



Hydrogen
Europe

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*@28th Meeting of the EU-Russia Gas Advisory Council's
Work Stream on Internal Market Issues (GAC WS2)*

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Fuel Cells & Hydrogen Joint Undertaking 2



FUEL CELLS AND HYDROGEN JOINT UNDERTAKING



ENERGY

- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power & combined heat & power generation



TRANSPORT

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime, rail and aviation applications

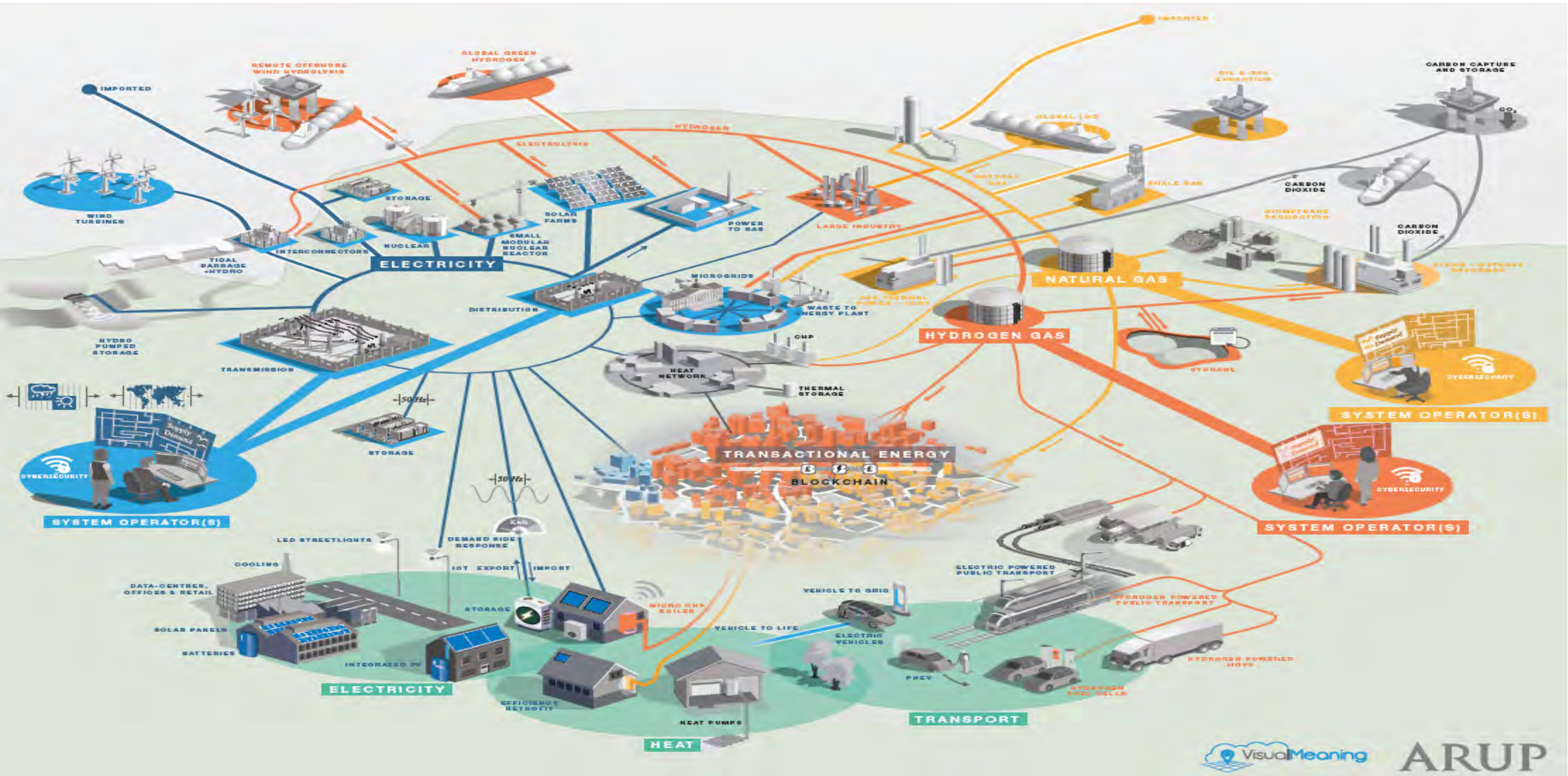


CROSS-CUTTING

(e.g. standards, safety, education, consumer awareness, ...)

