Hydrogen Europe

Session “Alternative Fuels: Pathways to the decarbonisation of transport”
3d October 2019

CiVITAS FORUM 2019
CIVITAS ANNUAL CONFERENCE | 2-4 OCTOBER 2019 | GRAZ | AUSTRIA

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

Federal Ministry
Republic of Austria
Transport, Innovation and Technology

Das Land Steiermark


Hydrogen Europe

HE in innovation: part of the FCH-JU

Hydrogen Europe

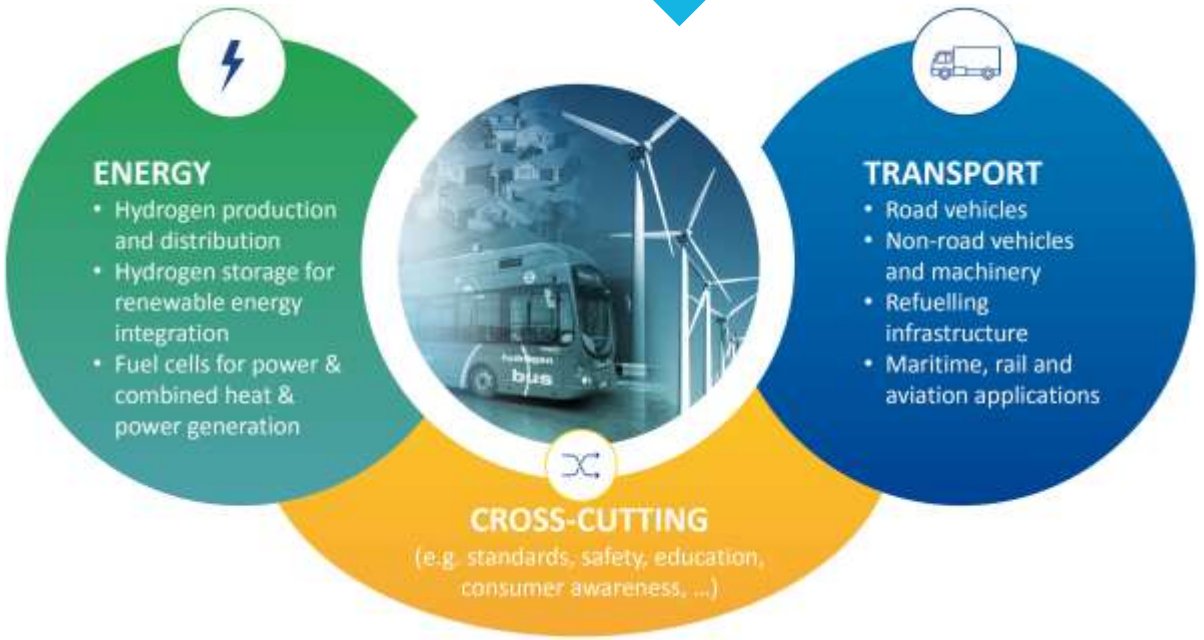
Hydrogen Europe Industry

