



Hydrogen Europe

Hydrogen in the EU Energy Policy?

Jorgo Chatzimarkakis, Secretary General

2nd meeting of HyENet, Brussels, 18 November 2019



Hydrogen has become a hot topic!



The poster features a green-to-blue gradient background. In the top left corner is the European Commission logo. In the top right corner is the hashtag #hydrogen4climate. The main title 'Hydrogen for Climate Action' is centered in large white font. Below it, the subtitle 'How to kick start the EU Hydrogen Industry to achieve the EU climate goals?' is in a smaller white font. The date '9 October 2019 - Brussels' is at the bottom left. A large circular graphic on the right contains various white line-art icons representing different sectors: aviation (airplane), industry (factory), energy (solar panel, wind turbine, battery, lightning bolt), transport (train, truck, car, bus), and nature (trees, leaves, sun, moon). A small circle with 'H₂' is at the top right of the circle. At the bottom right is the website URL www.hydrogen4climateaction.eu. The Hydrogen Europe logo is in the bottom left corner.

European Commission

Hydrogen for Climate Action

How to kick start the EU Hydrogen Industry
to achieve the EU climate goals?

9 October 2019 - Brussels

#hydrogen4climate

H_2

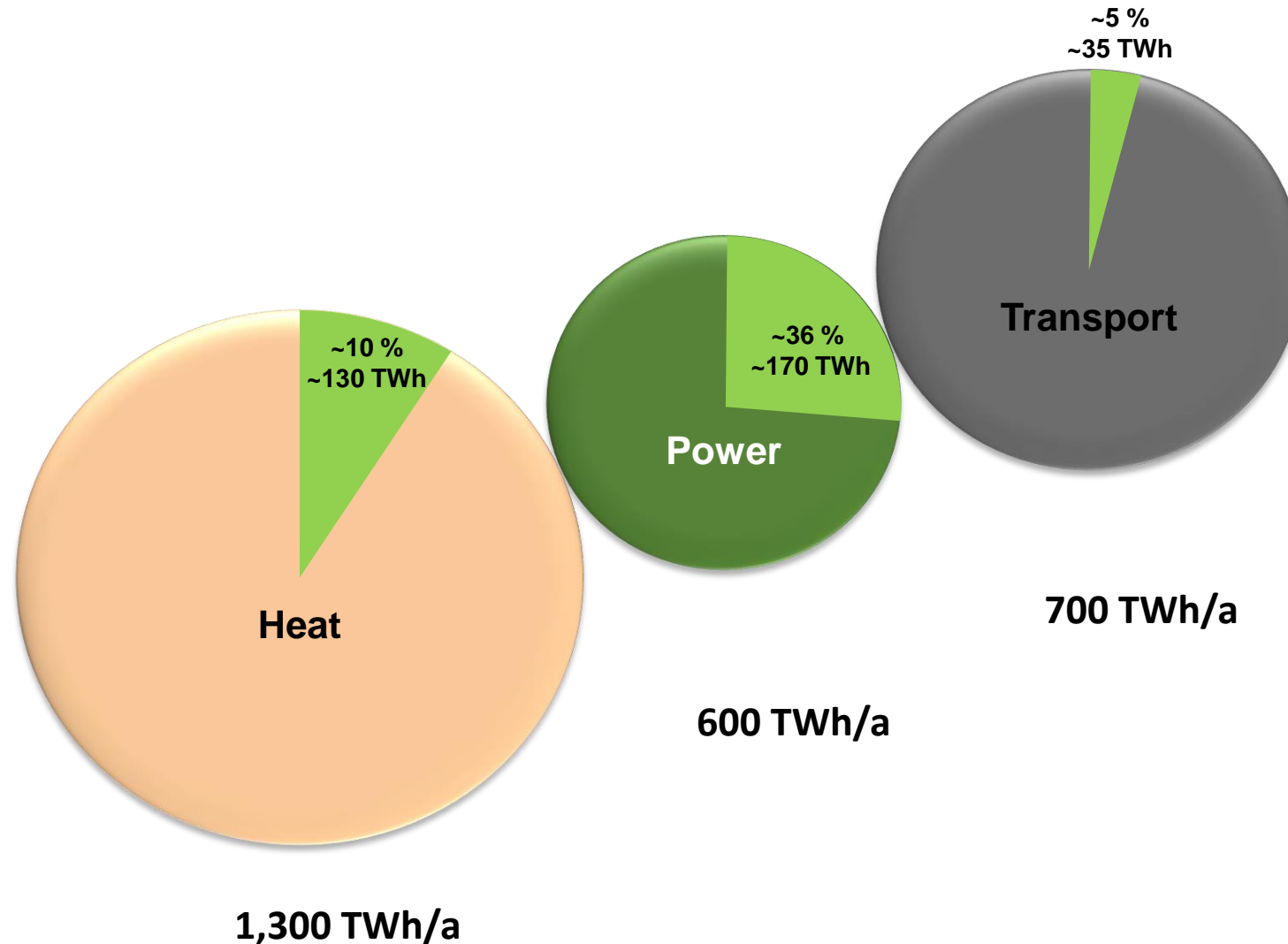
www.hydrogen4climateaction.eu



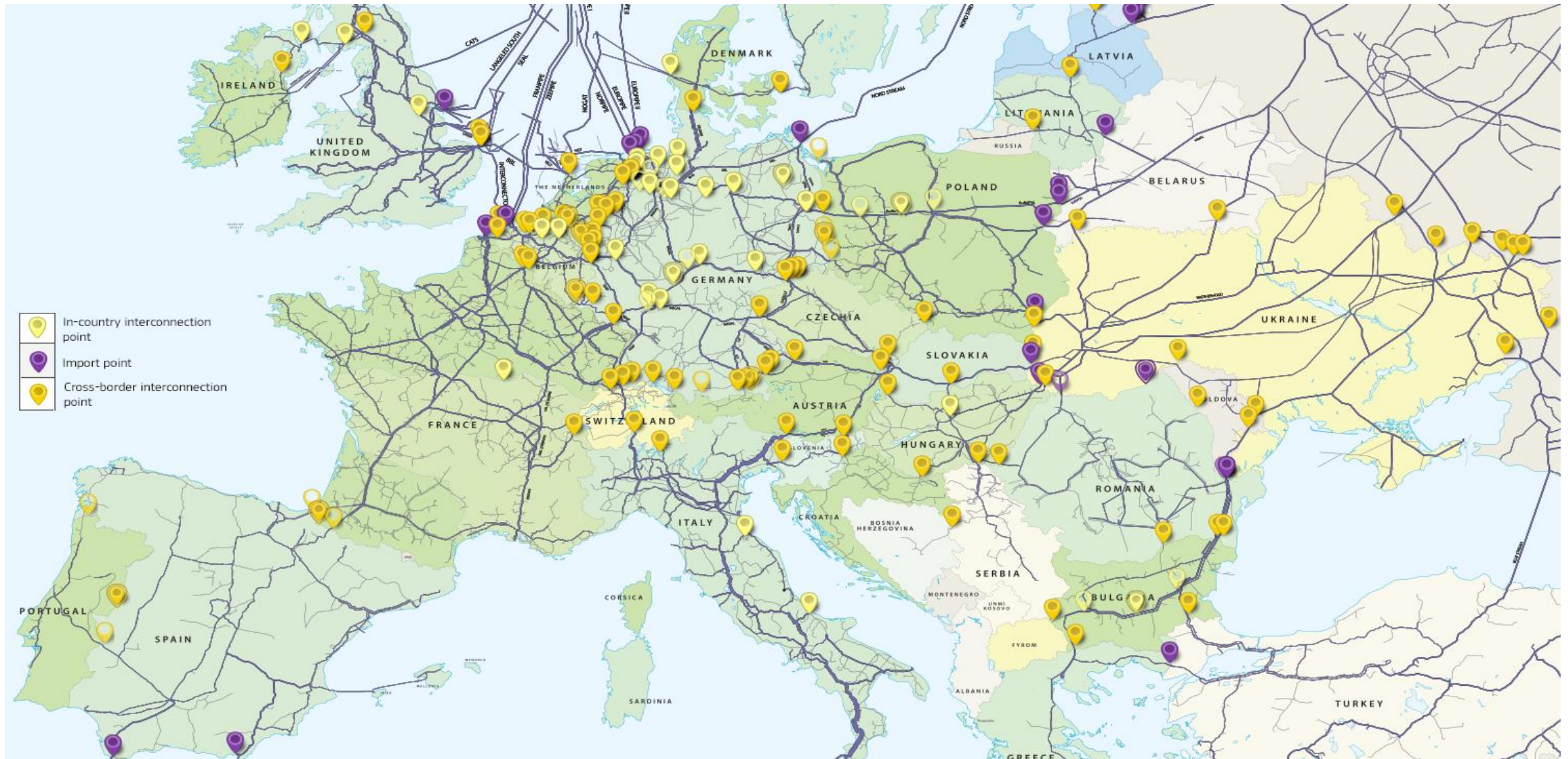
Why Hydrogen for Climate Action?



