



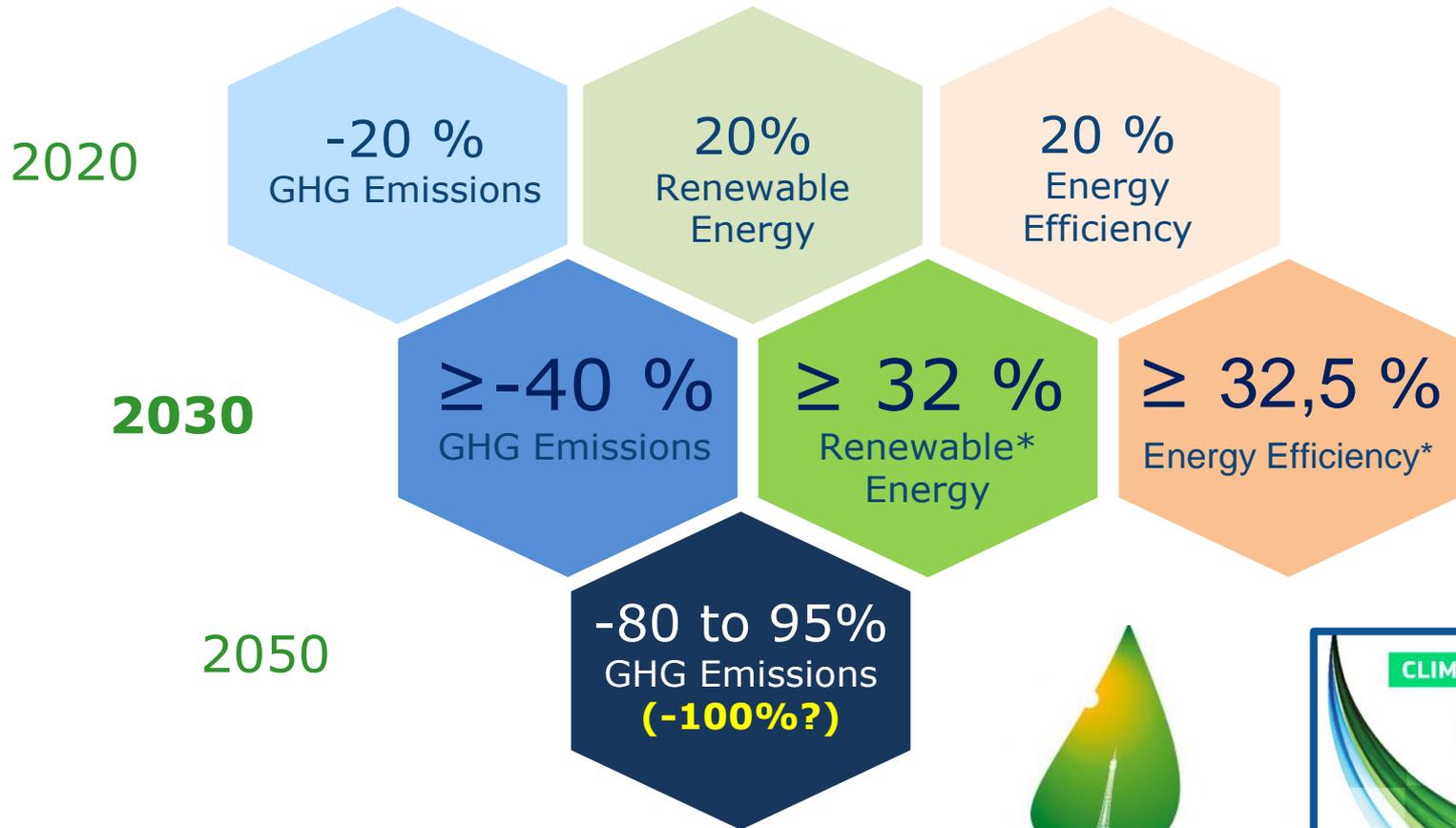
IPHE Industry Forum: Getting hydrogen to scale – the EU approach

