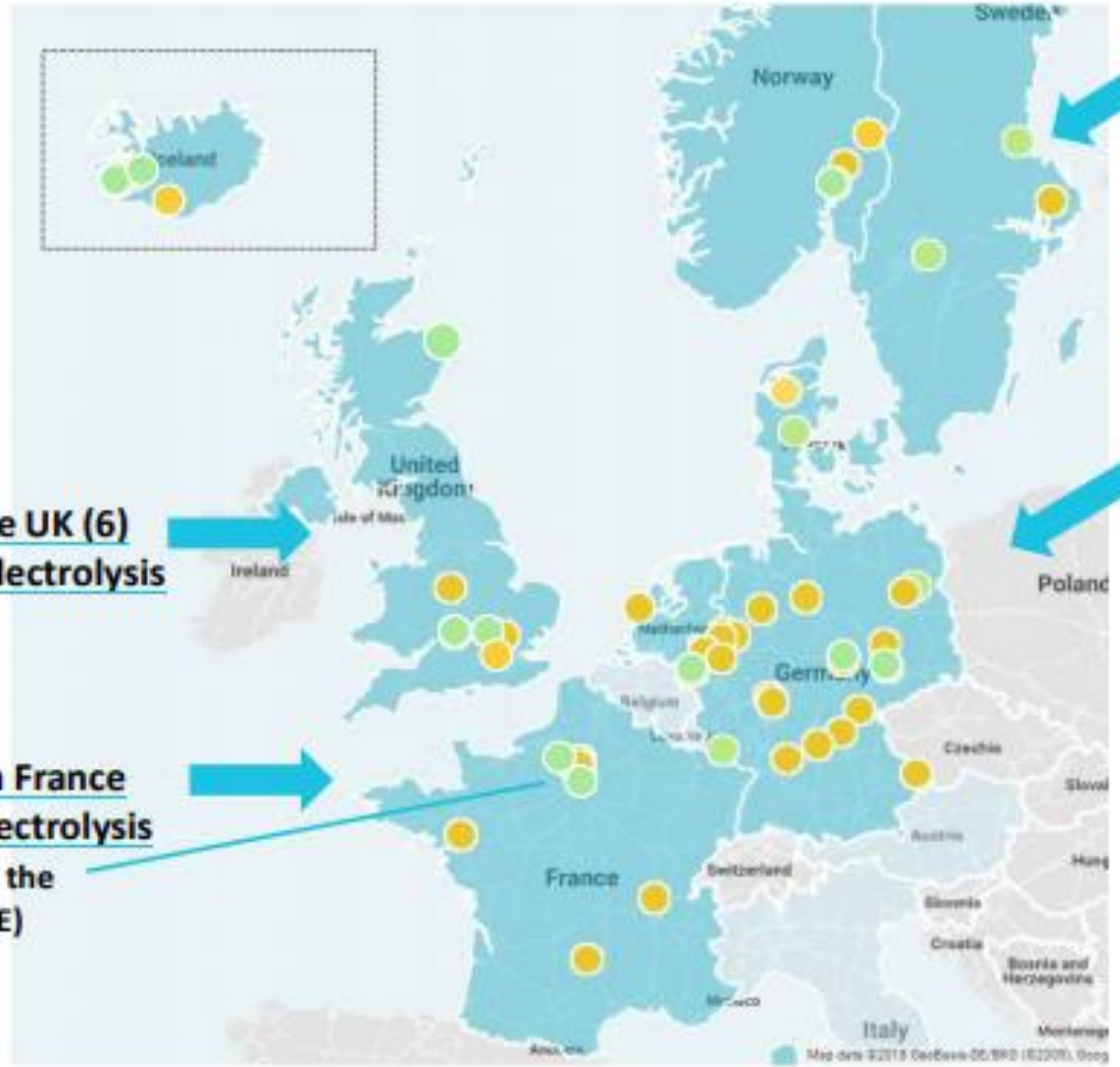
Hydrogen Mobility Europe

Deployment of HRS to date H2ME initiative

15 HRS and 360 vehicles have been deployed to date:

- 170 Renault Kangoo vans
- 40 B Class F-CELL
- 80 Toyota Mirai
- 10 Honda Clarity
- 60 vehicles procured by project partners



