# Hydrogen refuelling station deployment in Europe

## *EU project perspective: H2Benelux & Hydrogen Mobility Europe (H2ME)*

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**Mondorf-les-Bains, 21 February 2019**

# Outline

- ✓ WaterstofNet
- ✓ Power-to-Gas cluster
- ✓ Hydrogen station deployment in Europe
  - ✓ Hydrogen Mobility Europe
  - ✓ H2Benelux

# WaterstofNet

*Introduction*

- ✓ Founded in 2009
- ✓ Non-for-profit organisation with 8 employees
- ✓ Located in Turnhout (BE) and Helmond (NL)
- ✓ Cross border project development: BE and NL
  - ✓ Zero-emission mobility
  - ✓ Energy storage
- ✓ Cooperation with companies, authorities and knowledge institutes
- ✓ Hands-on project experience through demonstrations

# WaterstofNet

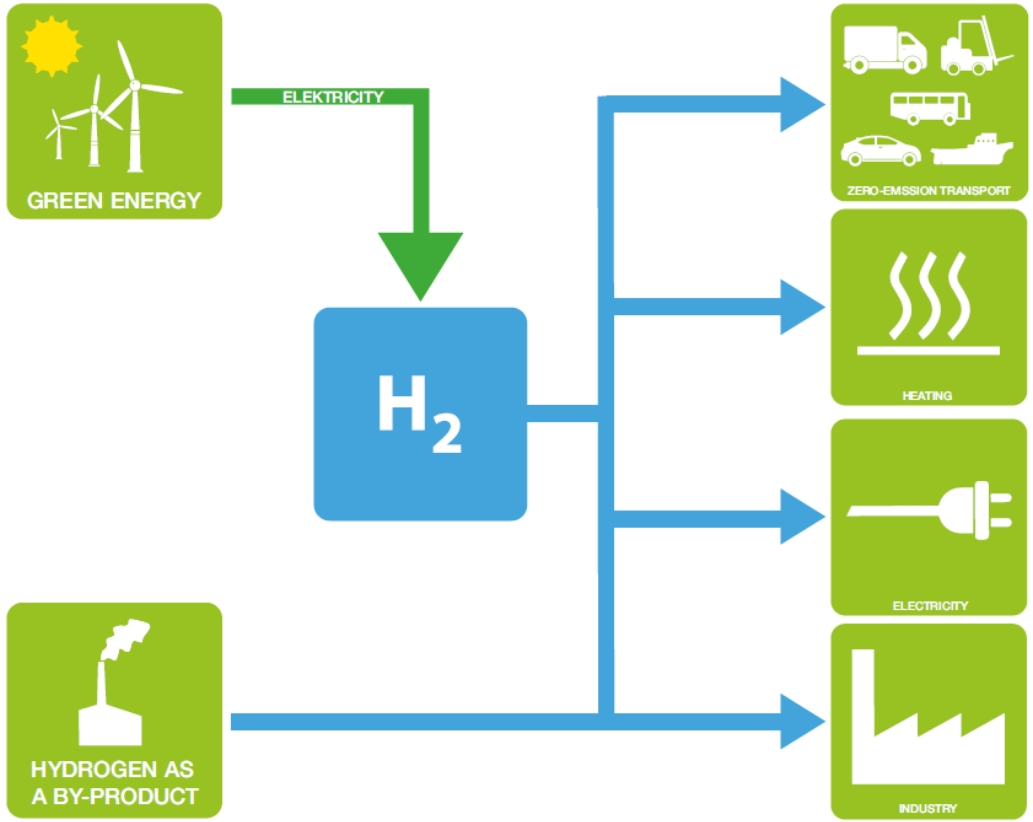
*Core activities*

develops and realises sustainable hydrogen projects

develops and coordinates industrial ecosystems for hydrogen, such as the Power to Gas corporate cluster

is a part of international hydrogen development networks (IEA, Hydrogen Europe, etc.)