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

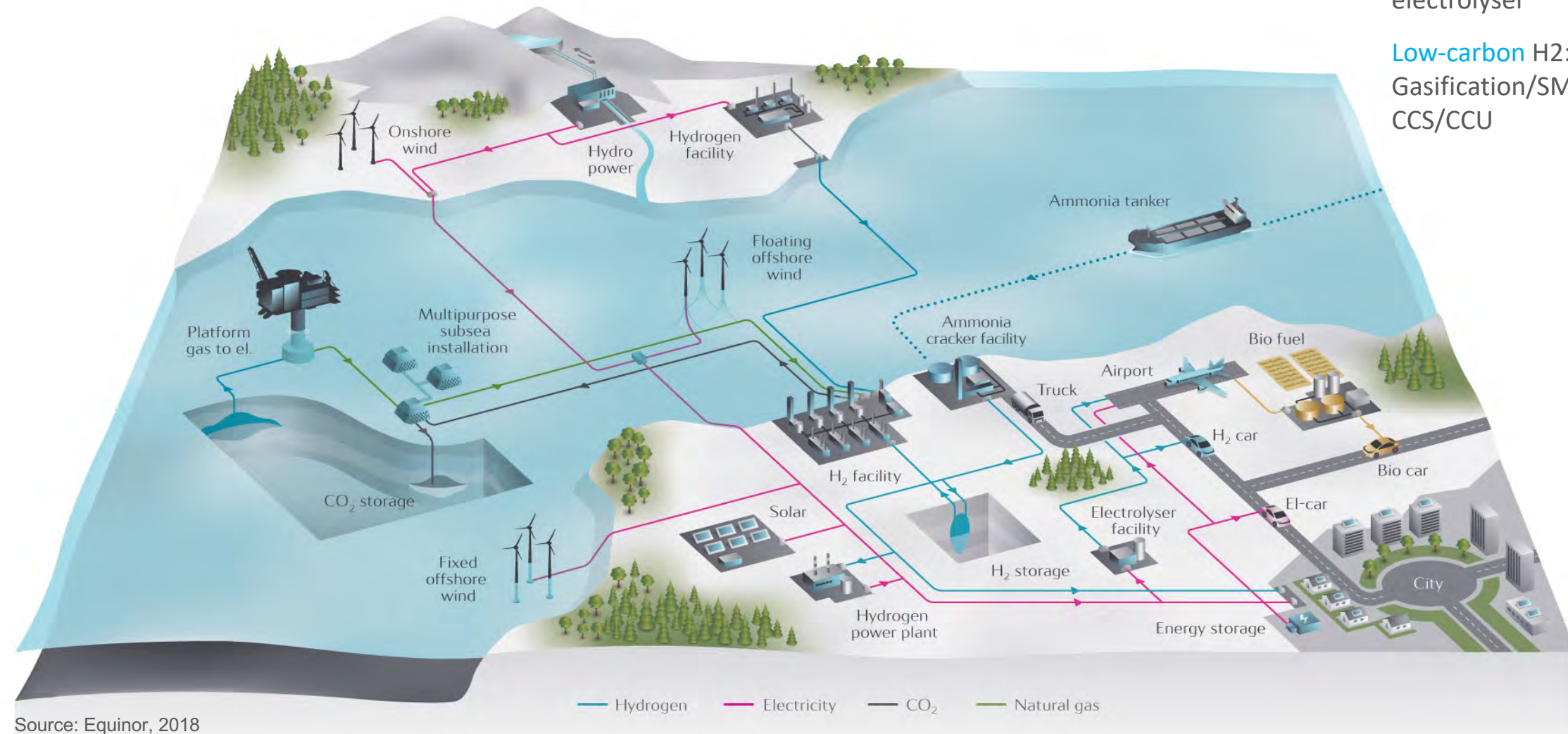
