Hydrogen exchange Definition study ”HyXchange” conclusions and follow-up

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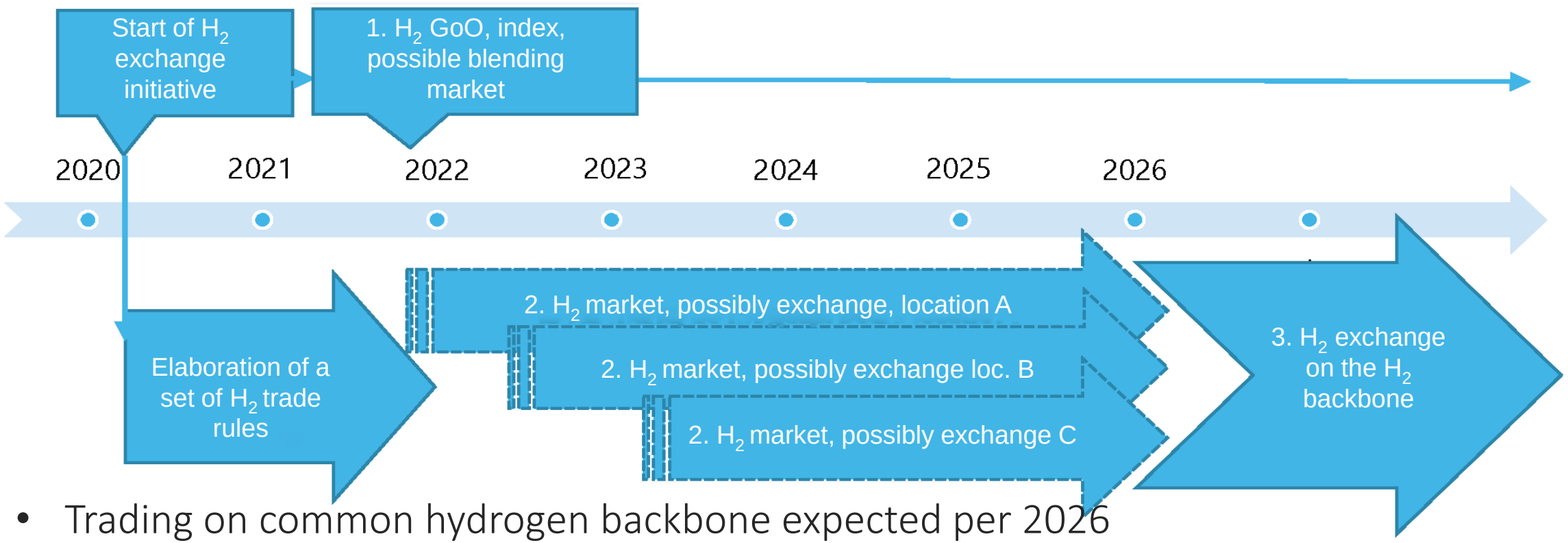
Summary “A Hydrogen Exchange for the Climate”

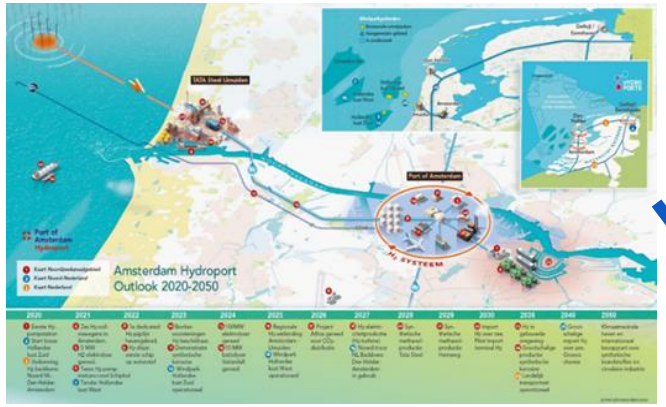
https://www.government.nl/documents/reports/2020/09/24/a-hydrogen-exchange-for-the-climate



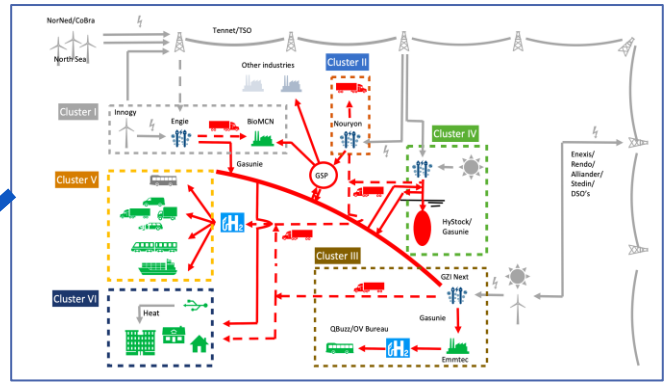
- Trading on common hydrogen backbone expected per 2026
- Before that moment, trading may be established at regional level
- Launch of an index as a step-up to a full-fletched exchange
- Definition of rules and regulation for infrastructure access, GoO’s and trading