Difficult to increase renewable shares

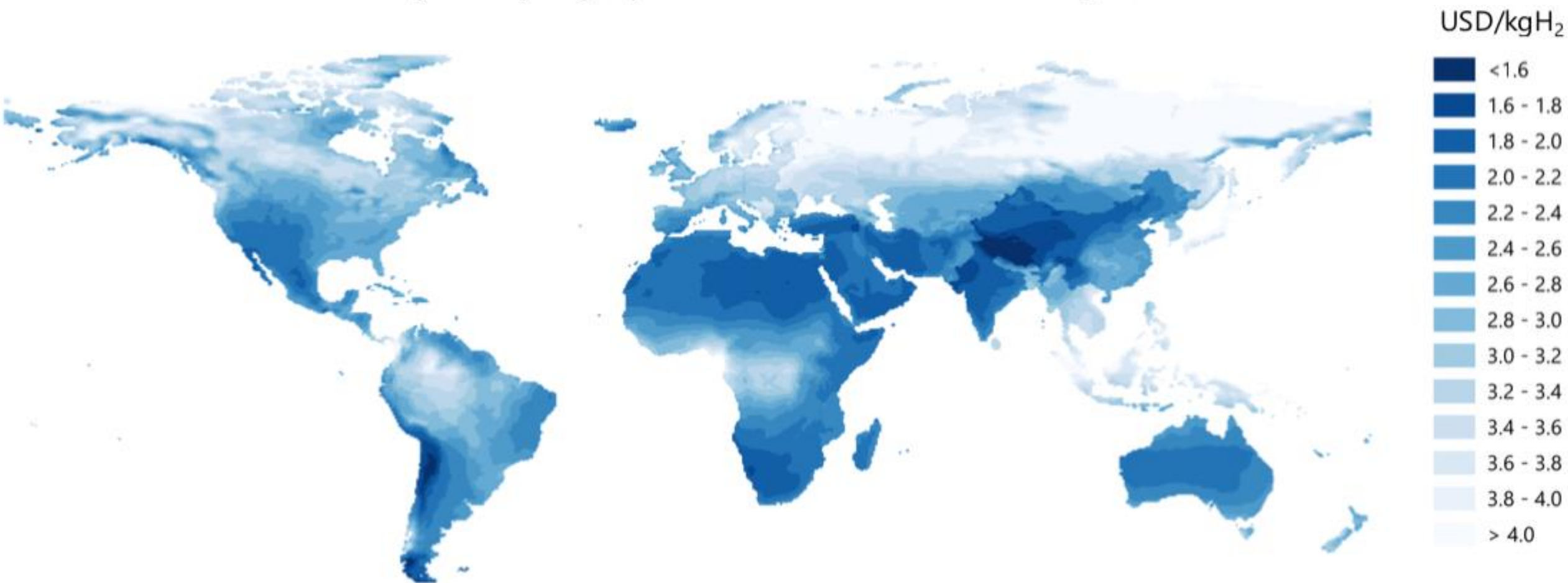


The European Gas Grid – cheap transport of H₂

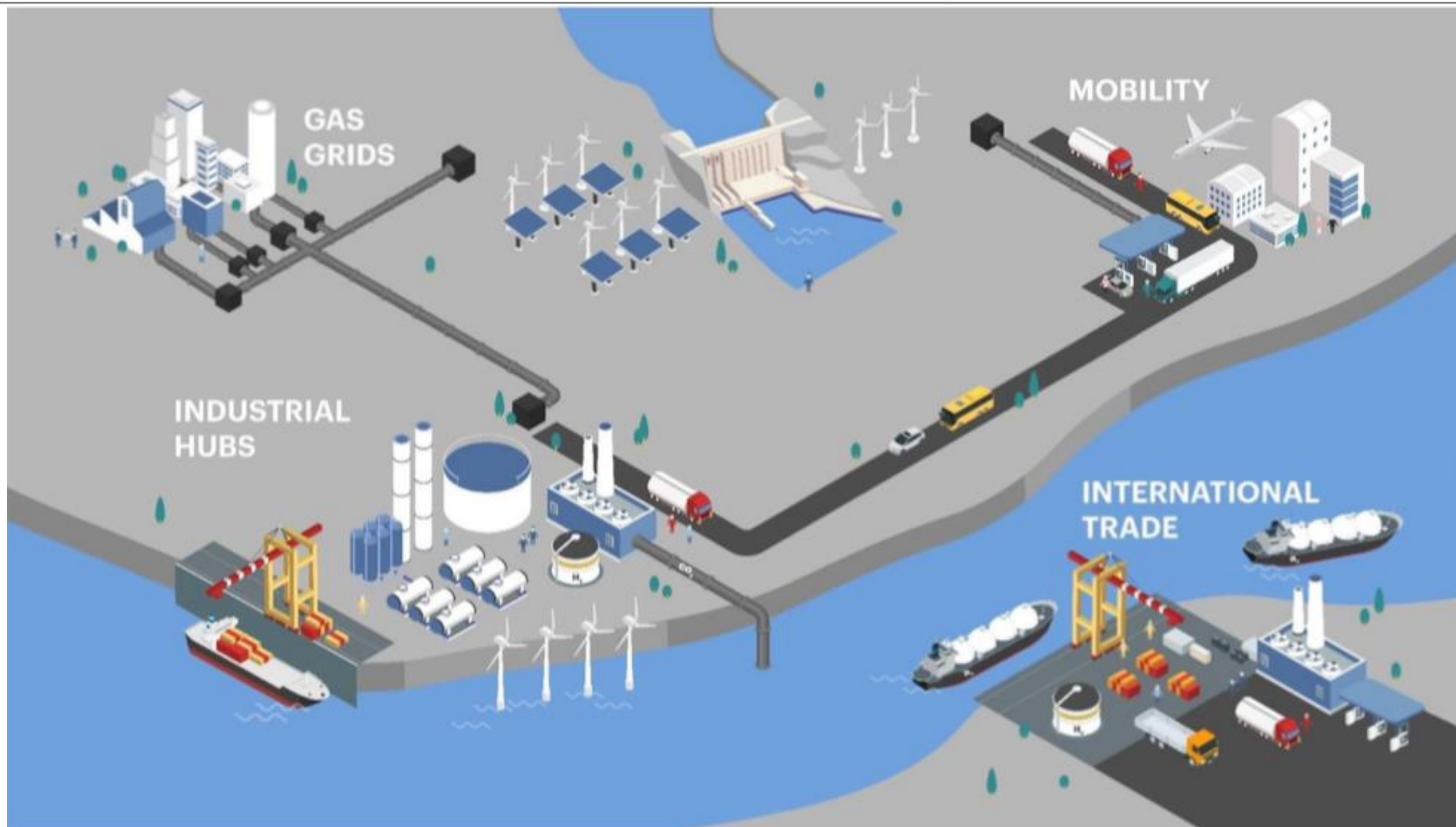


Global Conditions for Renewable Hydrogen

Long-term hydrogen production costs from solar & wind systems



Who can do the job?



Hydrogen can help to reach the targets

2030 FRAMEWORK FOR CLIMATE AND ENERGY AGREED TARGETS

	GREENHOUSE GAS EMISSIONS	RENEWABLE ENERGY	ENERGY EFFICIENCY	INTER-CONNECTION	CLIMATE IN EU-FUNDED PROGRAMMES	CO2 FROM:
2020	-20%	20%	20%	10%	2014-2020 20%	
2030	≤ -40%	≥ 32%	≥ 32.5%	15%	2021-2027 25%	CARS -37.5% Vans -31% Lorries -30%

Upwards revision clause by 2023

Targets to become even more ambitious

“I want Europe to become the first climate-neutral continent in the world by 2050. To make this happen (...)

we must go further. We must strive for more. A two-step approach is needed to reduce CO₂ emissions by 2030 by 50, if not 55%.”

- **Green Deal for Europe** during first 100 days in office.