Sectoral Integration



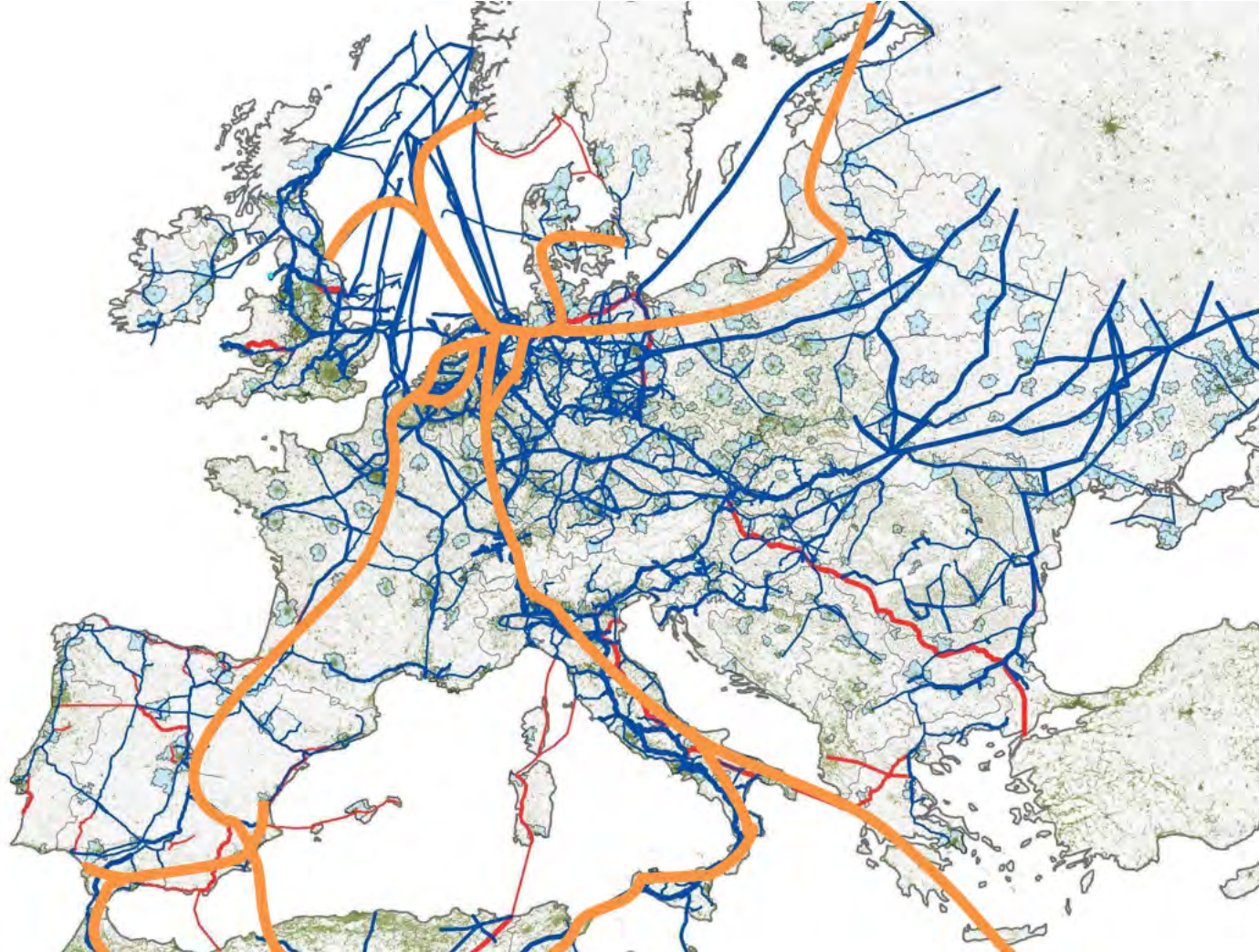
Hydrogen Production >> Renewable & Low-Carbon