5 December 2018, Pretoria, South Africa

José Cotta
Head of Unit

DG Research & Innovation, European Commission

European Union's targets for climate & energy

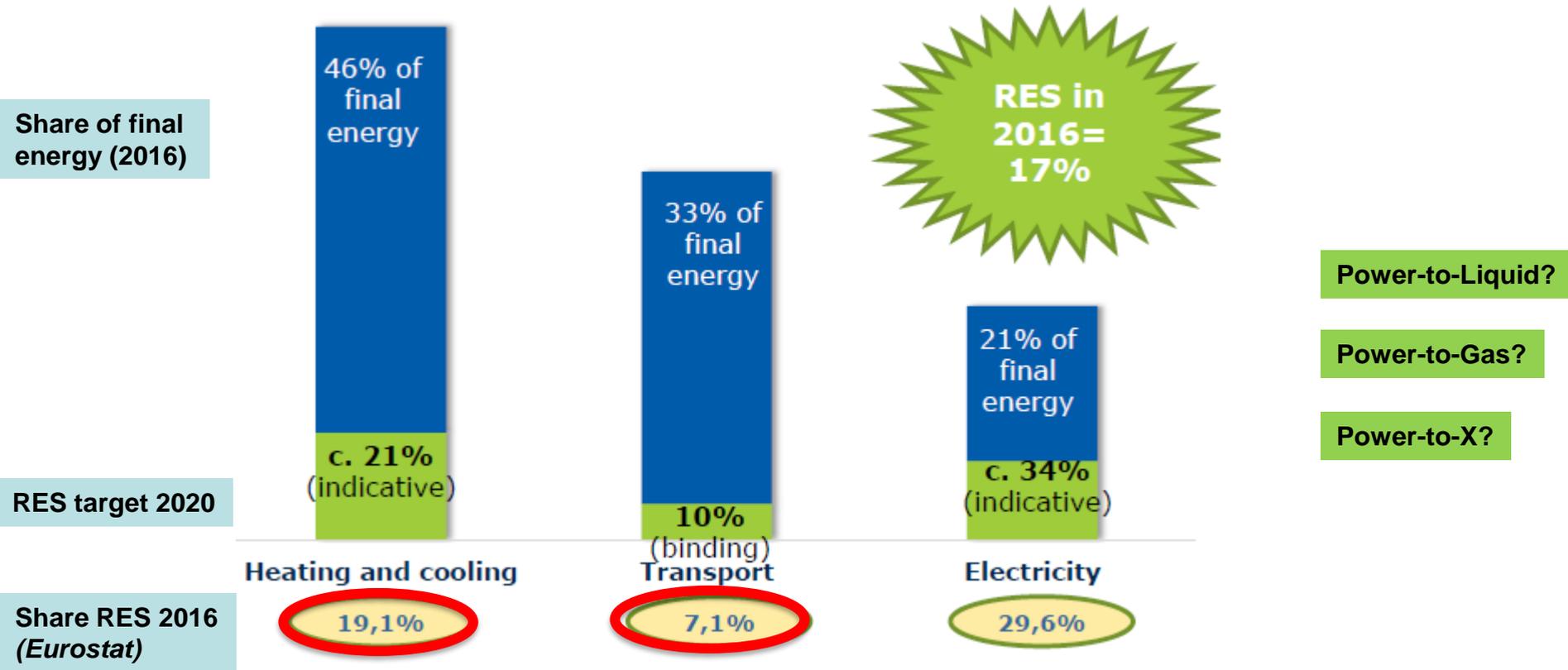


*targets revised upwards in 2018



The Challenge: All sectors need to be decarbonised

Renewables in the EU - progress per sector

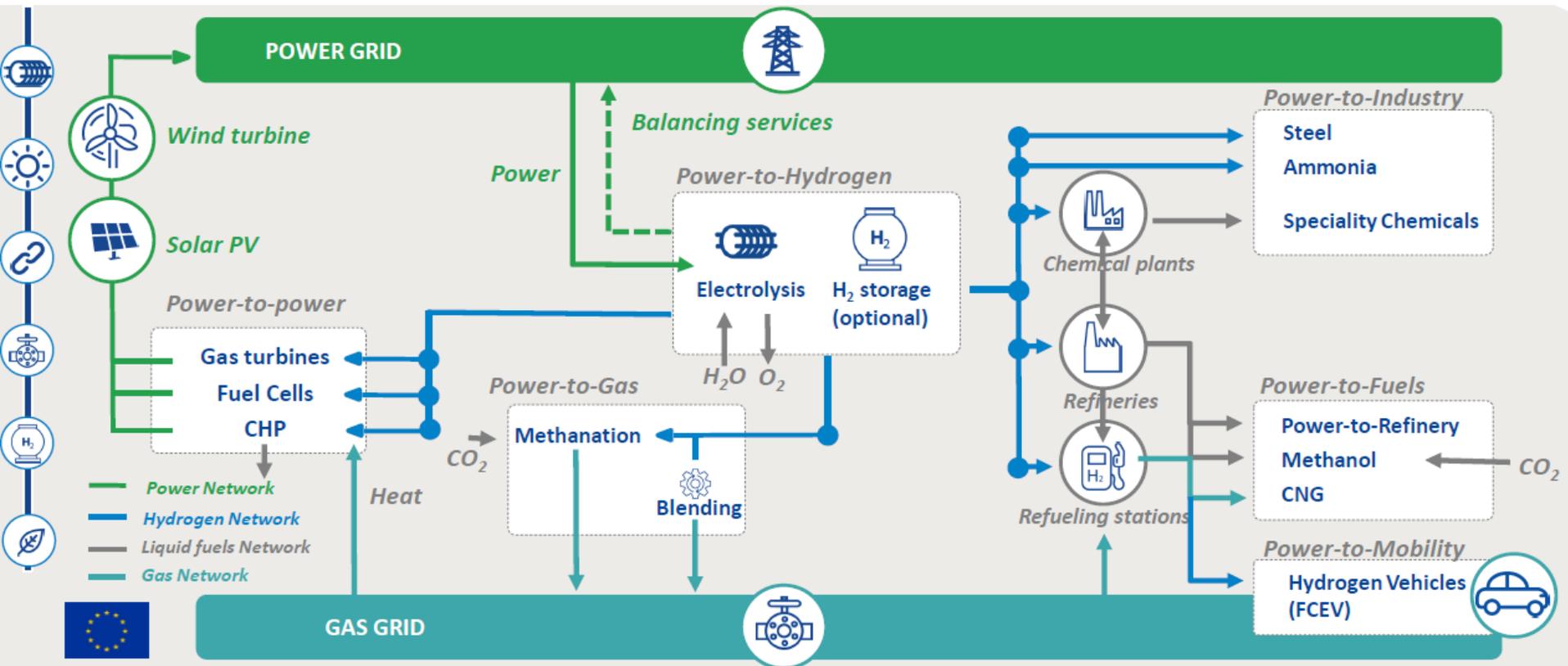


→ Need to channel (excess) renewable electricity to transport, buildings & industry while safeguarding the stability of the system based on intermittent RES

Hydrogen: Connecting Electricity, Gas & Mobility

European Commission

→ Hydrogen allows more renewables in the energy system, enables sector-coupling & boosts system efficiency. It is one of the most promising options for deep decarbonisation.



Source: Fuel Cells and Hydrogen Joint Undertaking

→ These benefits now need to be demonstrated and validated in the field to allow the sector to scale

SUPPLY PUSH: Fuel Cells and Hydrogen Joint Undertaking

European Commission

FCH JU - key EU instrument for hydrogen related R&I, from TRL 2 up to pilot deployment