Hydrogen Europe Research

&

European Commission

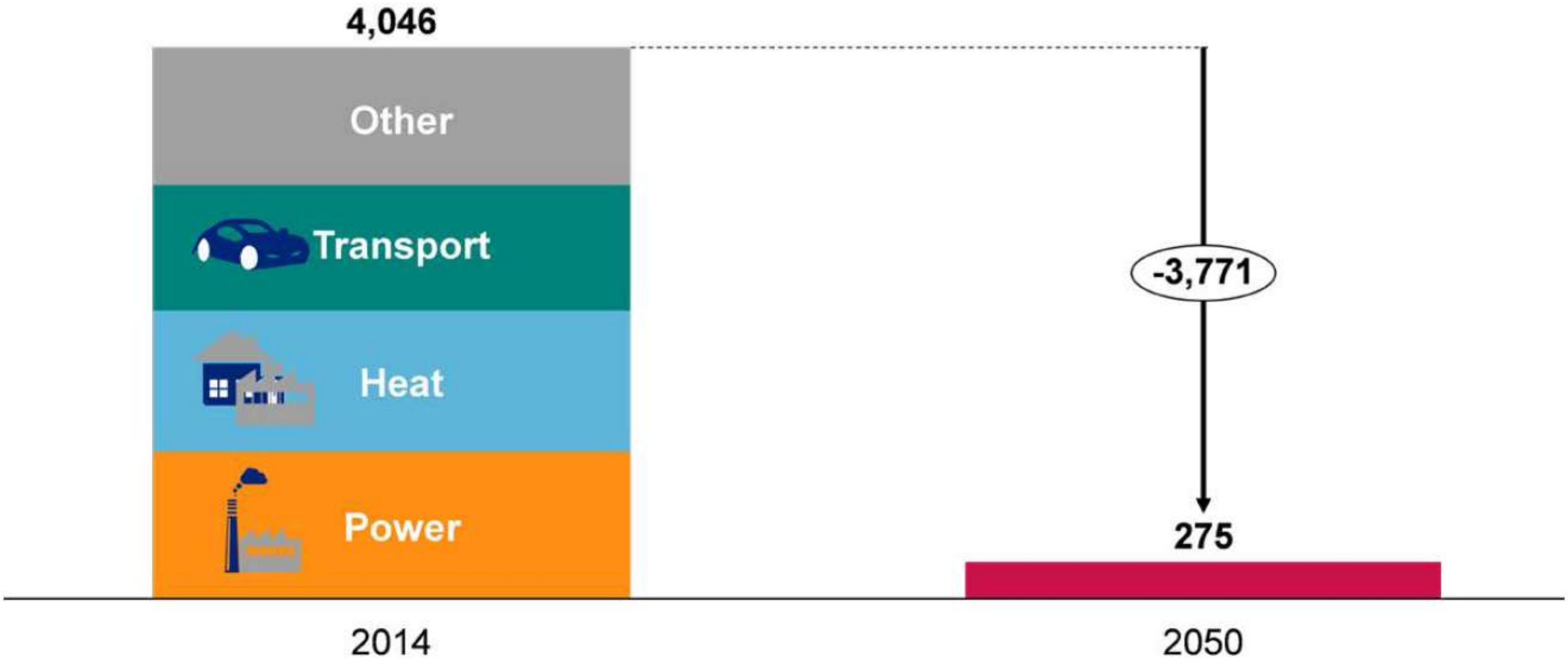
FCH | FUEL CELLS AND HYDROGEN JOINT UNDERTAKING



A portfolio of clean, efficient and competitive solutions based on fuel cells and hydrogen technologies **in energy and transport.**

Europe’s decarbonised vision & reality

FIGURE 1 – THE SCALE OF EUROPE’S DECARBONISATION PROBLEM ($MtCO_2e$)



Sources: Poyry point of view, fully decarbonising europe’s energy system by 2050, May 2018