Renewable H₂: electricity and electrolyser

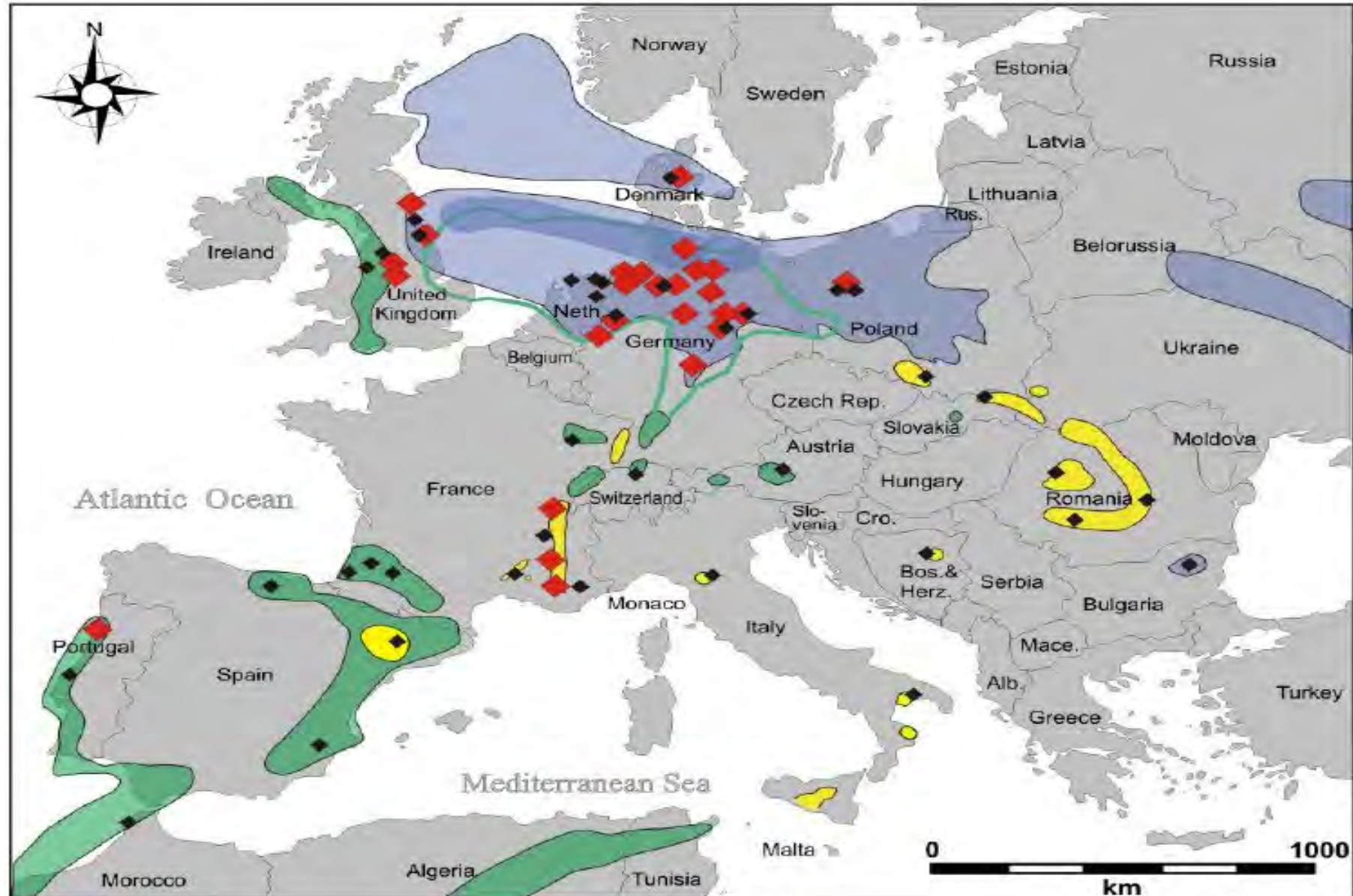
Low-carbon H₂: natural gas/coal, Gasification/SMR/Pyrolysis, CCS/CCU