creates roadmaps for hydrogen infrastructure and applications



# WaterstofNet

*Project portfolio evoluation*

PtG cluster

**2009 - 2012**

electrolysis

Construction of refuelling station in Halle

Demonstration of hydrogen-fuelled forklifts

Conversion of refuse trucks to hydrogen

by-product

1 MW fuel cell plant running on residual hydrogen

**2012**

Wind energy, hydrogen, forklifts and smart grid

Strategic vision for opportunities for hydrogen in the North Sea region

**2013**

Demonstration of four buses with fuel cells in four European cities

electrolysis

Construction of refuelling station in Helmond

Bus with hydrogen-powered range extender

Hydrogen-fuelled watercraft

**2014**

Hydrogen-fuelled car at WaterstofNet

Road map for hydrogen infrastructure in Belgium

Road map study for power-to-gas

**2015**

Large-scale implementation of hydrogen fuelled vehicles and hydrogen refuelling stations

Demonstration of two refuse trucks running on hydrogen in 10 European cities

Demonstration of 29 hydrogen-fuelled buses in 5 European cities

**2016**

Indoor refuelling for a large fleet of forklifts and expansion of refuelling station to public refuelling station

Expansion of refuelling station in Helmond

trucked-in

Mobile hydrogen refuelling station

electrolysis

Development and construction of two hydrogen refuelling stations in Wilrijk and Breda

Conversion of 44 ton trucks to hydrogen

Demonstration of two articulated buses running on hydrogen

**2017**

8 hydrogen refuelling stations in Benelux

80 hydrogen-fuelled cars in Benelux

Conversion of 28 ton trucks to hydrogen

Analysing the barriers to large-scale implementation of hydrogen

Potential study for green hydrogen

Green hydrogen certification

Smart battery and hydrogen-integrated energy-storage

**2018 - 2020**

Demonstration of 15 refuse trucks running on hydrogen in 8 European cities

electrolysis

Large-scale hydrogen production in a port environment

# Power-to-Gas company cluster

- ✓ Coordindated by WaterstofNet
- ✓ 39 cluster members across the whole value chain
- ✓ Initiated based on opportunities identified in Power-to-Gas roadmap study
- ✓ Activities of the cluster:
  - ✓ Development and realisation of PtG projects
  - ✓ Development of business models
  - ✓ Knowledge exchange and creation regarding PtG concepts
  - ✓ Profiling of regional industry within the European PtG market
  - ✓ Collocutor for startegic discussions concerning the transition to renewable energies and the potential of hydrogen

# Power-to-Gas company cluster

*Members in the value chain*

AGENTSCHAP INNOVEREN & ONDERNEMEN

POWERTOGAS Industry Cluster Flanders

Samen voor sterk innoveren

WaterstofNet

**Production & Trade Renewable Energy** → **Grid-operators** → **$H_2$ Technology** → **System integrators** → **$H_2$ Application**

- Aspiravi
- COLRUYT GROUP
- EDF luminus
- Eneco
- ENGIE
- Polders Investeringsfonds nv
- TERRANOVA SOLAR
- SUEZ

- fluvius. Tot bij u
- FLUXYS

- AGFA
- Air Liquide
- ANGLO BELGIAN CORPORATION
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- www.vanwingen.be
- HYDROGENICS
- COCAS
- PLASTIC OMNIUM
- SIEMENS
- umicore

- DEME
- POM
- Port of Antwerp
- TRACTEBEL
- PORT OF ZEEBRUGGE
- Oiltanking
- WaterstofNet

- trucks europe
- HYUNDAI
- PITPOINT CLEAN FUELS
- Q8
- Shipit
- TOYOTA
- VDL BUS
- VANHOOL

# Hydrogen fuelling station deployment in Europe

- ✓ 152 hydrogen stations in Europe
- ✓ 14 European countries with at least 1 station
- ✓ 350 and 700 bar refuelling stations
- ✓ Germany: 60 hydrogen stations
- ✓ Considerable expansion expected

- ✓ Station deployment through national and European programs
  - ✓ Hydrogen Mobility Europe
  - ✓ H2Benelux

# Hydrogen Mobility Europe (H2ME)

*Major pan-European effort to support commercialization of HRS and FCEV in Europe*

WaterstofNet

**H2ME 1:**

- DE, FR, UK, Scandinavia
- 29 HRS
- > 300 FCEV and vans
- 72 M€ (32 M€ funding)
- 2015 - 2020

**49 HRS**

**> 1400 H2 vehicles**

**H2ME 2:**

- H2ME1 + NL
- 20 HRS
- > 1100 FCEV, vans & trucks
- 103 M€ (35 M€ funding)
- 2016 - 2022