The solution for decarbonisation

Hydrogen Europe

Enable the renewable energy system → Decarbonize end uses

Enable **large-scale renewables integration** and **power generation**

Distribute energy across sectors and regions

Act as a **buffer** to increase system resilience

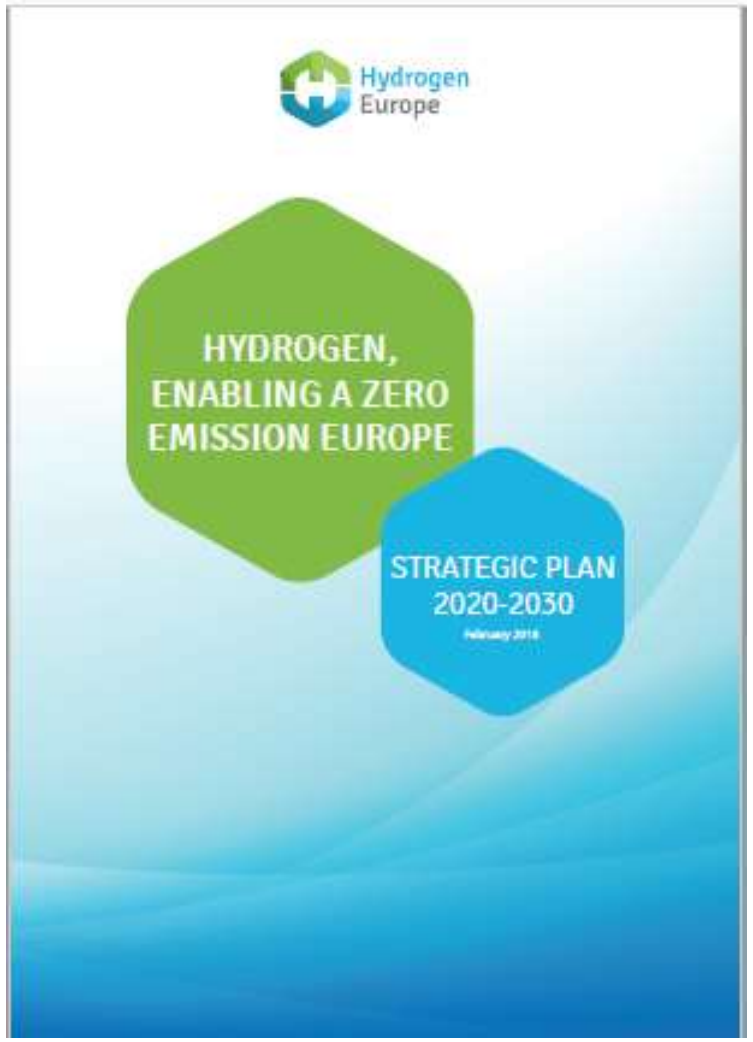
Help decarbonize **transportation**

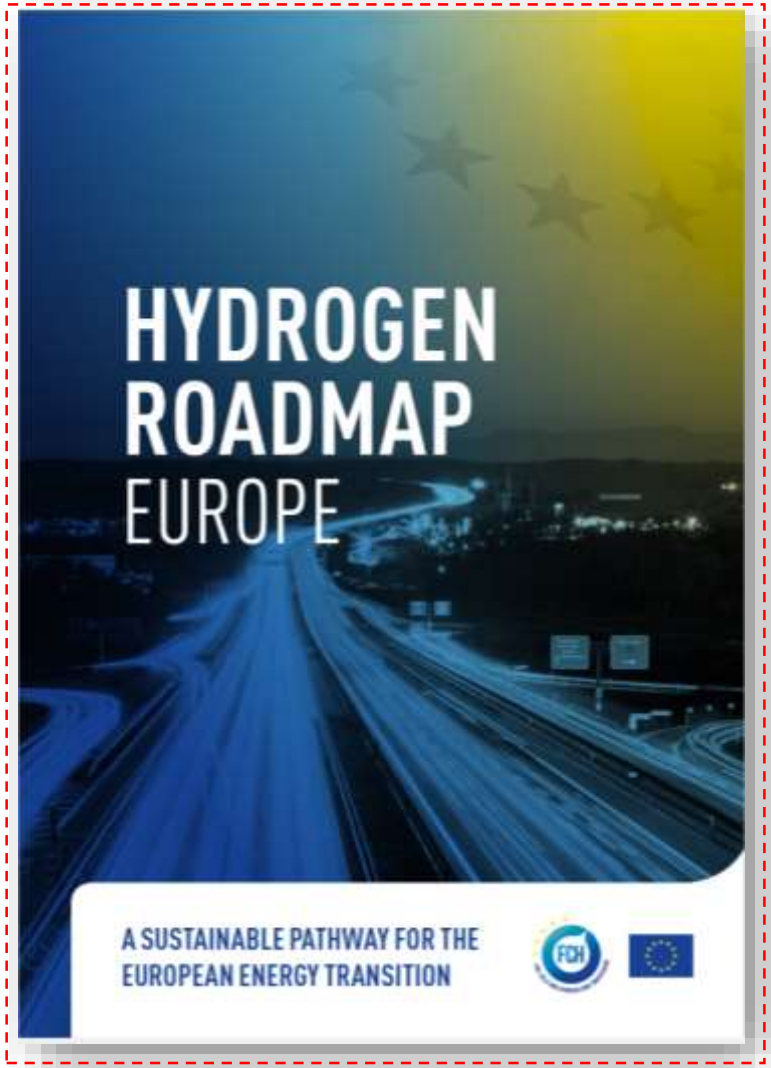
Help decarbonize **industrial energy** use

Help decarbonize **building heat and power**

Serve as renewable **feedstock**

EU Politics


Hydrogen Europe
HYDROGEN, ENABLING A ZERO EMISSION EUROPE
STRATEGIC PLAN 2020-2030


HYDROGEN ROADMAP EUROPE
A SUSTAINABLE PATHWAY FOR THE EUROPEAN ENERGY TRANSITION


Wir nehmen die Zukunft in die Hand.
The Hydrogen Initiative


The Hydrogen Initiative

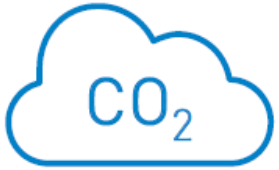
Hydrogen Roadmap for Europe

BESIDES CO_2 ABATEMENT, DEPLOYMENT OF THE HYDROGEN ROADMAP ALSO CUTS LOCAL EMISSIONS, CREATES NEW MARKETS AND SECURES SUSTAINABLE EMPLOYMENT IN EUROPE

2050 hydrogen vision

~24%

of final energy demand[1]