We need a European Hydrogen Backbone



Salt caverns for hydrogen storage



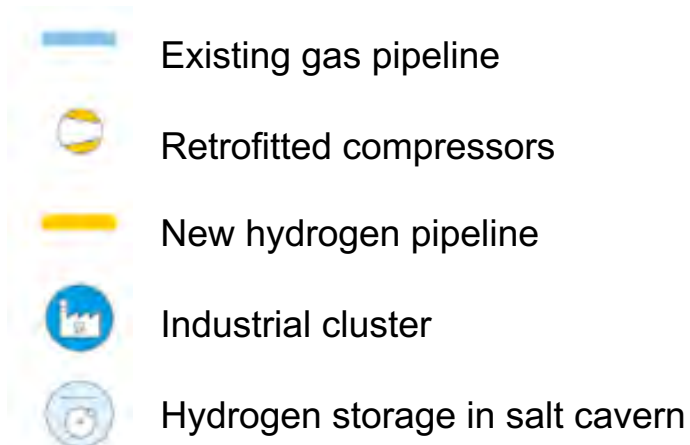
RES Import: Europe-North Africa Backbone



Where to start? - The Netherlands



- Low caloric gas pipelines will become available, because the Groningen gas field has to reduce production to 0 in 2030
- 1 Transport pipeline capacity about 15 GW
- New hydrogen pipeline connections to offshore wind farms
- Connections to Germany (Ruhr-area, Bremen-Hamburg and Belgium (Antwerp, Zeebrugge)
- European connections to France, Austria, Italy, etc.