- First ever **European Climate Law** which will set the 2050 target into law.



**Statement
in the European Parliament,
16.07.2019**



Hydrogen has become a hot topic!



Frans Timmermans - Executive Vice President-Designate of the European Commission – Responsible for Europe's Green Deal

“Hydrogen could be a huge opportunity for our economy”

“It is not that difficult to use gas infrastructure to import [green] hydrogen using gas infrastructure”

“we need to protect our industries and [...] help them free themselves from fossil fuels, for example when hydrogen is used in the manufacturing of steel”



Hydrogen has become a hot topic!



Kadri Simson - Commissioner-designate, Energy

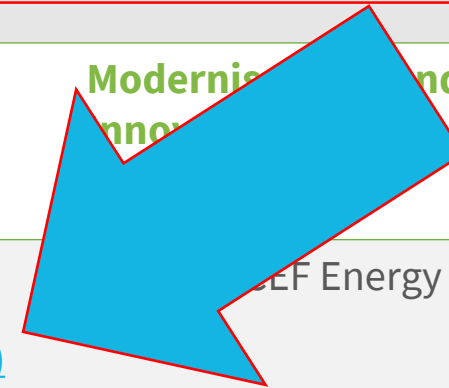
“I want to examine how we can best make the gas regulatory framework and infrastructure fit for the future, contributing to decarbonization through the use of low carbon gases such as hydrogen”

“If we are talking about gas, in the future we are taking about bio-gases and hydrogen that can help us for sector coupling”