~560 Mt

annual CO_2 abatement[2]

~EUR 820bn

annual revenue (hydrogen and equipment)

~15%

reduction of local emissions (NO_x) relative to road transport

~5.4m

jobs (hydrogen, equipment, supplier industries)[3]

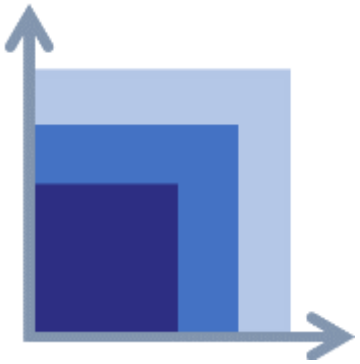
Mobility and hydrogen – why it makes sense

High daily range

600 km today without refuelling for cars, 400km for buses and trucks…and without noise

Zero tailpipe emissions

Only water emitted and CO_2 emissions savings – linked to hydrogen production source



Modularity

The refuelling infrastructure is ready to be scaled up to accommodate growing fleets

Flexibility& no productivity loss

No new street infrastructure; refuelling in <5 min for cars, <15 min for trucks and buses

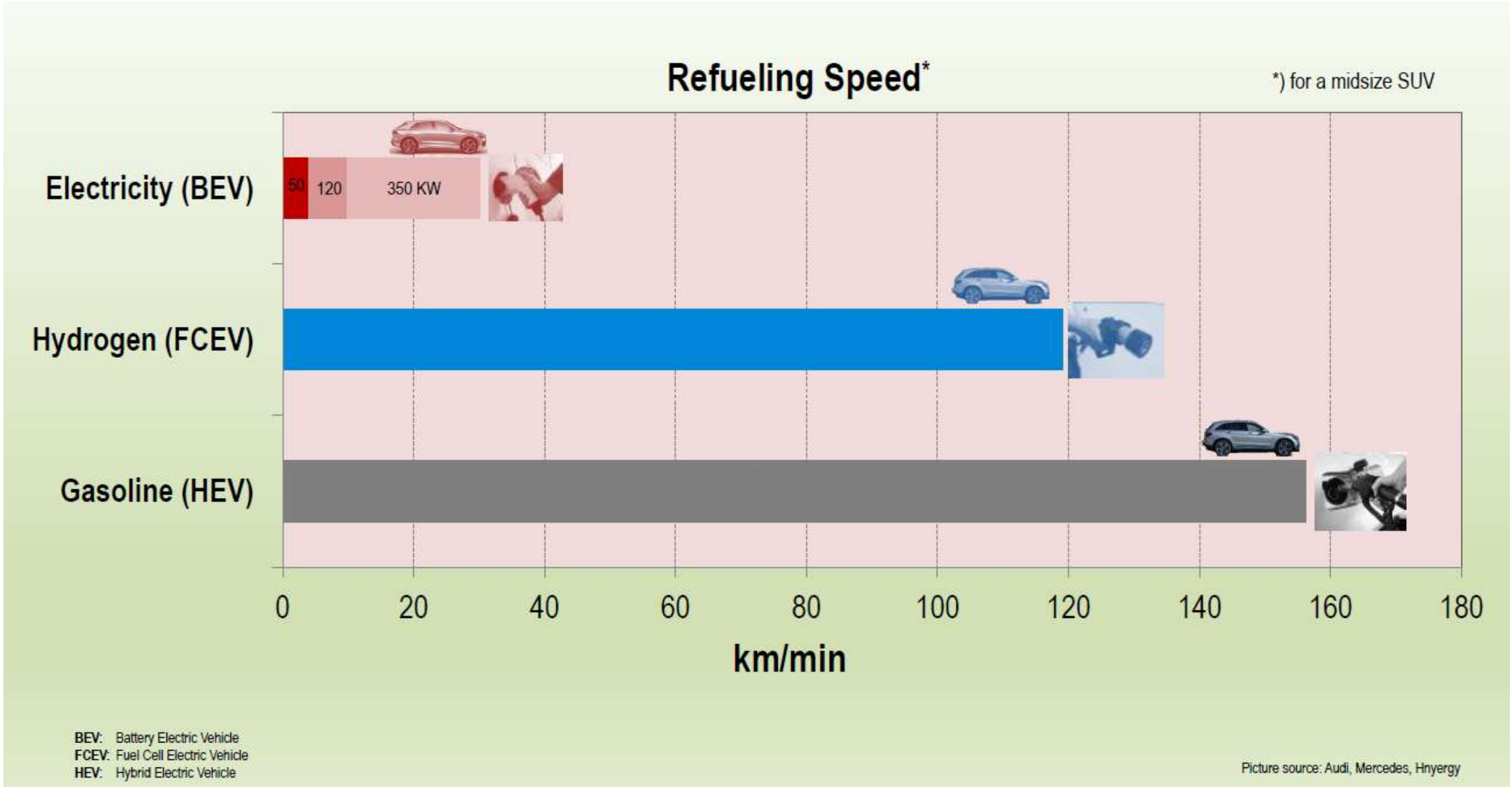
As well as fast and smooth acceleration

For commercial vehicles: payload similar to

Diesel truck and no issue with high energy use

A concrete answer to political push for **transport decarbonisation**

Refuelling speeds of FC vehicles



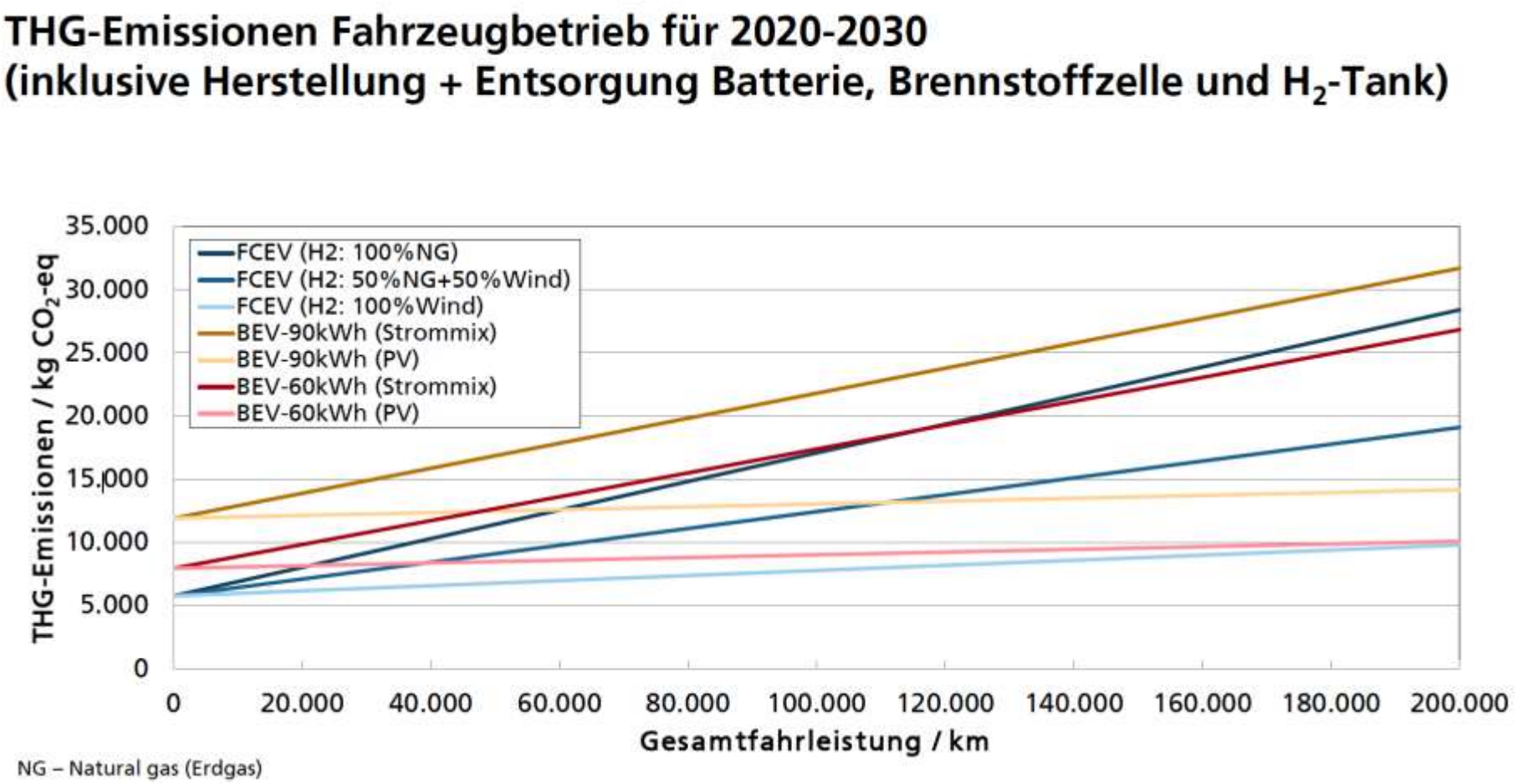
Source: HyEnergy GmbH

The fuel volume challenge

- Hydrogen has a volume issue compared to diesel, the industry is working on overcoming this issue – liquid hydrogen might be an option for long haul applications