Definition project: investigating / discussing practical steps

Gasunie and four Dutch sea ports funded the preparation work of a Hydrogen Exchange



Port of Amsterdam

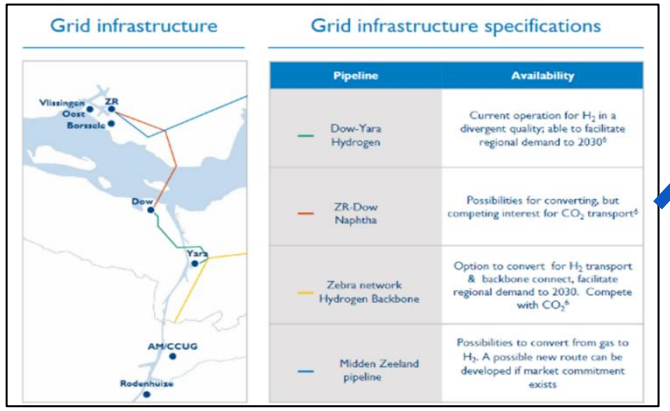


Groningen Seaports

Im/exports

Im/exports

North Sea Port



Im/exports

Port of Rotterdam

HyXchange: Involvement of market parties and traders

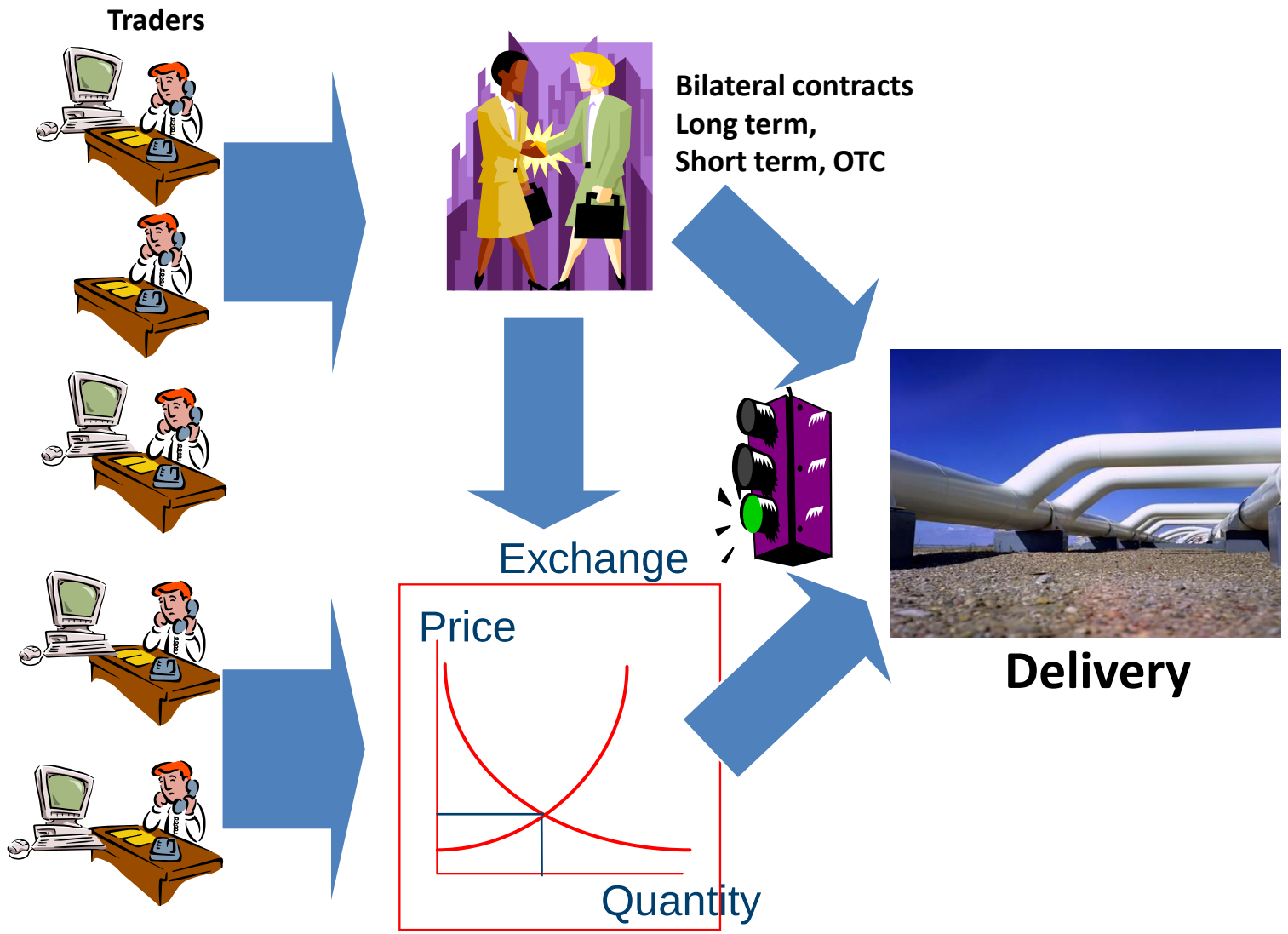
We foresee a market with both Bilateral contracts (long term, short term, OTC) and exchange trading.