6 HRS operational in Scandinavia (11) including 3 with on-site electrolysis)

3 HRS operational (20) in Germany

3 HRS operational in the UK (6) including 2 with on-site electrolysis

3 HRS operational (11) in France including 1 with on-site electrolysis

(7 HRS planned in total for the Paris region within H2ME)

**Numbers in brackets () denote the total number of HRS planned for deployment under the H2ME initiative*

***Significant HRS and Vehicle deployment is taking place outside of the H2ME initiative*

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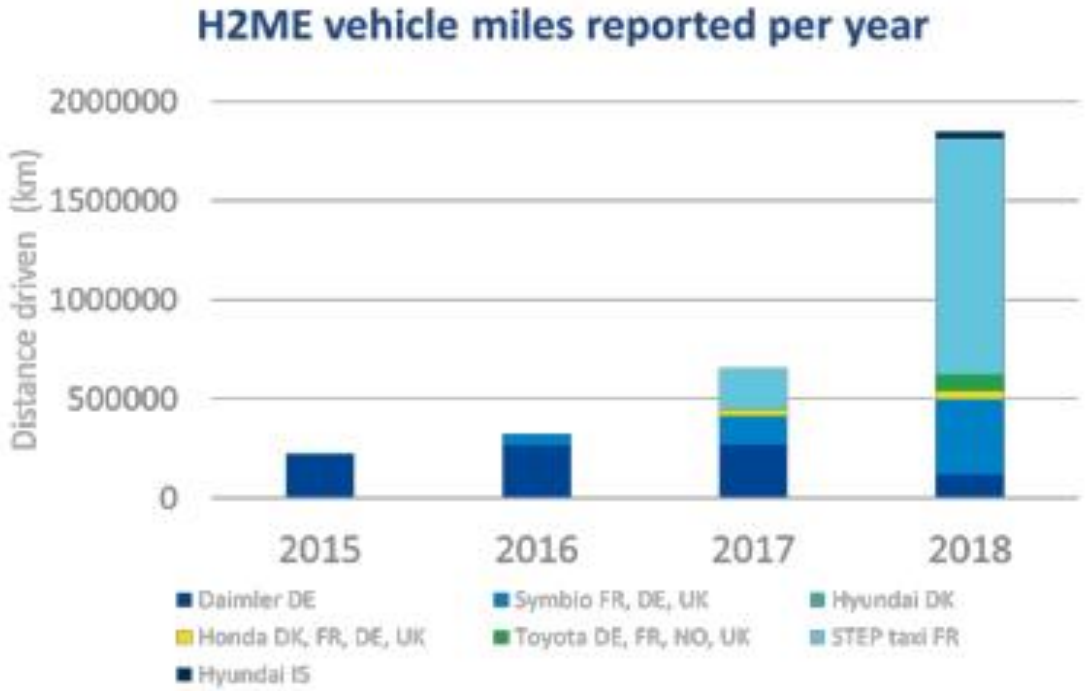
Hydrogen Mobility Europe

Deployment of cars H2ME initiative

To date, 360 vehicles have been delivered to end-users



Operating profiles

The vehicles in the project are being demonstrated across a wide range of use cases including:

- Private usage
- Fleet operation e.g. taxis, car leasing companies, fire service
- Business operations for delivery van drivers

Project vehicles have recorded ***3 051 950 km*** driven since the first FCEVs were deployed in Germany in Q3 2015 with 1 390 000 km accumulated by the STEP taxi fleet since August 2017 alone.

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Hydrogen Mobility Europe

Acknowledgements

▪ These activities have received funding from the **Fuel Cells and Hydrogen 2 Joint Undertaking** under grant agreement No 671438 and No700350. This Joint Undertaking receives support from the **European Union**'s Horizon 2020 research and innovation programme, the New European Research Grouping on Fuel Cells and Hydrogen ("**N.ERGHY**") and **Hydrogen Europe**.