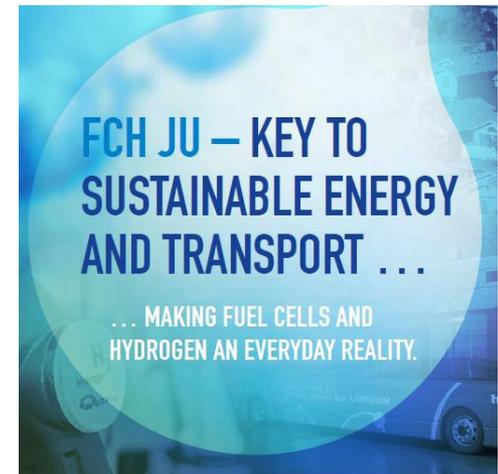
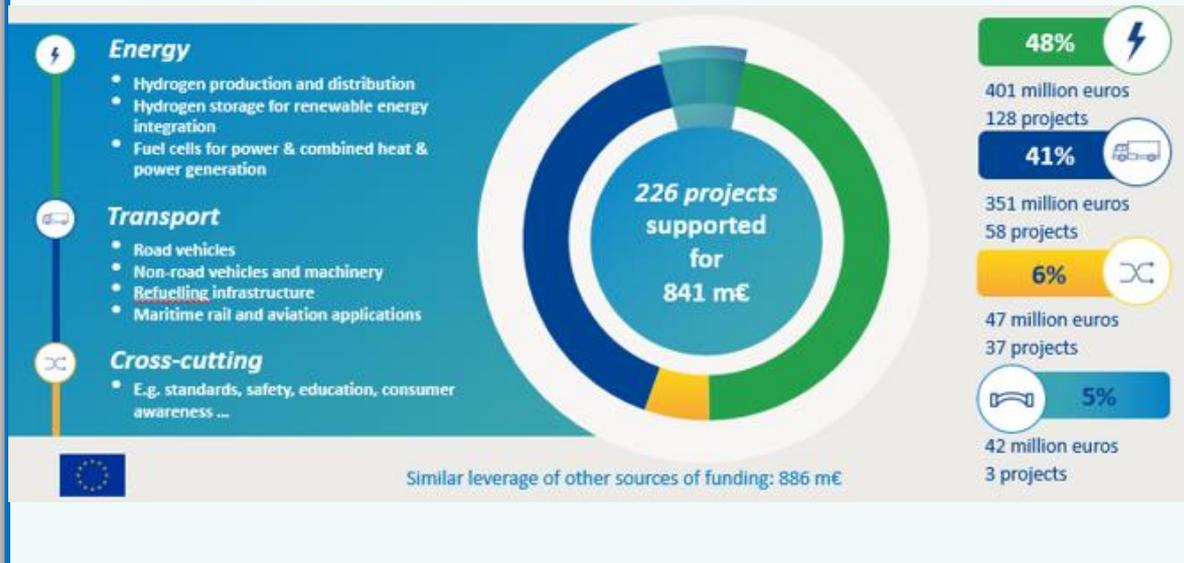
Industry Grouping
Over 130 members
~ 50% SME



Research Grouping
~70 members

Strategic objective:
bring FCH technologies to the point of market readiness by 2020

EU funding 2014-2020:
665M€
(2008-2014: 470M€)



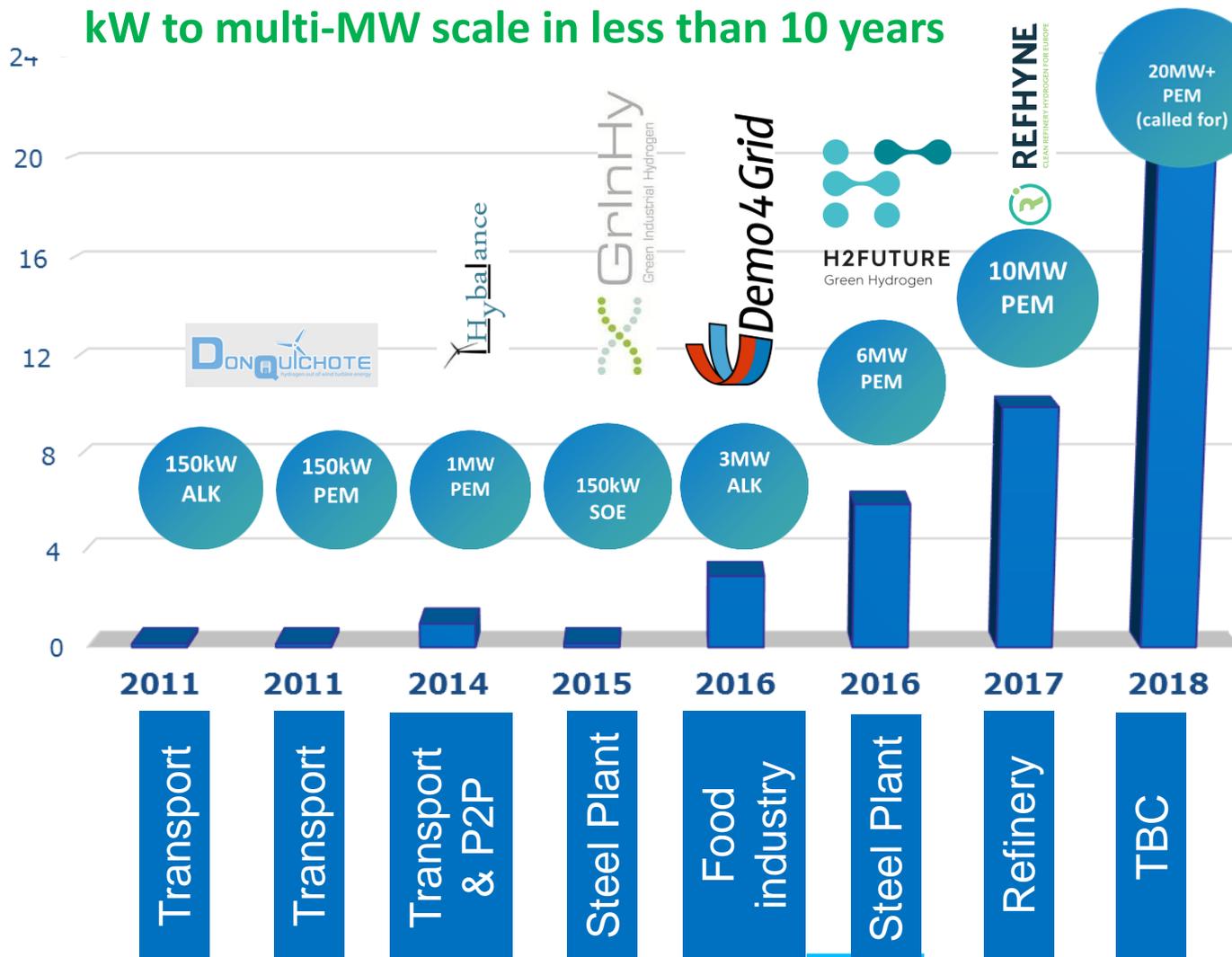
Example 1: Electrolysis - key enabling technology for energy storage & greening of industry