- H2 has significantly better energy density properties than batteries – both in terms of volume and weight

GHG emissions projections TTW: FCEV vs BEVs



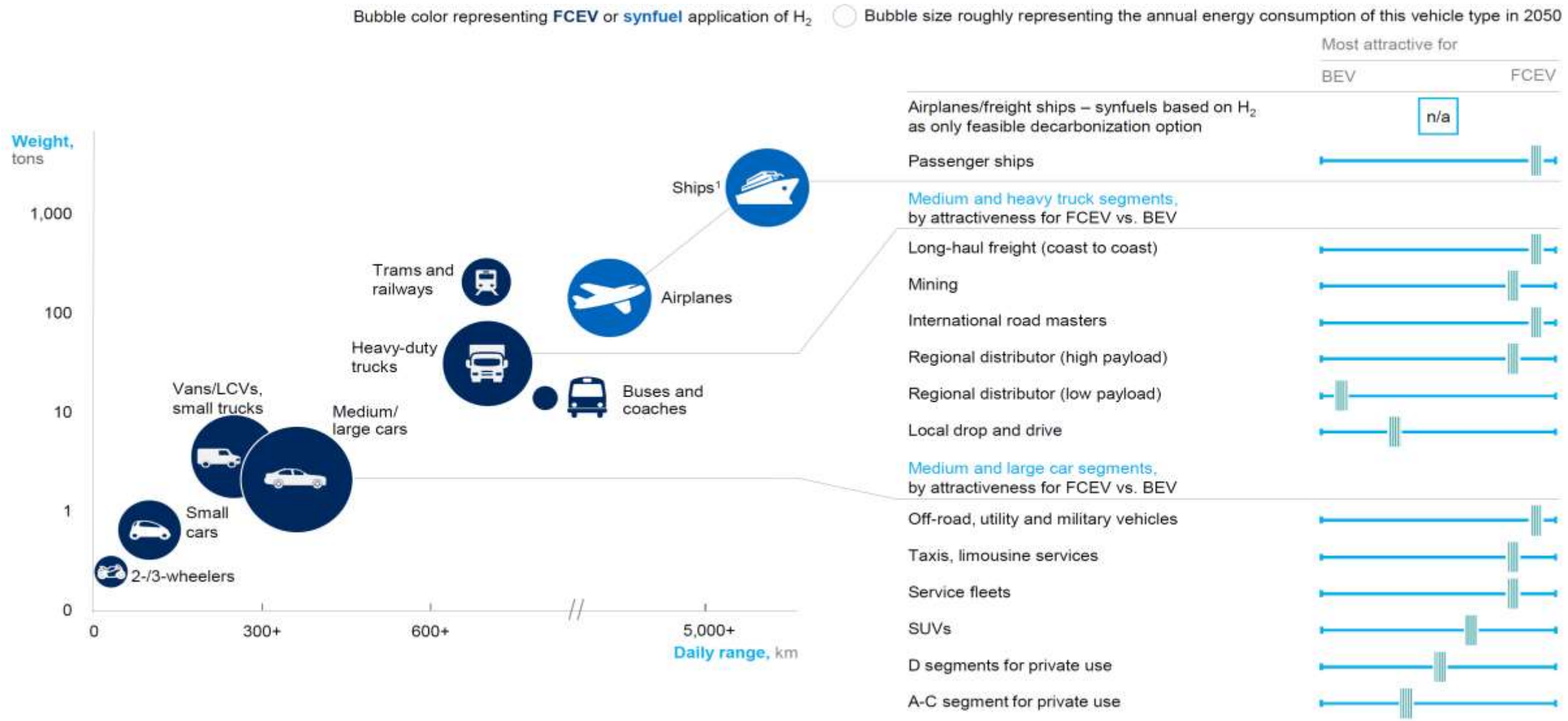
On a well-to-wheels basis:

- Green hydrogen is the way forward
- Large batteries generate >CO2 emissions

Source: Frauenhofer

Hydrogen Roadmap for Europe: Transport

FCEVs as most efficient decarbonisation level for long-distances and heavy payloads