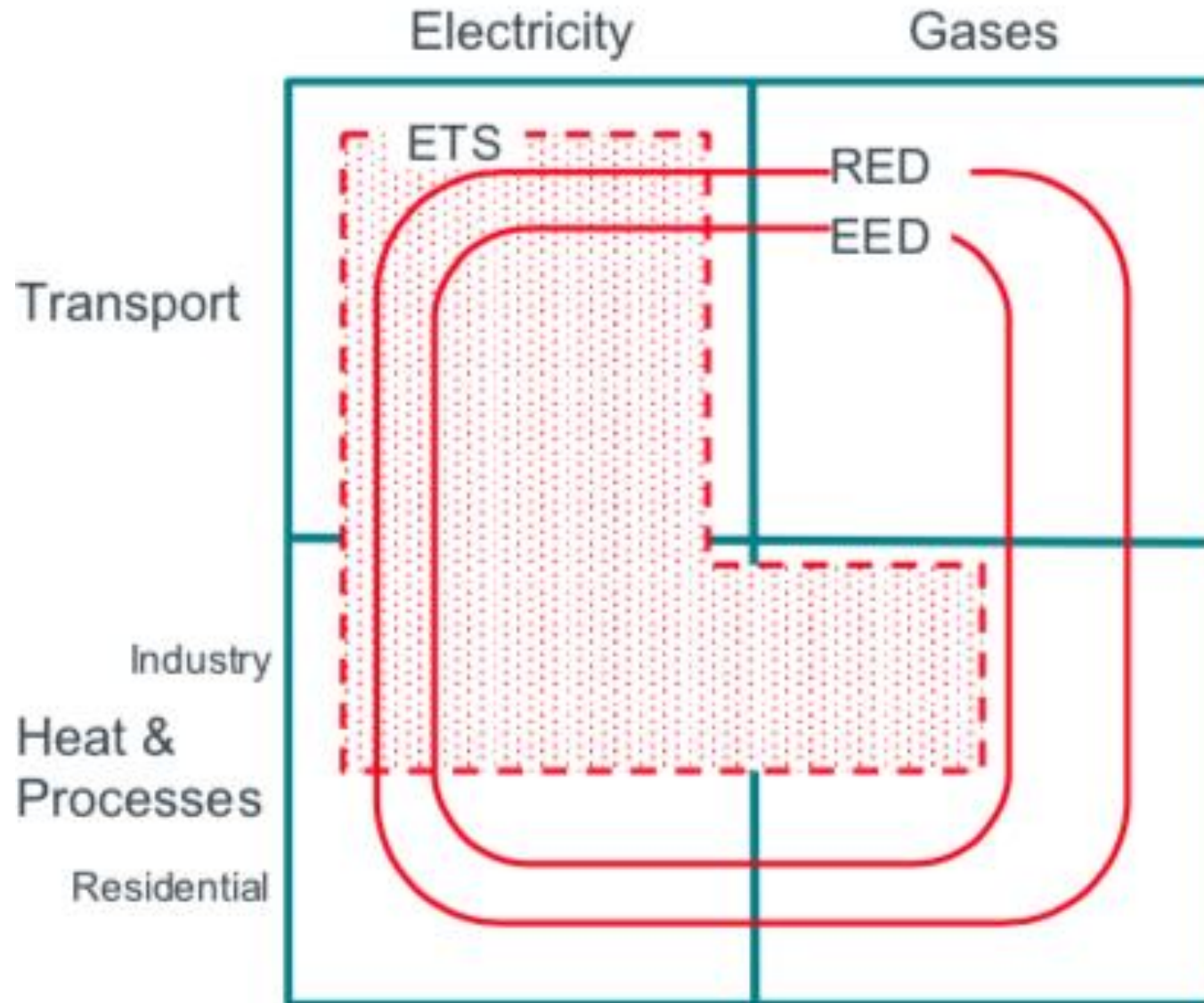


Current CO2 legislation - H2 role

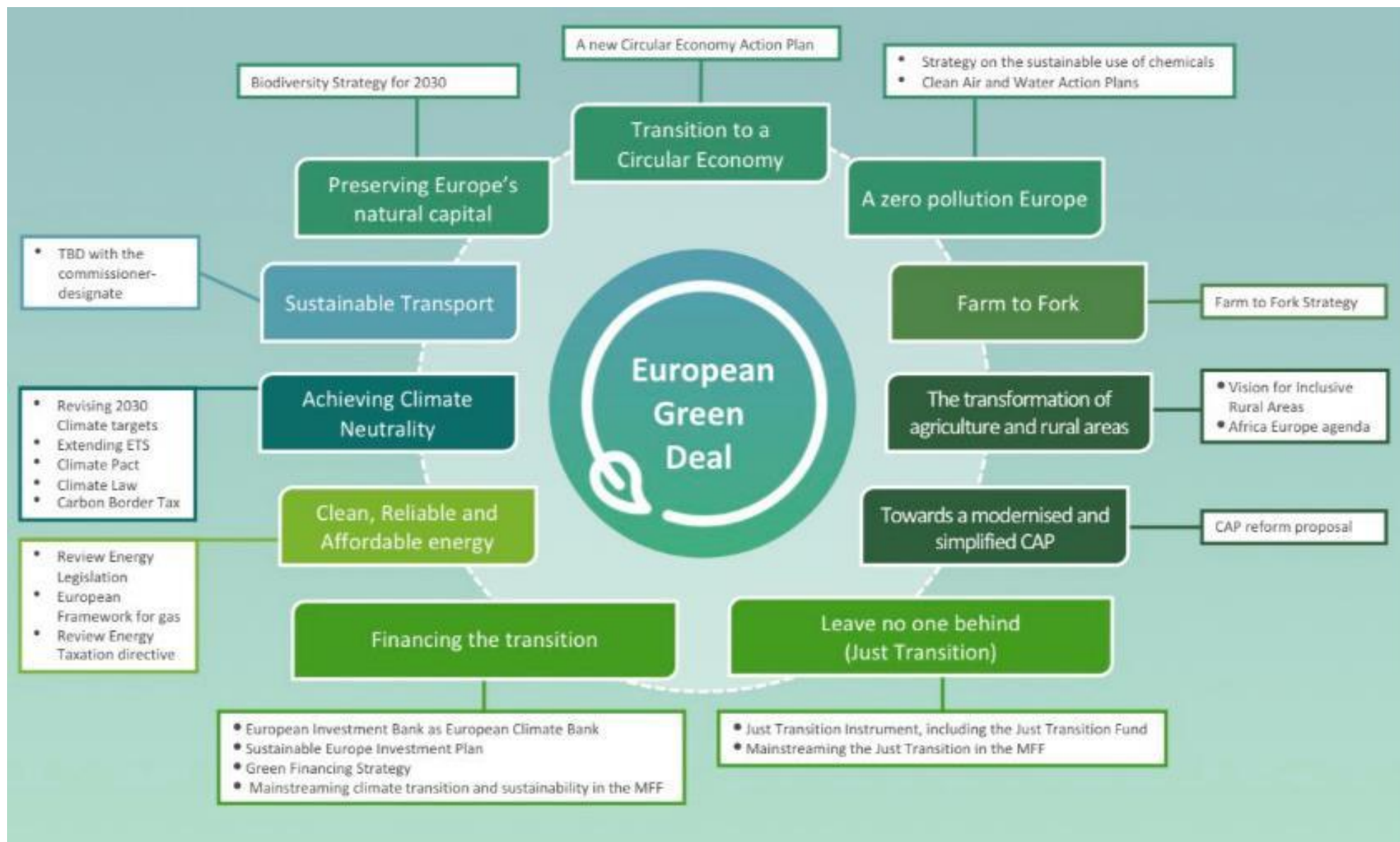
Sector	Requirement	Legislative Tools	Financial Tools	Hydrogen's role
Transport	-CO ₂ reduction -PM/NO _x /SO _x reduction -Integration of RES	1. Renewable Energy Directive (RED2) 2. CO2 emission standards for LDVs/LCVs 3. CO2 emission standards for HDVs 4. Clean vehicle Directive 5. Alternative Fuel Infrastructure Directive	CEF transport/blending	-H2 as a fuel -H2 made fuels -Renewable hydrogen for refineries
Energy-intensive industries	Decarbonisation	EU ETS	Modernisation fund / CEF Energy	Renewable / low - carbon hydrogen as feedstock switch
Gas/ Heating	Decarbonisation (to remain a player) Integration of RES	1. Renewable Energy Directive (RED2) 2. Upcoming Gas Regulation (2020-2021)	CEF Energy	Renewable / low - carbon hydrogen as feedstock Fuel cell as energy converter
Power	Storage / ancillary services Integration of RES	1. Renewable Energy Directive (RED2) 2. Electricity Market Design		Rapid response electrolyzers + Sectoral Integration