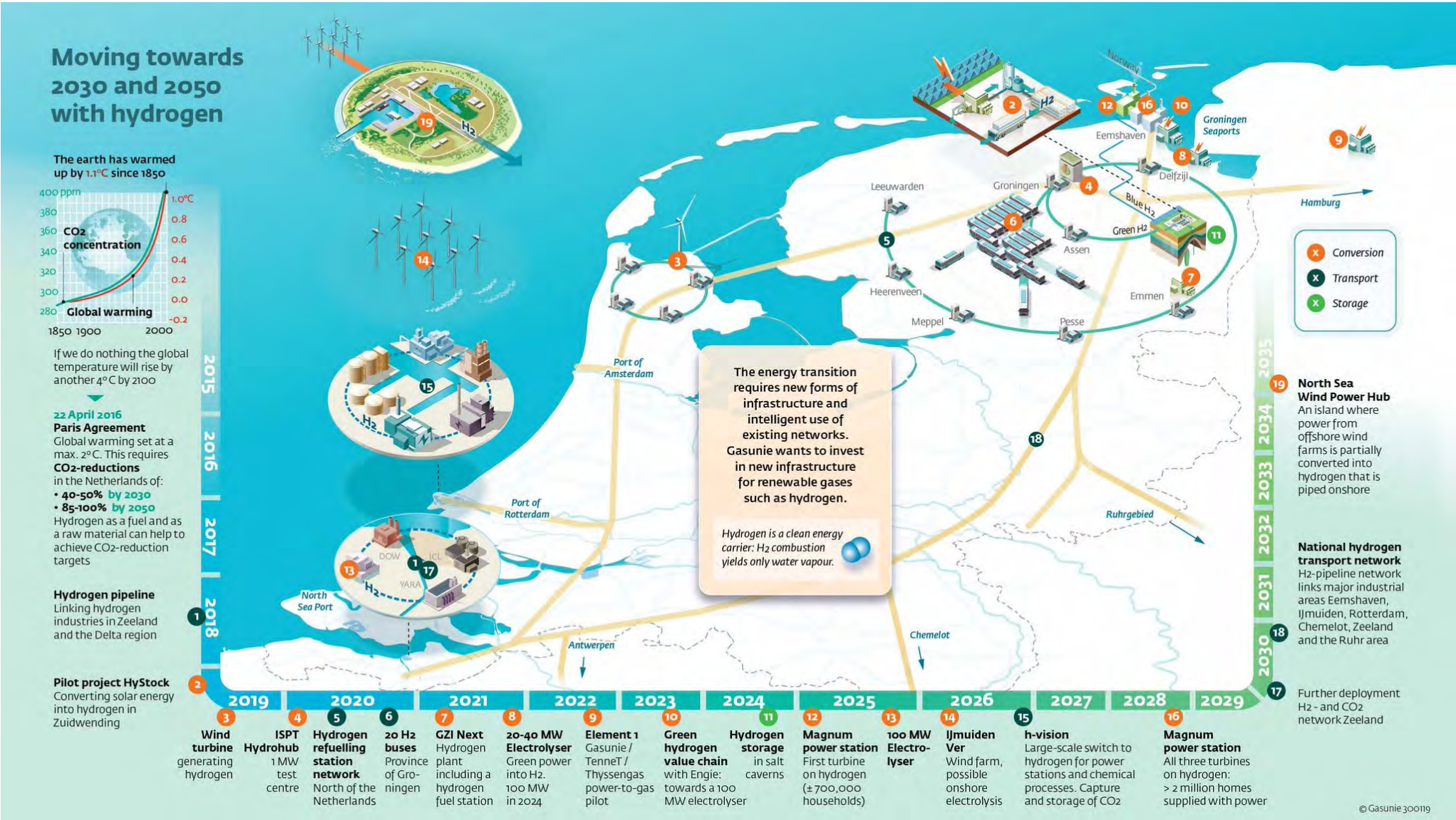
Gas Market Regulation (next battlefield)

- Prepared now but presented beginning 2020
- It will be a Regulation and not a Directive
- **Content:**
 1. One part of the package will be mirroring the electricity market (retail).
 2. Another part of the package will mostly cover the future **content of the gas grids**

⇒ Hydrogen Europe to publish its Vision paper



Hydrogen Valleys: H2 in The Netherlands



Hydrogen Roadmap for Europe

BESIDES CO₂ 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 demand¹



~560 Mt

annual CO₂ abatement²



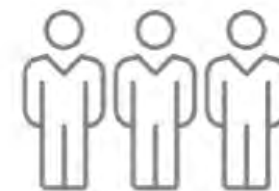
~EUR 820bn

annual revenue
(hydrogen and
equipment)