European



Evolution of FCH JU's electrolyser projects: from kW to multi-MW scale in less than 10 years



H2FUTURE project:

Project duration:
Jan 2017- June 2021 (4.5 years)

Total budget: 18M€
FCH JU funding: 12M€

Consortium partners:
VERBUND (coordinator),
Voestalpine Steel, K1
MET, Siemens, Austrian
Power Grid AG, TNO

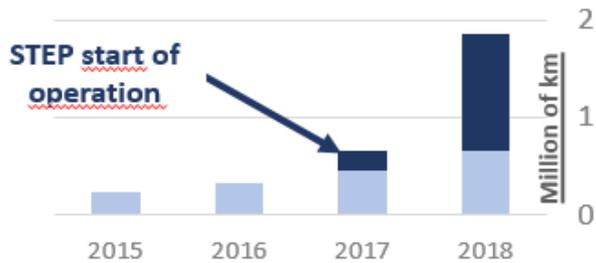
Scope: A 6MW PEM
electrolyser to be
integrated in the steel
making process and
provide grid services

Example 2: FCEV pilot deployments – from dispersed trials to fleets, fleets, fleets

European Commission

Fleet operation in H2ME & ZEFER projects

Vehicle usage in fleet operation



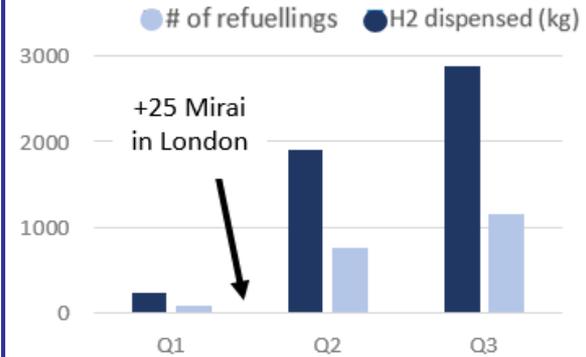
49 stations
 >1400 cars and vans
 €170m total cost

€67m funding
 >40 organisations

A major European activity!



HRS response to fleet operation (2018)



HRS high quality service required:

- Constant use
- Integrated in gasoline station forecourt
- Back-to-back refuelling
- Proprietary « App » for HRS status



60
 vehicles will be deployed in Hype by STEP taxi fleets in Paris



60
 vehicles will be deployed in Hype by BREATH taxi fleets in Brussels



50
 private hire vehicles will be deployed by Green Tomato Cars in London



10
 vehicles will be deployed to Metropolitan Police fleets in London



Zero Emission Fleet Vehicles for European Roll-out

Taxi fleet (STEP) in Paris

- July 2017 – Sept. 2018: furthest distance travelled by one of the vehicles is 72.836km
- ~ 4-6.000km/month/taxi in Paris
- 2 shifts operation

Example 3: Emerging applications - heavy duty, rail & waterborne – 1ST projects are lining up

European Commission



FCH 2 JU & S2R JU: HYDROGEN TRAIN WORKSHOP
Hosted by HyER.