Hydrogen Mobility Europe

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

FCH

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

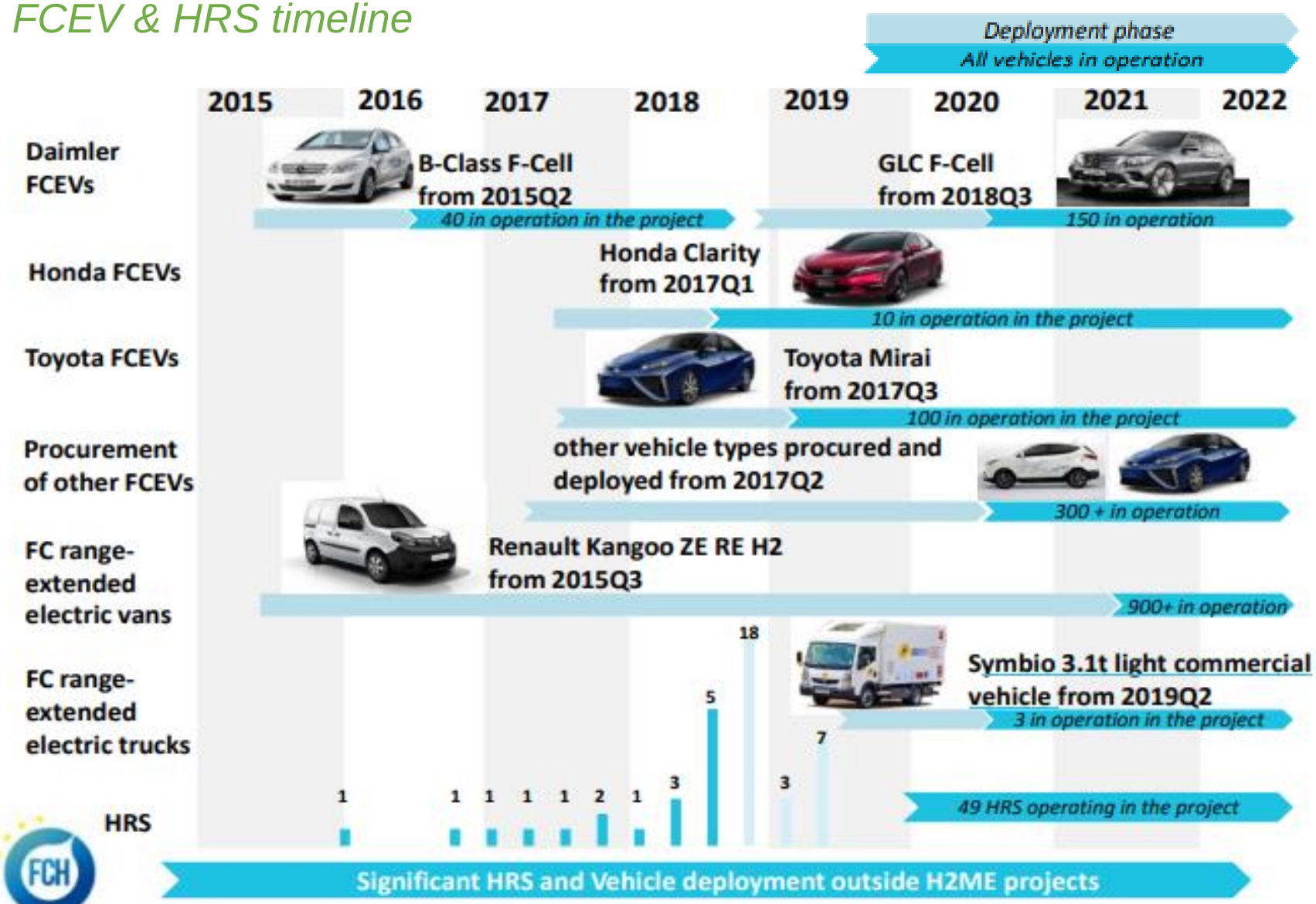
# Hydrogen Mobility Europe (H2ME)