During the study, the key topics for a hydrogen exchange were discussed with market parties in several stages:

- Discussion with market parties in the harbour regions, involved in hydrogen initiatives
- A broad consultation meeting on a nationwide level with European scope
- Two product committees regarding:
  - hydrogen certificates
  - hydrogen spot market/index
- Another broad consultation meeting

Around 35 market parties and organizations involved

You're welcome to join!

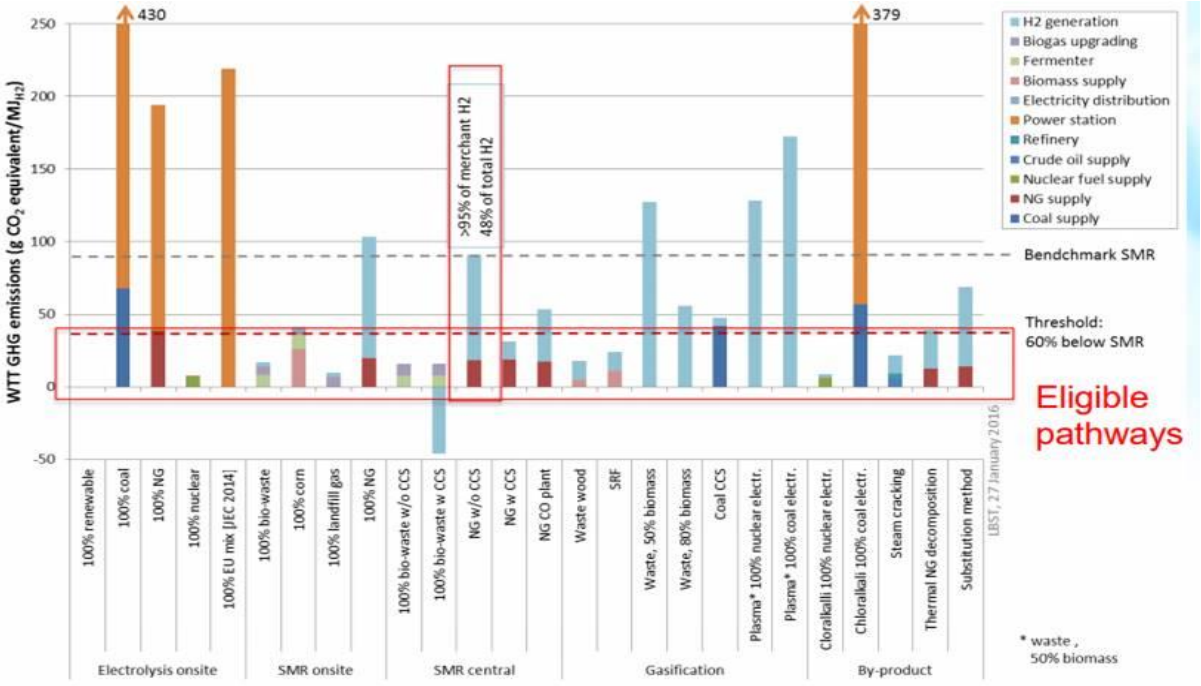


Different sources of hydrogen

Green or Low carbon H_2 can be many things:

- H_2 from Electrolysis from wind power, solar or other renewables
- Gas reforming with partial or full CCS/CCU (retrofitted to existing facilities, or new) or
- H_2 as a by-product from chemical industries (e.g. crackers), or from electrochemical industry, either based on grey or green electricity
- Other like H2 from pyrolysis, etcetera

These sources can have various CO_2 emissions according to Certifhy project



Various CO2 emissions of green and low-carbon H_2 sources *(source: Certifhy)*

There should be one GoO design for all H_2, whereby the GoO specifies the CO_2 emissions.