Monday, 15th May 2017

42% of EU railway not electrified; FC train cost half of the investments versus electrification



Heavy duty trucks responsible for 25% of road sector's GHG emissions but a challenging application for batteries; a niche for hydrogen

JOINT WORKSHOP ON MARITIME AND PORT APPLICATIONS

15-16 June 2017 - Valencia, SPAIN

Maritime sector & ports under pressure to decarbonise; hydrogen seen as key enabling technology



Topics called in FCH JU's Calls for Proposals:

FCH-01-2-2018: Demonstration of Fuel Cell applications for mid-size passenger ships or inland freight

FCH-01-1-2018: Large Scale Demonstration of H2 fuelled HD Trucks with High Capacity Hydrogen Refuelling Stations (HRS)

FCH-01-7-2018: Improvement of innovative compression concepts for large scale transport applications

FCH-01-7-2017: Validation of Fuel Cell Trucks for the Collect of Urban Wastes

Fuel cell for railway – FCH JU & Shift2Rail JU launch a new study

March 19, 2018

Category: Latest News



Research and Innovation

Example 4: Stationary fuel cells – provision of sustainable heat and power

European Commission

30 trial/demonstration projects financed to date with 160M€

DEPLOYING:

3,800 μ -CHP units
1 MW_e commercial
3 MW_e industrial
>500 kW_e off-grid/backup



Domestic solutions:
on-track for
commercialisation



Clean solutions
for commercial
buildings are
ready



Exporting
industrial CHP

Off-grid / backup power:

PoC with promising results <7 kW_e range:

50% elec. efficiency proven
Stack durability 10,000 h
System lifetimes 10 y claimed
CAPEX 4000 €/kW_e at mass production claimed