Current legislative framework: Many gaps!



Way out: Climate Act & Green Deal



Key aspects of a successful market design

1

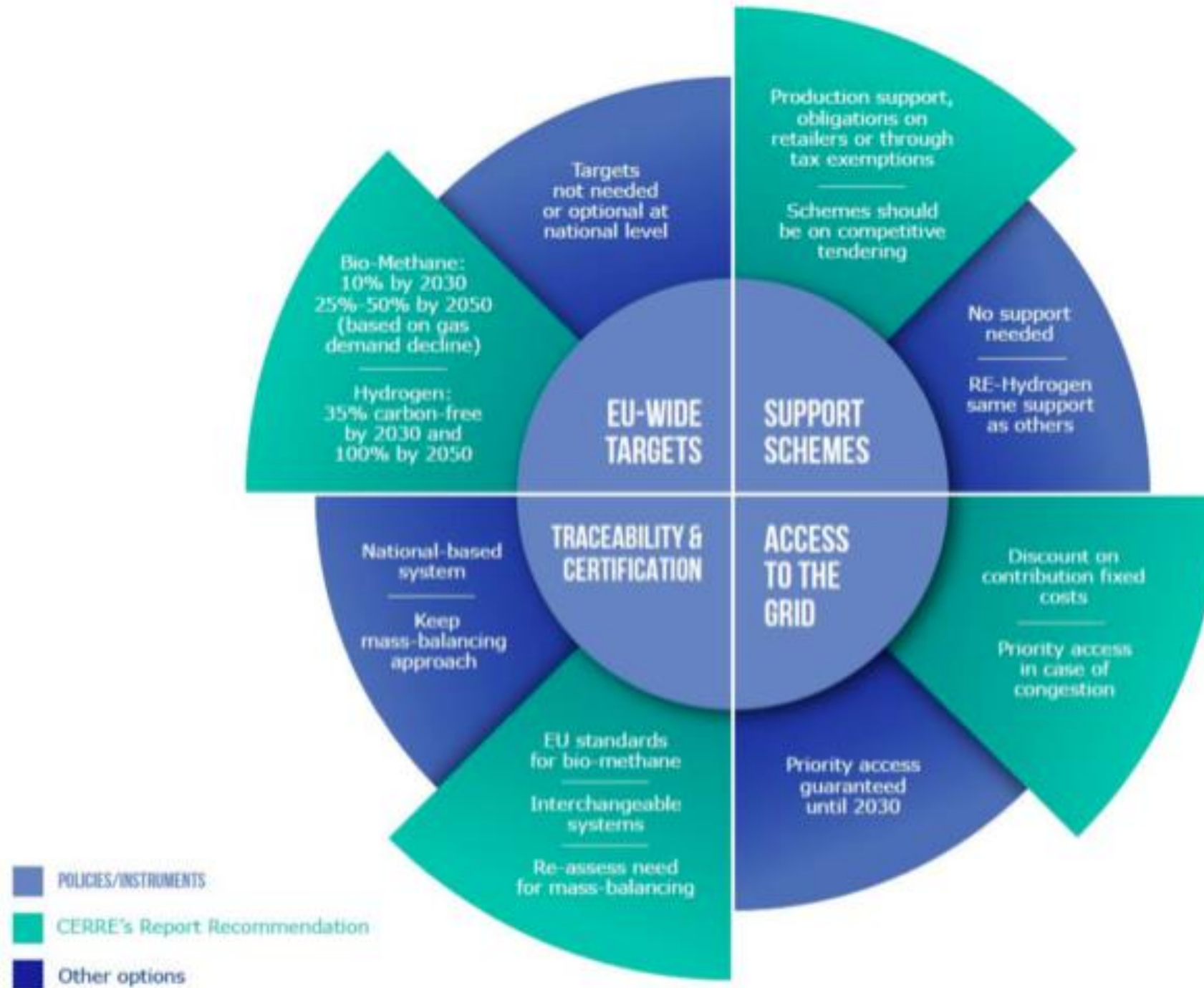
Define aspiration and
strategic orientations

2

Incentivise a level
of decarbonisation

3

Ensure whole
system efficiency



CO₂ regulation on cars and vans



Cars – future challenge

Average CO₂ emissions from new **passenger cars** registered in the EU in 2025 will have to be **15%** and in 2030 **30%** lower compared to 2021 (starting point 95g CO₂/km).