1 H_2-based fuels or fuel cells

Overview of trucks offer

DAF/VDL 28-40t - Benelux

FPT – fuel cell powertrain

Scania 27t

Hyundai- 1,600 trucks by 2025 in CH

HV Systems

In Europe

Nikola - >1,000 pre-orders + 700 HRS USA

Worldwide

>500 7.5t trucks in Shangai

Toyota/Kenworth – port of L.A, US

France: Hydrogen refrigerated semi trailer

- The trailer builder company CHEREAU handed over the keys to end user Malherbe in July 2019
- Hydrogen powered refrigerated semi trailer

- Could become a key market in the future with:

- Diesel bans in city centres

Overview: Dual fuel Refuse Collection & Sweeper Vehicles

More info:
http://www.lifeandgrabhy.eu/about-project

Project REVIVE

OEMs: FAUN, E-trucks, UlemCo, Scania, PVI …

Overview: Vans in Europe – up to 500 km range

Renault Kangoo 3.5 t FC van – 400 units in operation and more to come

Mercedes-Benz
Concept Sprinter F-Cell

4.25 t FC van - “H2 Panel Van” model, DHL Express - 100 FC vans by 2020
Up to 10m_2 cargo capacity;
Max. payload >800 kg

Volkswagen Crafter HyMotion – 4.25 t FC van
Launch in 2022

Fuel cell cars

Hyundai NEXO, 800 km range
Hyundai ix 35: 600 km range

Toyota Mirai: 500 km range

Mercedes GLC, fuel cell with plug-in-battery, 500 km range (50 km by battery)

BMW Fuel Cell X5 – small series from 2022; sales from 2025

Bus OEMs offering FC bus options

ALEXANDER DENNIS

CAETANOBUS

ebe EUROPA

EvoBus

rampini

Safra

SOLARIS

VANHOOL

VDL

WRIGHTBUS

Source: JIVE project

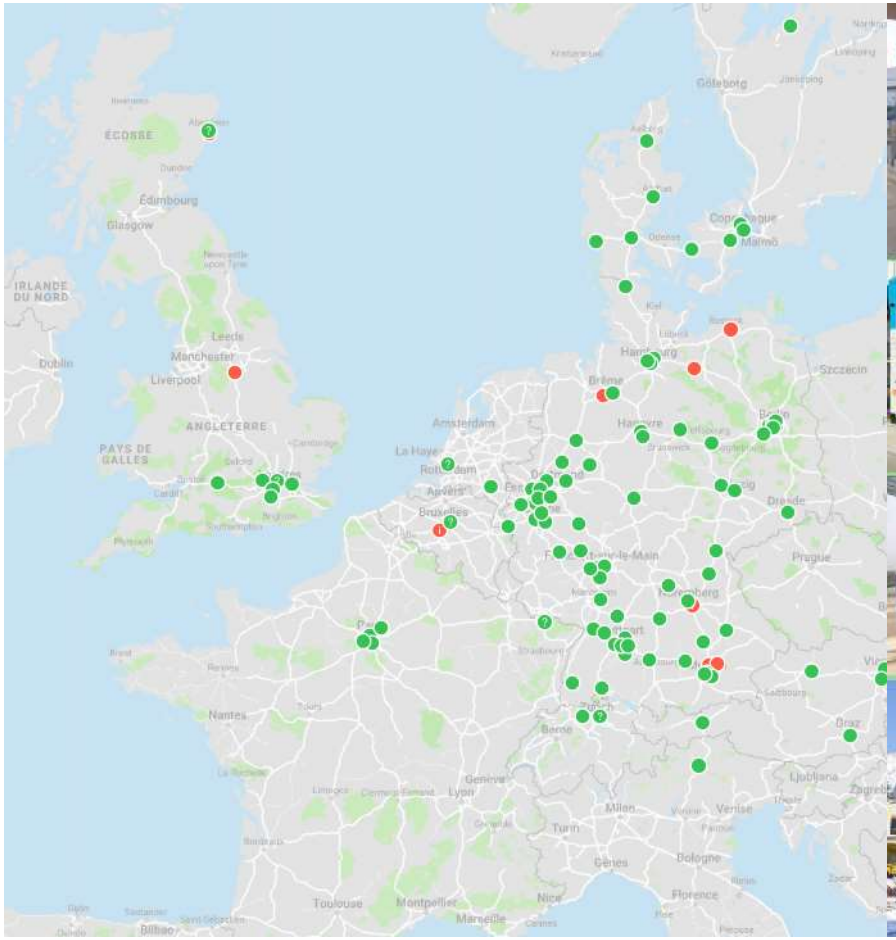
JIVE projects: deployment sites and objectives