Demonstrations to follow as from next year for SOFC remote power applications

Containerised portable PEMFC gensets to be demonstrated soon



2 MW_e Fuel Cell in a Chlor-alkali plant, China

- H₂ by-product as fuel
- Over 1 year operation
- ~50% elec. eff. recorded



Research and Innovation

EVERY
WHERE ⁹

Example 5: Blueprints of small “H2 Valleys” already exist



Orkney Islands- a model hydrogen territory

Project: BIG HIT

<http://https://www.bighit.eu/>

Type of project: Demonstration

Duration: 01/05/2016 > 30/04/2021

Project Budget: 7.2 M €

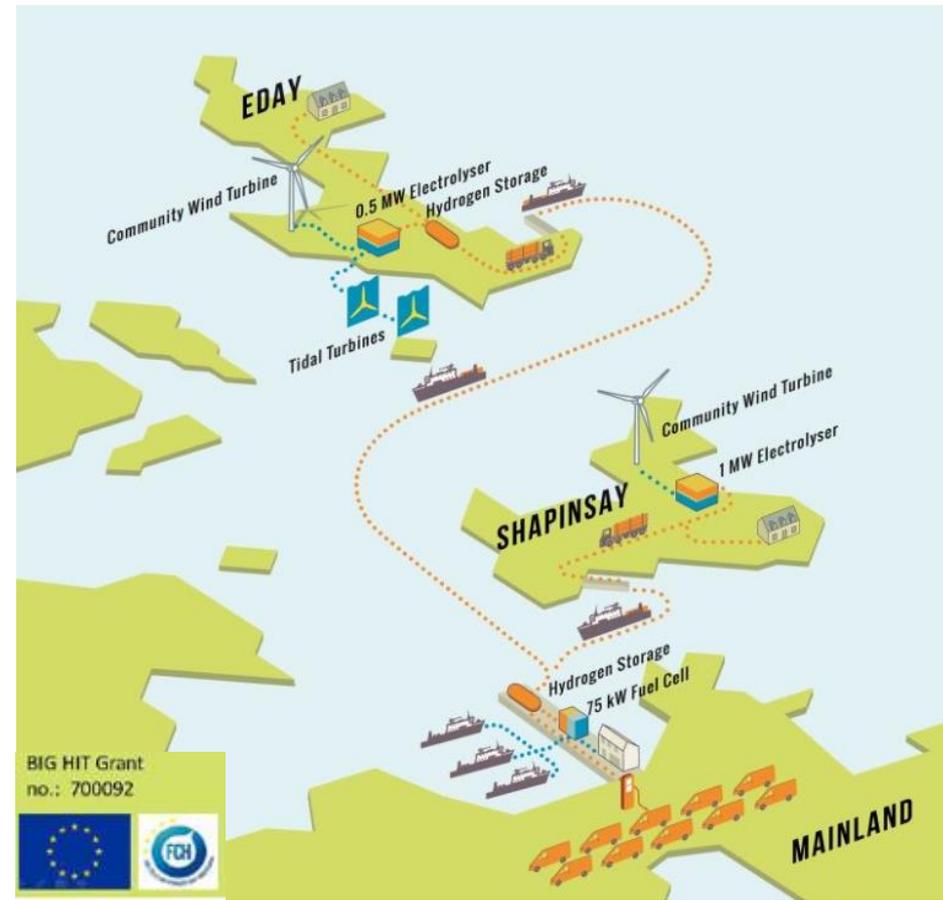
EU funding: 5 M€

Objective:

- create a replicable hydrogen territory in Orkney (Scotland)

Scope:

- a fully integrated model of hydrogen production, storage, transportation and utilisation for heat, power and mobility.
- absorbing otherwise curtailed energy from wind & tidal
- 2 PEM electrolyzers (1.5 MW in total) producing ~50 tpa of H₂ used to provide heat and power to local schools, harbor buildings, a marina and 3 ferries (when docked), and a refuelling station with a fleet of fuel cell vehicles.

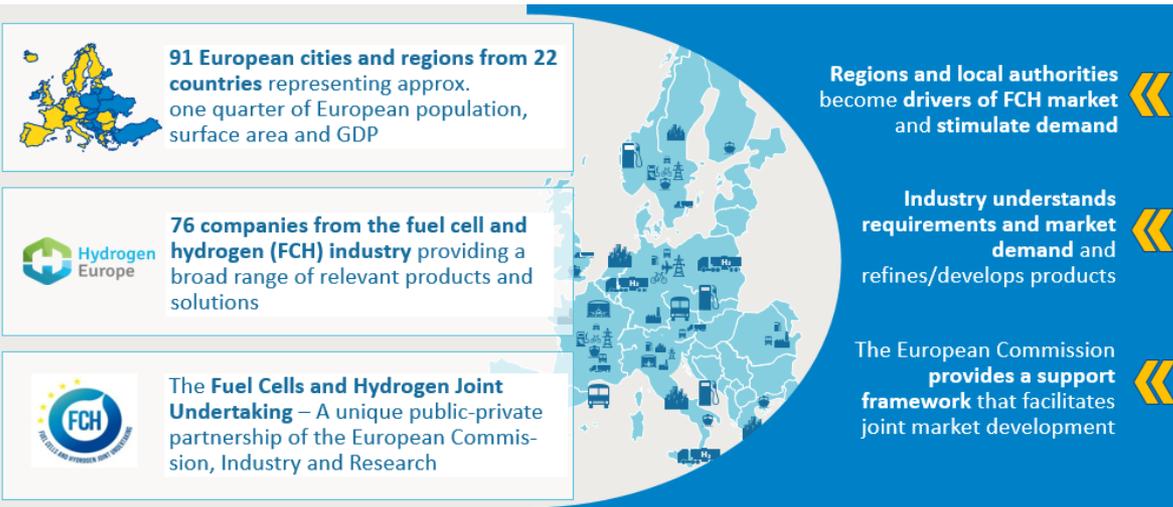


What next?

European
Commission

→ the benefits & viability of hydrogen as a **systemic solution** for the energy transition must now be demonstrated **at bigger scales,** covering **full hydrogen value chain** and **with different set-ups/components,** depending on country specific conditions, to de-risk the technology & unlock faster rollout

FCH JU's “Regions & Cities Initiative” aims at driving market development in Europe based on a broad stakeholder coalition:



> 24 regions and cities indicate that they have an ambition to implement local H₂ Valley projects

> These projects have a total indicated investment volume of EUR 1.3 bn alone, thereby representing the largest share of all indicated investments

- 20M € is tentatively earmarked to co-fund a large “H₂ Valley” project as part of the 2019 FCH JU’s Call for Proposals
- Additional activities in support of “Hydrogen Valleys” are also foreseen
- Synergies with Mission Innovation “H₂ Challenge”

Thank you very much for your attention!

For more information please refer to:

- European Commission: <https://ec.europa.eu/>
- FCH JU : www.fch.europa.eu
- Hydrogen Europe: www.hydrogeneurope.eu
- Hydrogen Europe Research : www.nerghy.eu