H_2 market: larger, more actors, variety, time variations

Traditional H2 market: Grey Hydrogen industry demand/production, fully continuous and localized.

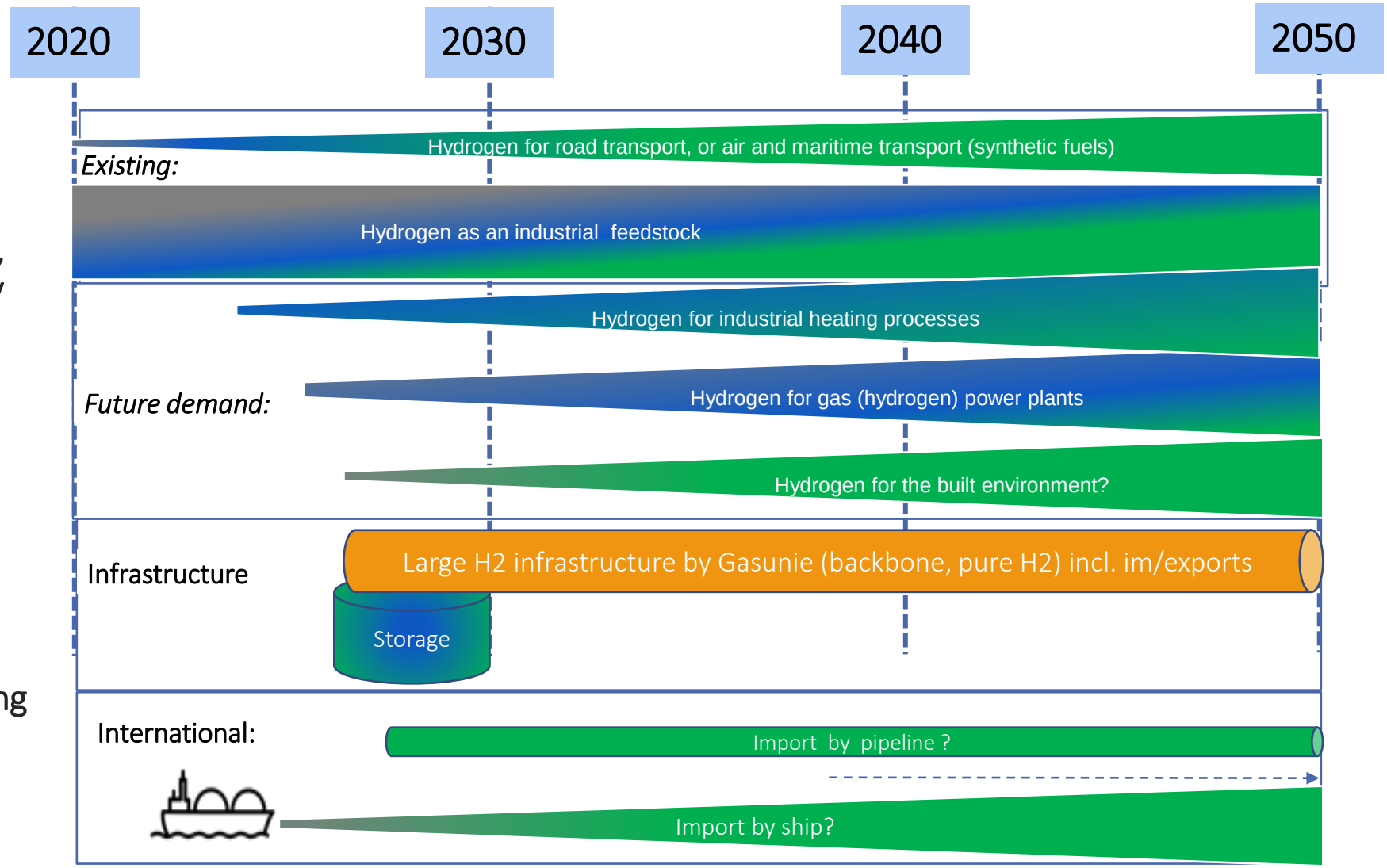
New H_2 market will bring change:

- Blue H_2 + Green H_2 (+ byproduct H_2, pyrolysis H_2) towards CO_2 neutrality
- More diverse supply / demand

More time variations / imbalances:

- Electrolysers with fast weather-dependent variations daily/hourly
- Hydrogen power plants as back-up for renewable power
- H2 for built environment could bring seasonal variation.