In 2025
15% ↓

In 2030
30% ↓



Vans – future challenge

Average CO₂ emissions from **vans**
registered in the EU in 2025
will have to be **15%** and in 2030 **30%** lower
compared to 2021 (starting point 147g CO₂/km).

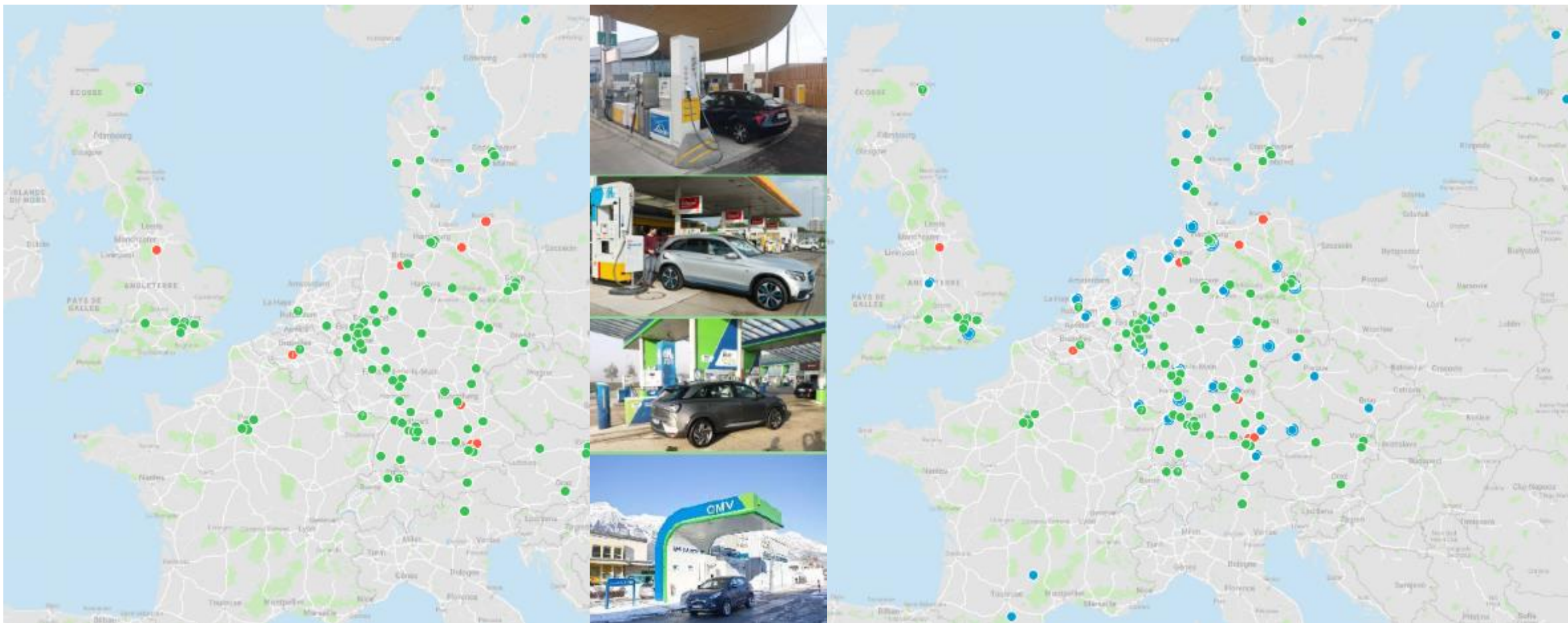


We are working on it!



**H2Haul –
decarbonising
freight transport
with fuel cell
trucks**

Refuelling >150 stations



IPCEI (1)

H2-DEMAND:

1000 Trucks
5000 City Bus
10.000 LDV

2 Fertiliser
2 Refinery
2 Steel

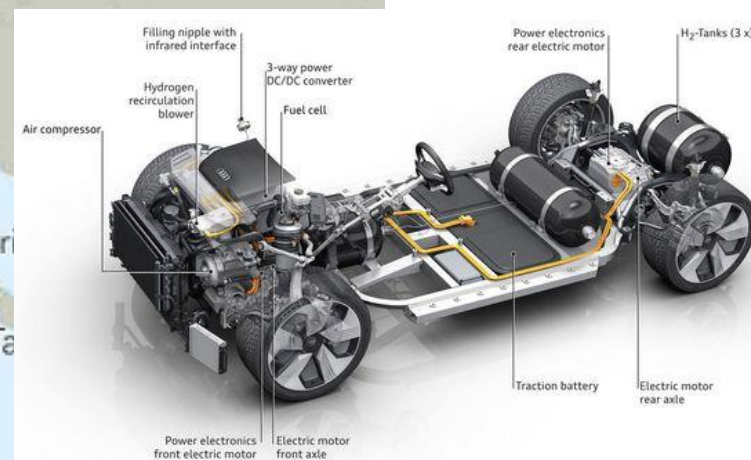
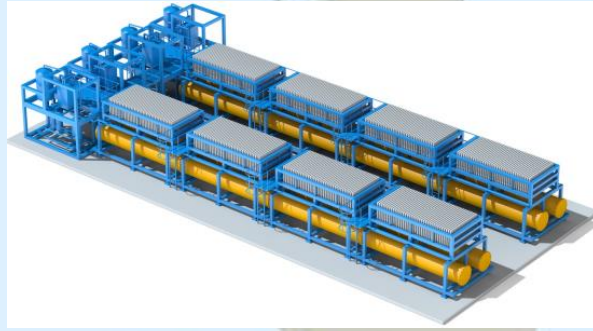


IPCEI (1)

STRATEGIC H2-EQUIPMENT:

1 Liquefaction
1000 H2 Stations
20 GW Electrolyser

FC Stacks
H2 Tanks
Mobility Platform



Power-to-Gas



H2 fit pipelines



Salt caverns for H2 storage



LOHC storage



Nearly any TEN-T Corridor can be chosen



Possible H2 demand in Europe



4 Steel



4 Refineries



2 Fertiliser



100.000



50.000



25.000

Possible production capacities in Europe



H2 Refuelling stations



H2 Tanks



Fuel Cell Stacks



H2 Auto Platform



Electrolyser factory



Power-to-Gas



LOHC



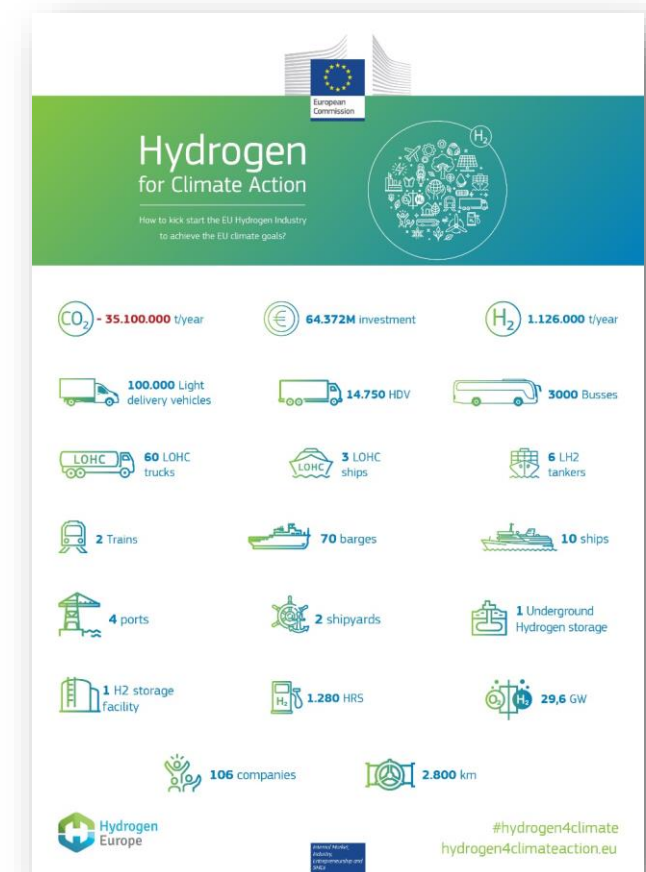
H2 Liquefaction

Accumulated capacity through IPCEI

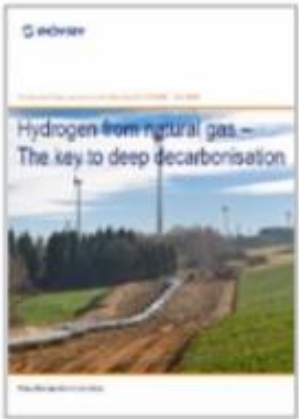
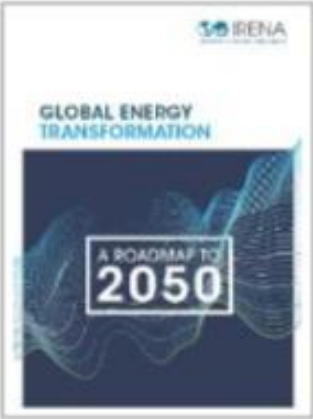
Important Project of Common Europe Interest (IPCEI)

- Industrial policy aimed at supporting Strategic Value Chain: **Hydrogen Technologies & Systems**
- Financial support through exemption of State Aid Rules for approved projects
- 1 conference on 09.10.2019
 - 11 projects presented >> more to be added
 - 65 billion € total investment
 - 35 Mio tons of CO₂ savings per year
 - 30 GW of Renewable Energy
 - 120.000 Hydrogen powered vehicles
 - 1300 Hydrogen refuelling stations
 - 22 Member states covered