~15%

reduction of local
emissions (NO_x)
relative to road transport

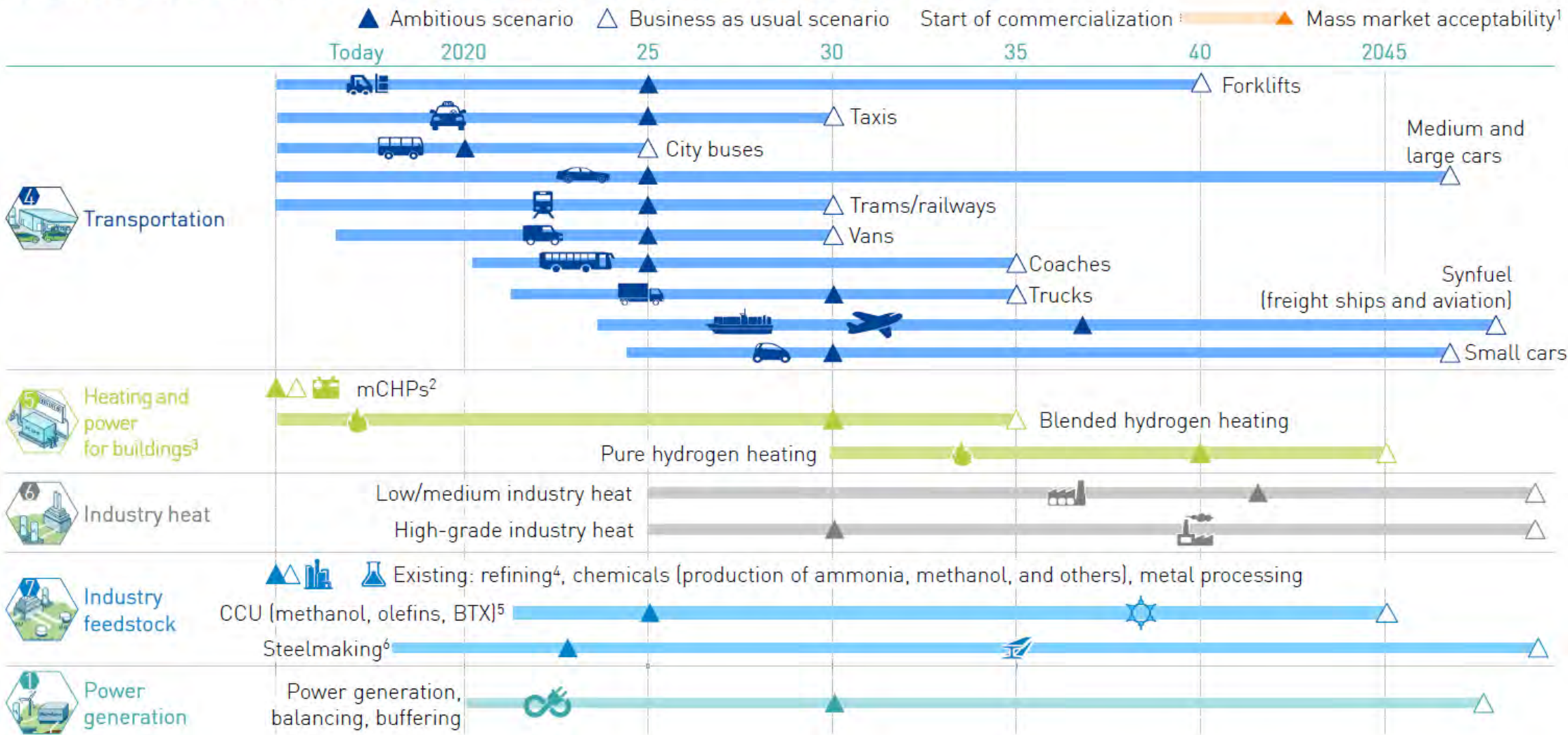


~5.4m

jobs (hydrogen,
equipment, supplier
industries)³

Hydrogen Roadmap for Europe

HYDROGEN TECHNOLOGY EXISTS AND IS READY TO BE DEPLOYED



Important Projects of Common European Interest



Geographically, 3 IPCEI's can be identified



Important Projects of Common European Interest



IPCEI 3: Spain, Portugal, France, Germany & Poland:

- Stacks
- Buses & trains
- Tanks
- Electrolyser capacity?