→ Need for optimization, requiring infrastructure (transport and storage) …a market -> Hydrogen Exchange



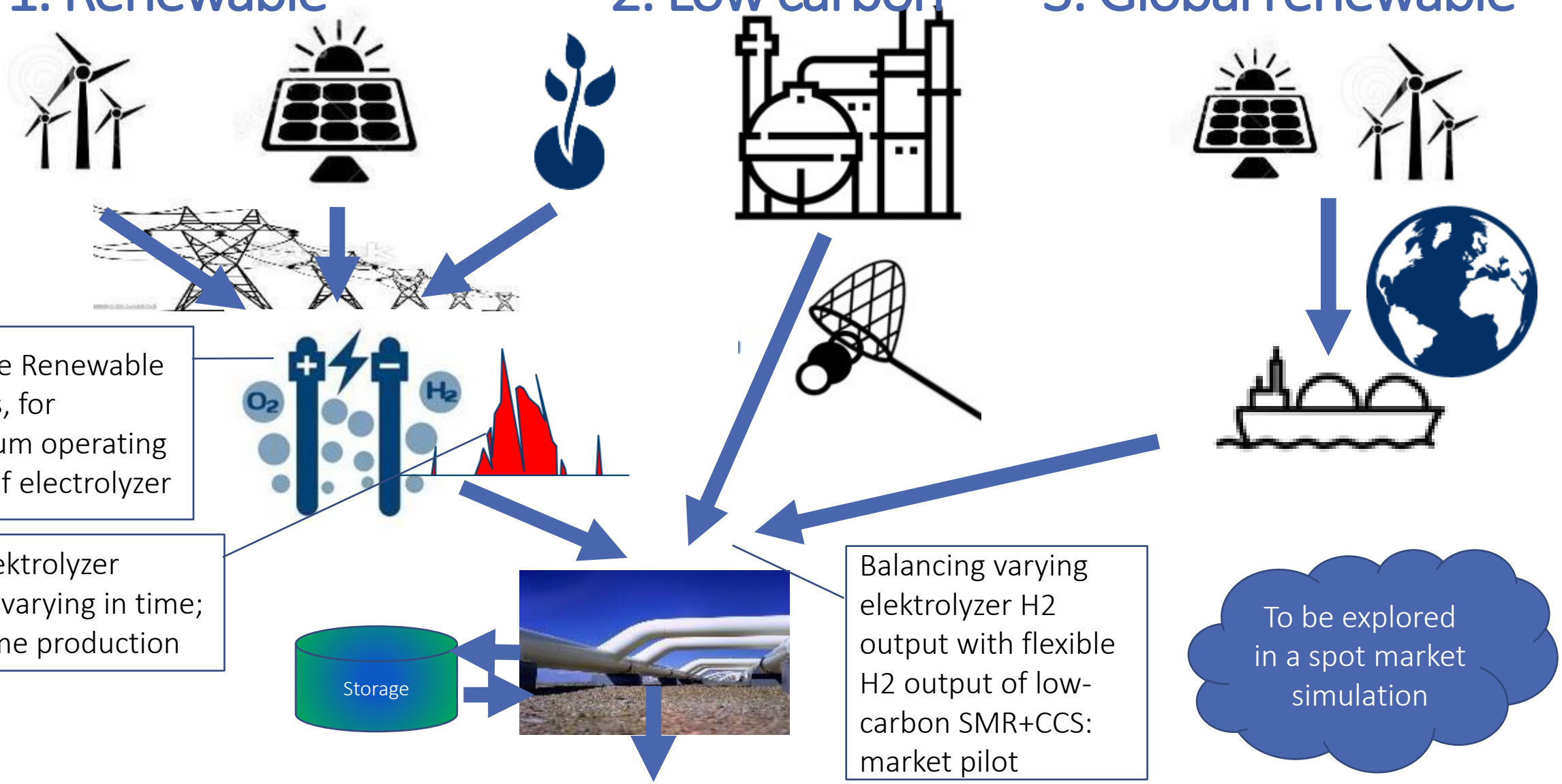
Source: https://www.government.nl/documents/reports/2020/09/24/a-hydrogen-exchange-for-the-climate