www.hydrogen4climateaction.eu



Plenty of Studies on H2



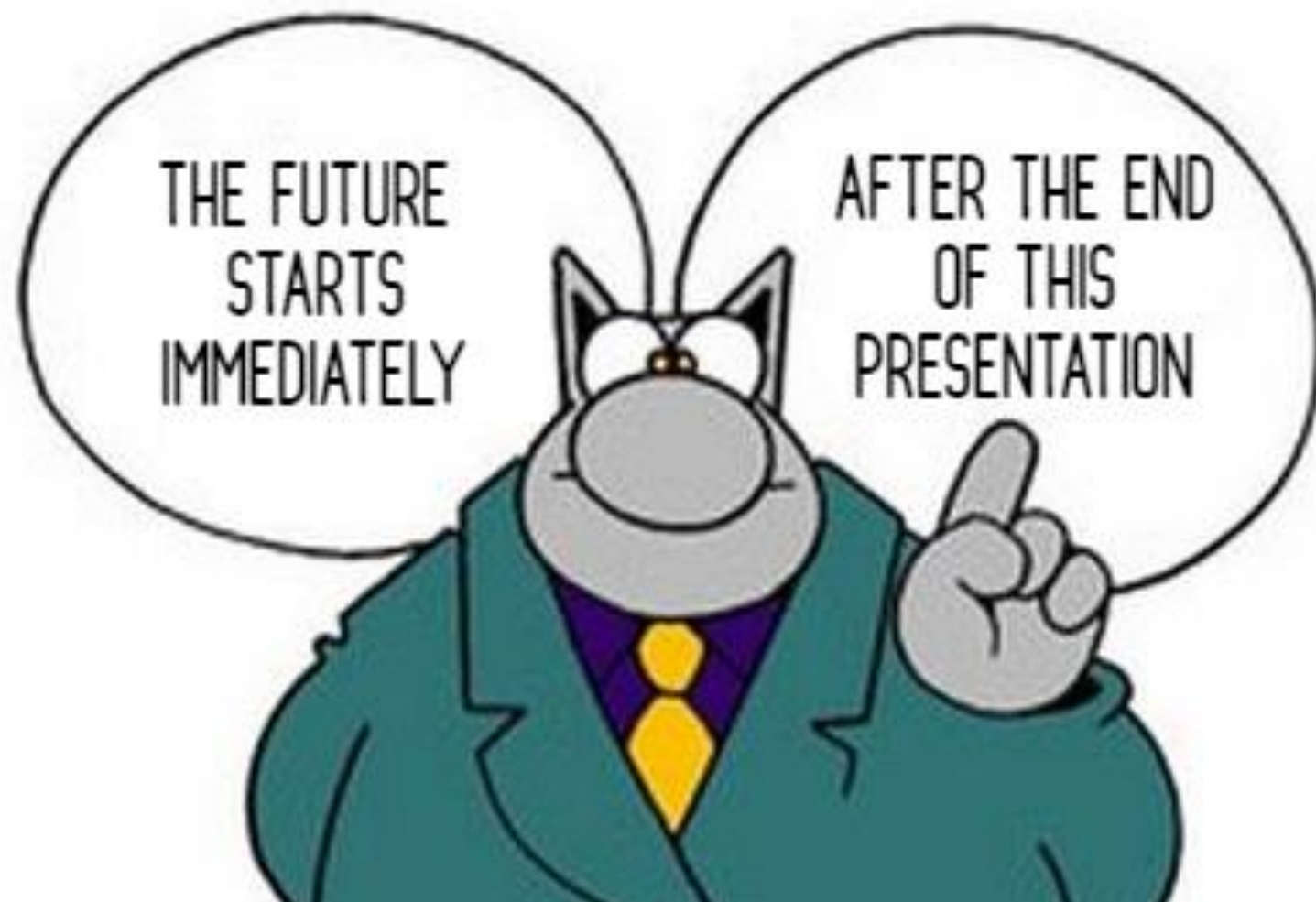


Contacts

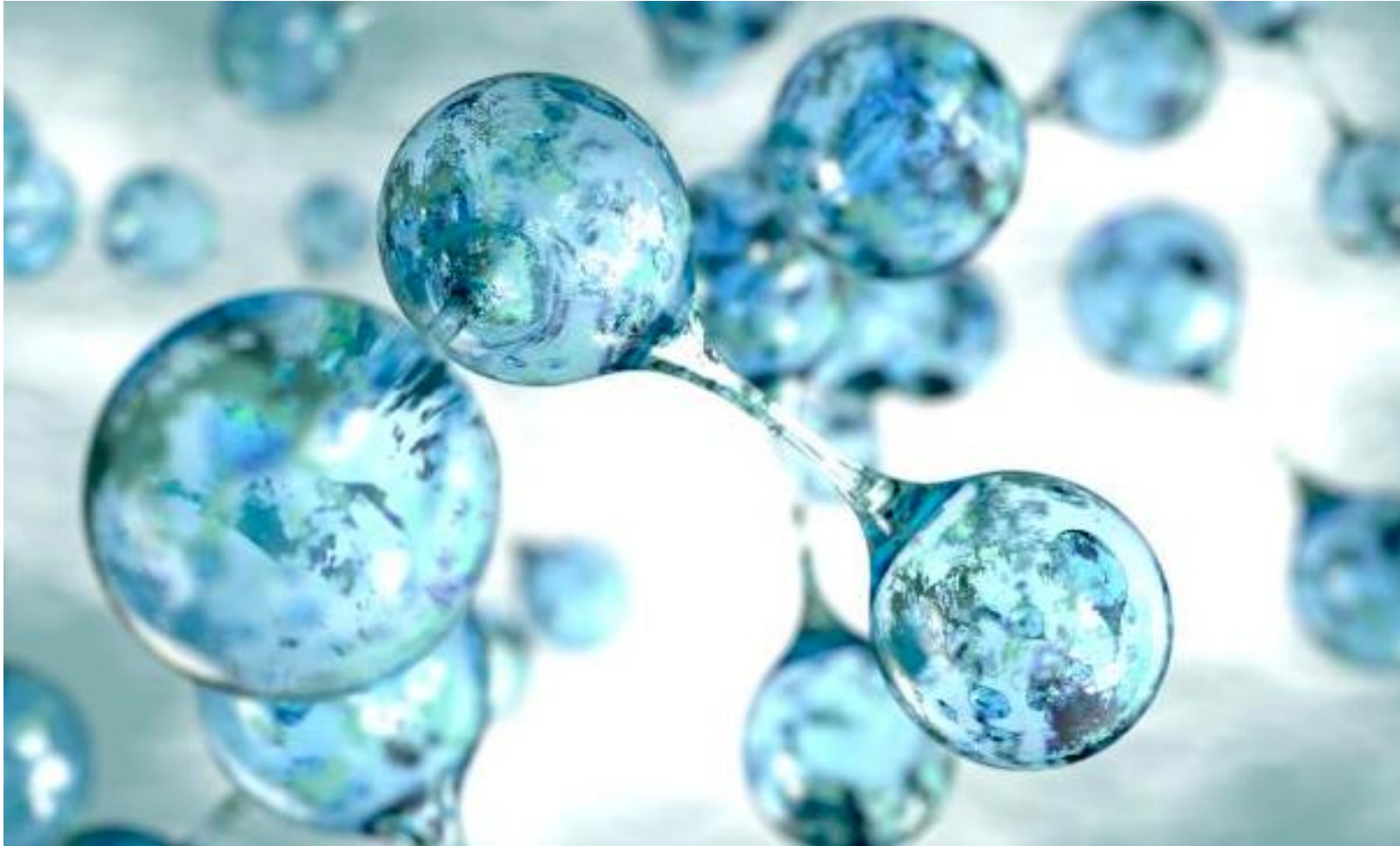
Hydrogen Europe

Av. de la Toison d'Or 56-60, BE-1060 Brussels

Twitter: [@H2Europe](https://twitter.com/H2Europe)



Back up slides - Let's go hydrogen!



Overview of trucks offer



DAF/VDL - Benelux



Hyundai- 1,600 trucks by 2025 in CH Switzerland

In Europe



Green GT/KAMAZ
- 40t in CH

Worldwide

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



FPT – fuel cell powertrain



+ hydrogen
refrigerated
semi trailer



Scania 27t



HV Systems



Toyota/Kenworth – port of L.A, US

Overview: Vans in Europe – up to 500 km range



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



HV Systems van



Mercedes-Benz
Concept Sprinter F-Cell



4.25 t FC van - “H2 Panel Van” model,
DHL Express - 100 FC vans by 2020
Up to 10m₂ cargo capacity; Max.
payload >800 kg



Volkswagen Crafter HyMotion – 4.25 t FC van
Launch in 2022

Overview: Fuel cell cars



Hyundai NEXO, 660 km range
Hyundai ix 35: 600 km range



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



Toyota Mirai: 500 km range
Second generation to be unveiled in Nov 2019



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

Bus OEMs offering FC bus options



 ALEXANDER
DENNIS



 CAETANO BUS



 ebe EUROPA



EvoBus



 rampini



Safra



 SOLARIS



 UDUS
BUS



VANHOOL



 VDL
BUS & COACH



 WRIGHTBUS
WRIGHT

Fuel cell trains



Developments in Germany,
France, United Kingdom etc.