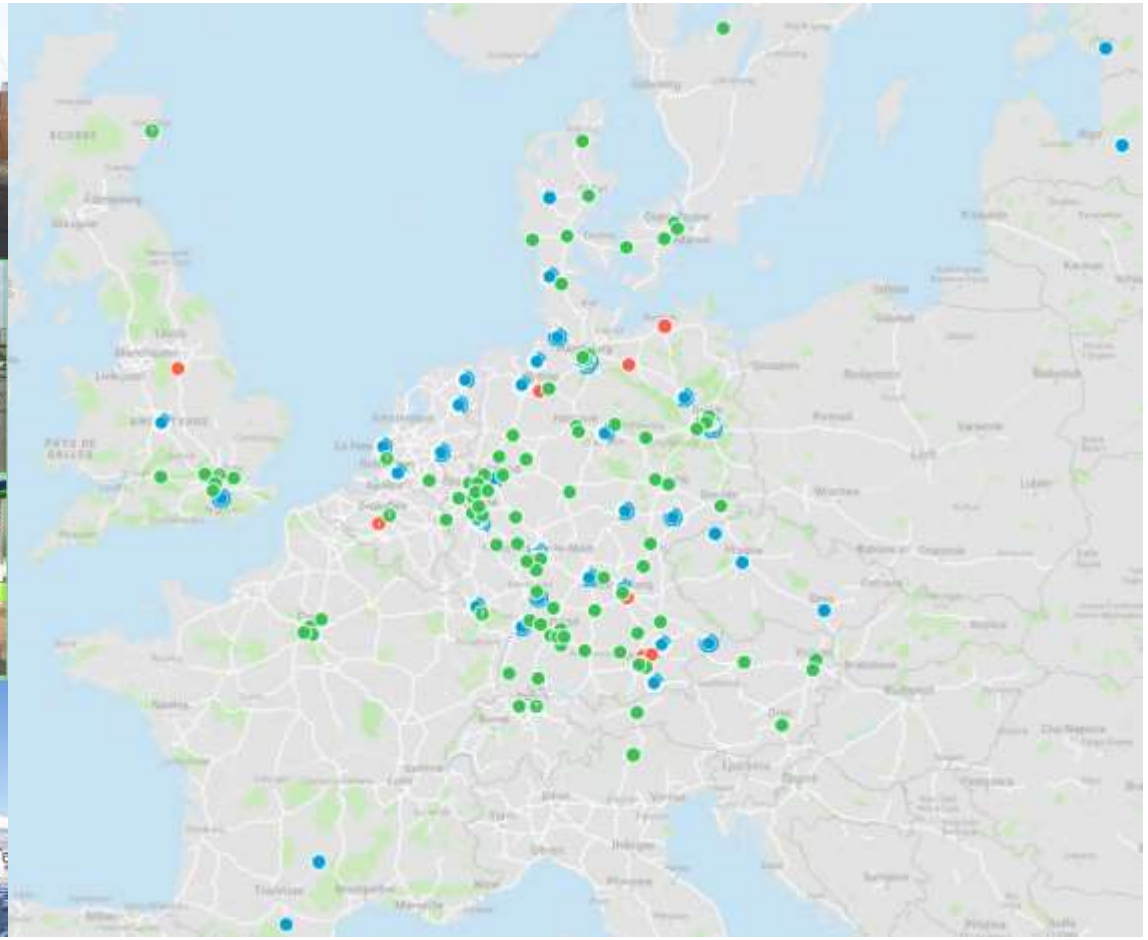
Objectives:

- **Deploy nearly 300 buses &** associated infrastructure
- **Stimulate the market for FC buses** in Europe by creating demand for hundreds of vehicles
- **Lower the prices** of fuel cell buses using joint procurement and economies of scale
- Demonstrate routes to achieve **low cost renewable hydrogen**

Rail & maritime

Refulling stations roll out: >150 stations, Germany leading the way with 75 stations





Source: HyEnergy GmbH, H2 Mobility Deutschland

Hydrogen Roadmap for Europe: Transport

THE EQUIVALENT OF ~3,740 REFUELING STATIONS WOULD BE REQUIRED BY 2030, IMPLYING INVESTMENT NEEDS OF EUR ~8.2 BN

Required large HRS[1], number

Current and planned HRS in Europe

Shift happens!
Hydrogen enables you.

Contacts

Hydrogen Europe

Avenue de la Toison d'Or 56-60

1060 Brussels

Belgium

www.hydrogeneurope.eu

Sabrine Skiker

EU Policy and Communication Manager – Mobility

Hydrogen Europe

s.skiker@hydrogeneurope.eu