Markets needed for optimization of threefold Hydrogen sourcing

1. Renewable

2. Low carbon

3. Global renewable

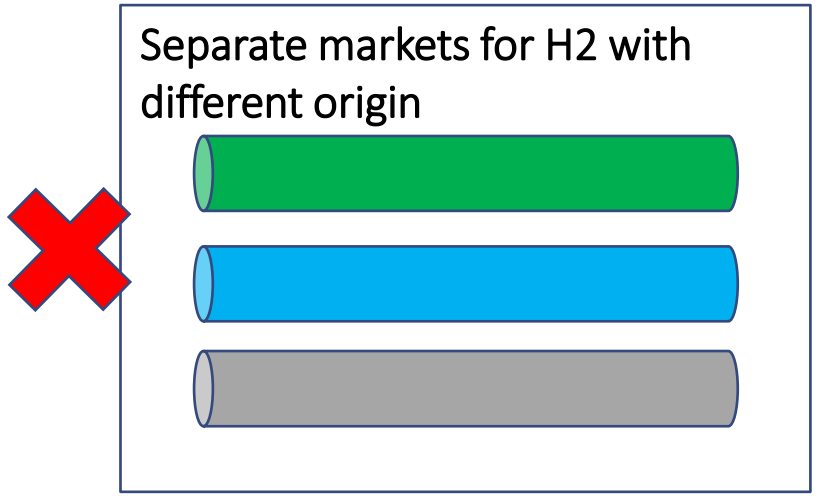


Secure Baseload Climate Neutral Hydrogen

One infrastructure and market place for all hydrogen

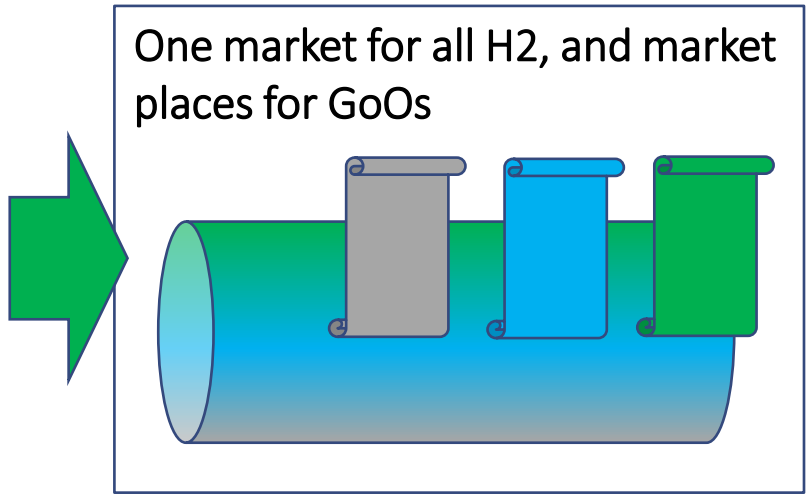
Separate markets for each hydrogen origin

- Fragmentation of market liquidity
- Sub-optimal use of infrastructure
- No optimization of variations physical hydrogen
- Higher cost, lower speed of introduction