*Partners*


*H2ME receives 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**.*

# Hydrogen Mobility Europe (H2ME)

*FCEV & HRS timeline*

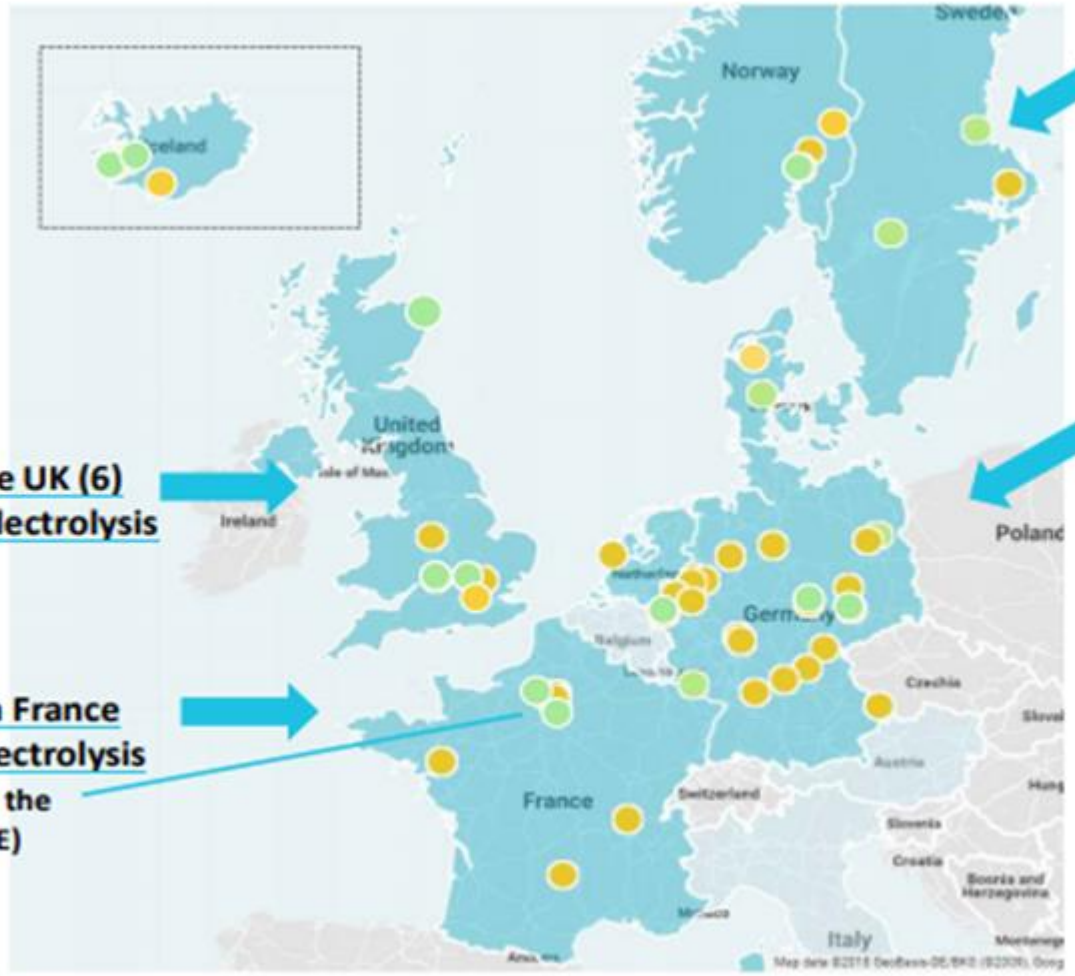


# Hydrogen Mobility Europe (H2ME)

*Status and plans for deployment*

**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)**

**Car users:**

Private usage

Fleet owners

Business operations for delivery van drivers

**But what about BeNeLux?**

**Almost a blind spot but required to connect/complement/complete important corridors**

**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*

# H2BeNeLux

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

**Project information:**

| | |
|---|---|
| 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 |
| Partners: | |

WaterstofNet

COLRUYT GROUP

PITPOINT CLEAN FUELS

Rijkswaterstaat
*Ministry of Infrastructure and the Environment*

# H2BeNeLux

*Main objective*

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.

# Hydrogen station deployment in Benelux

*H2Benelux considations*

- ✓ 8 operational hydrogen stations in BeNeLux
- ✓ 4 hydrogen stations: 700 bar, fast fill
  - 2 NL (Rhoon, Helmond)
  - 2 BE (Zaventem, Halle)
- ✓ H2BeNeLux stations considered:
  - NL: regions Amsterdam, Utrecht, Rotterdam
  - BE: regions Ghent, Leuven, Liège
  - Luxembourg


**Operational hydrogen stations Benelux**

700 bar

350 bar

**H2Benelux stations**

700 bar

# H2Benelux will as well...

... 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 ...

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

# H2Benelux will...

... 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 could 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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