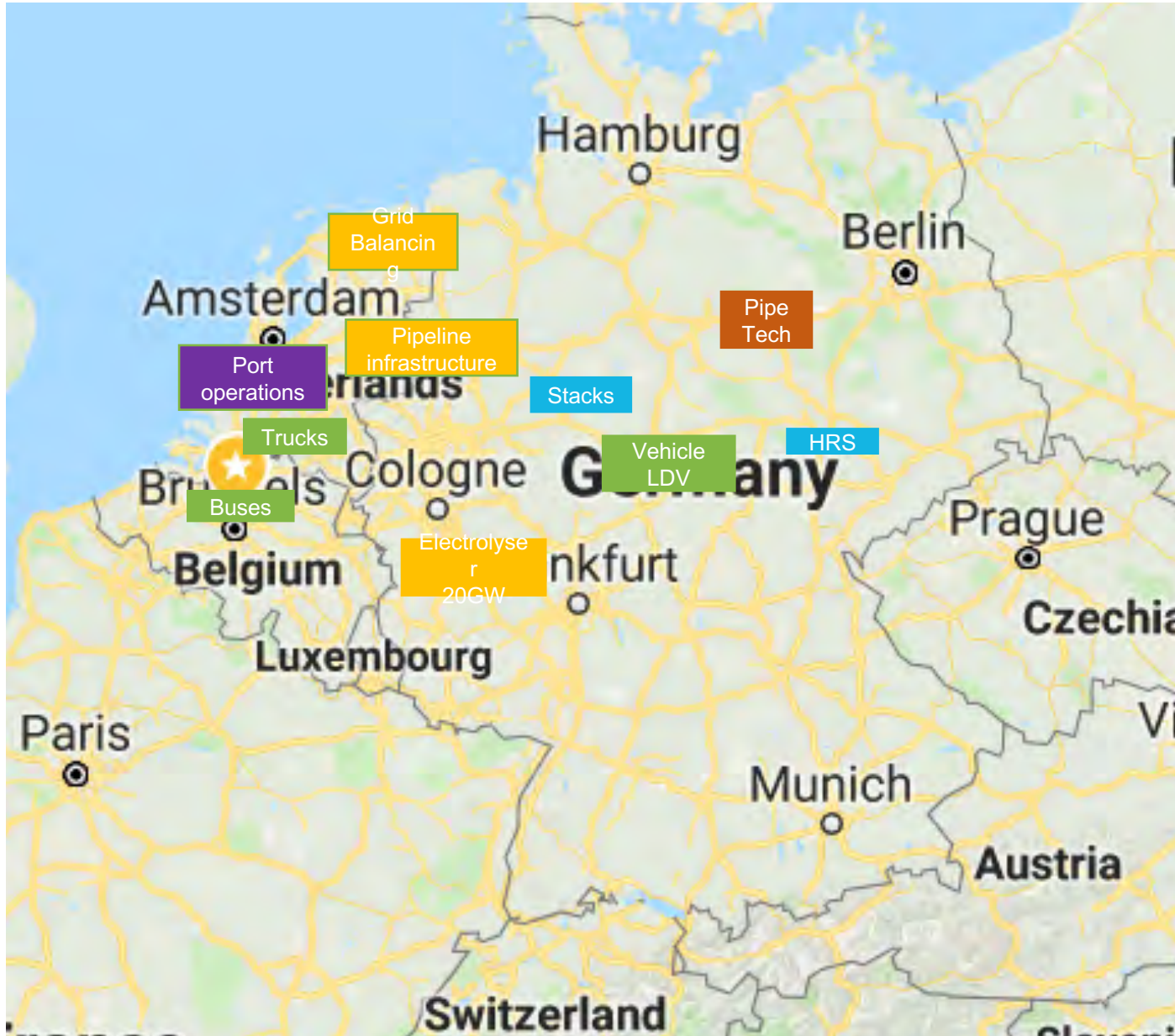
Important Projects of Common European Interest



IPCEI 2: Italy, Slovenia & Austria:

- Port strategy
- Pipeline hub in Austria
- Liquid hydrogen

Important Projects of Common European Interest



IPCEI 1: Netherlands, Belgium & Germany:

- Off-shore wind
- L-gas pipelines
- Electrolyser capacity
- Trucks
- Light Duty Vehicles

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