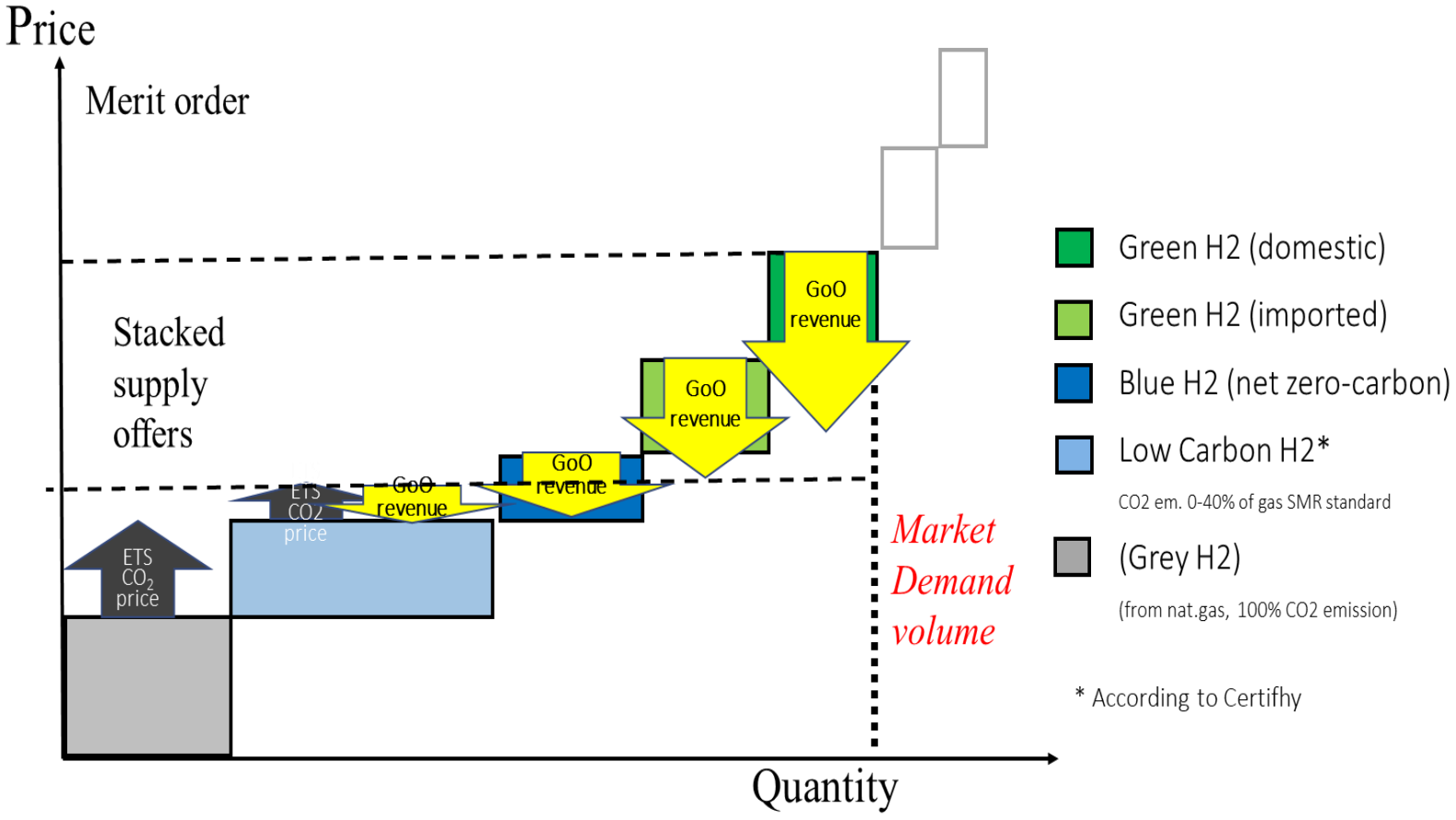
One market for all hydrogen (all origins) and market places for H_2 Guarantees of Origin (CO_2 related)

- Integration and sharing of liquidity
- Optimal use of infrastructure
- Optimization of variations in physical hydrogen
- Lower cost, higher speed of introduction



Certificates and market drivers, hydrogen market

- Hydrogen producers will get revenue from hydrogen sales as well as the guarantees of origin
- Therefore GoOs are needed for sorts of H2 from different origins to ensure a business case for producers.
- Also important for this:
  - CO2 pricing
  - Subsidies for renewable & low carbon H2
- Demand from sectors and applications where hydrogen has premium value: transportation, feedstock, synthetic fuels, housing



Source: Hydrogen Exchange definition Project

Needed*: a carefully balanced system of Guarantee of Origin, for all Hydrogen, including passporting, imports, CO2 footprint info

We urge the European Commission and all member states to implement.

A. **Renewable GOs including EU /global passporting and non-EU imports:** specifying CO2 footprint of production (if any), and standard rules for imports from non-EU countries.

B. **GOs for all Low carbon Hydrogen,** specifying CO2 footprint of production

Both applicable for all demand sectors.
Build a policy, initiative (to be tested in a pilot project) based on:

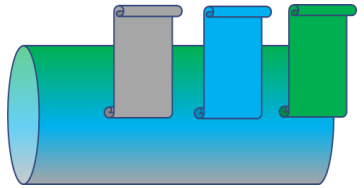
- Build on the EU-funded CertifHy project: industry standard
- Monitoring injected / withdrawn certified hydrogen consignments
- Sustainability (Renewable and Low-Carbon) verification / certification (prior to grid injection) and cross-border transfer of sustainability claims.
- Suggest "full disclosure" within the H2 grid. Experience in power market NL, others.

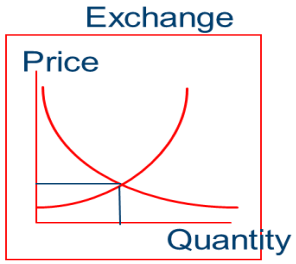
**https://ec.europa.eu/info/sites/default/files/energy_climate_change_environment/events/presentations/2.06.03_mf35_presentation-hydrogen_exchange_initiative-preconditions_for_establishing_a_hydrogen_exchange-den_ouden_v2.pdf*

Outcome of definition project: next phase “HyXchange”*

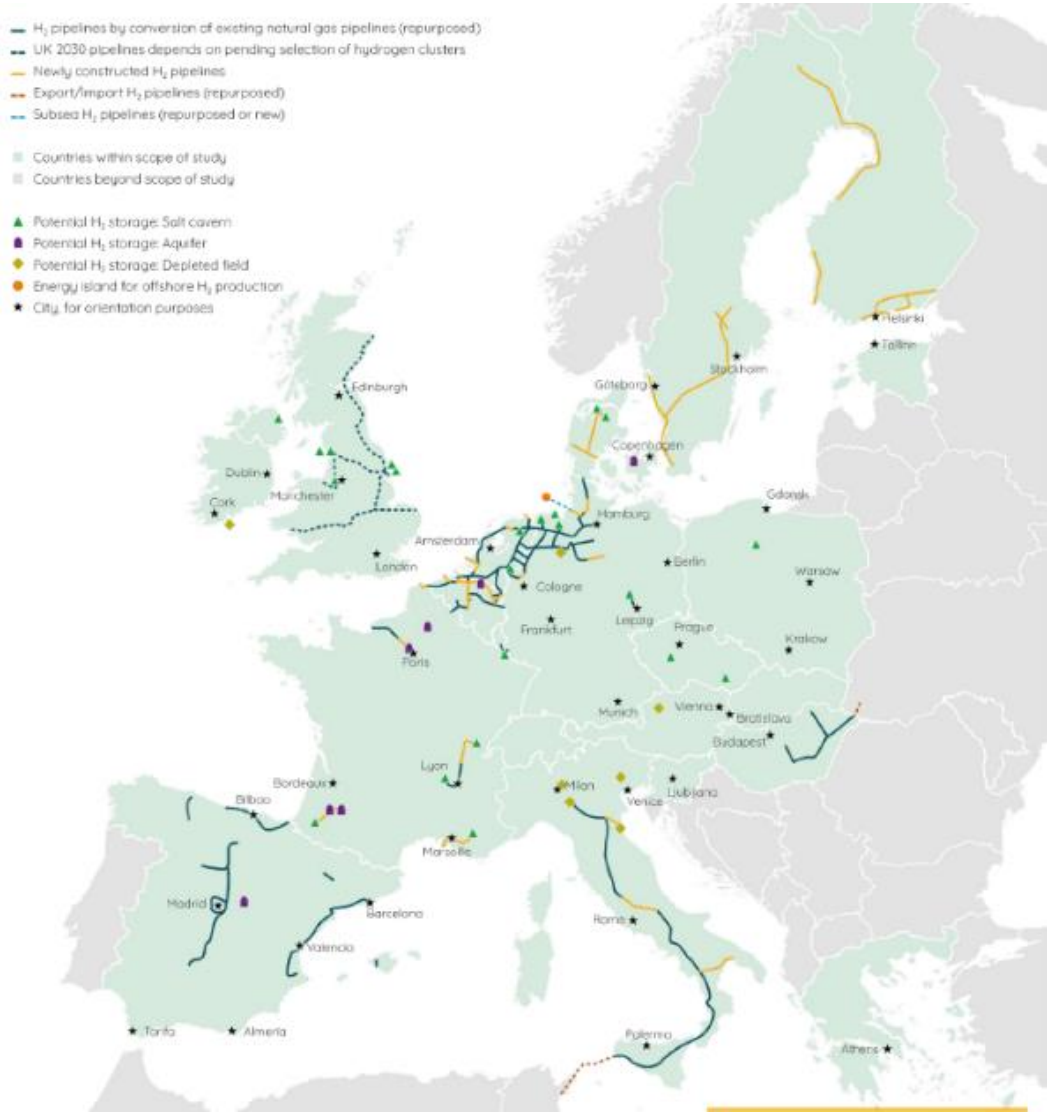
Out of this study and input from market parties, four preliminary products were selected:

A. **Certificate product**: a wish of many market parties. Can be developed doing a **pilot** in advance, awaiting the hydrogen infrastructure. Is a precondition for all other products.
B. **Index product:** this provides a value to the certificate product. This can be developed in anticipation of a hydrogen infrastructure. The index product is also a precursor for spot and futures and swaps.
C. **Spot market product:** needed, due to intermittent output of electrolyzers. Start by doing a **market simulation**. To be launched at sea port locations readiness of infrastructure, market parties. To be migrated towards the backbone when that is (partly) ready.
D. **Products for grid balancing and storage:** develop the market design together with infrastructure developers. To include in the market simulation.





HyXchange: a hydrogen exchange for Europe, with global role



Source: Guidehouse, "Extending the European Hydrogen Backbone"

- North Sea region as one of the starting points for a European Hydrogen backbone
- Parties in the initiative (Gasunie, Sea Ports, certifying body, Hydrogen Exchange initiative) ready to discuss models/ideas

- Prepare implementation with Pilots and Simulations
- We invite all parties to discuss further

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