

Preconditions for establishing a hydrogen exchange

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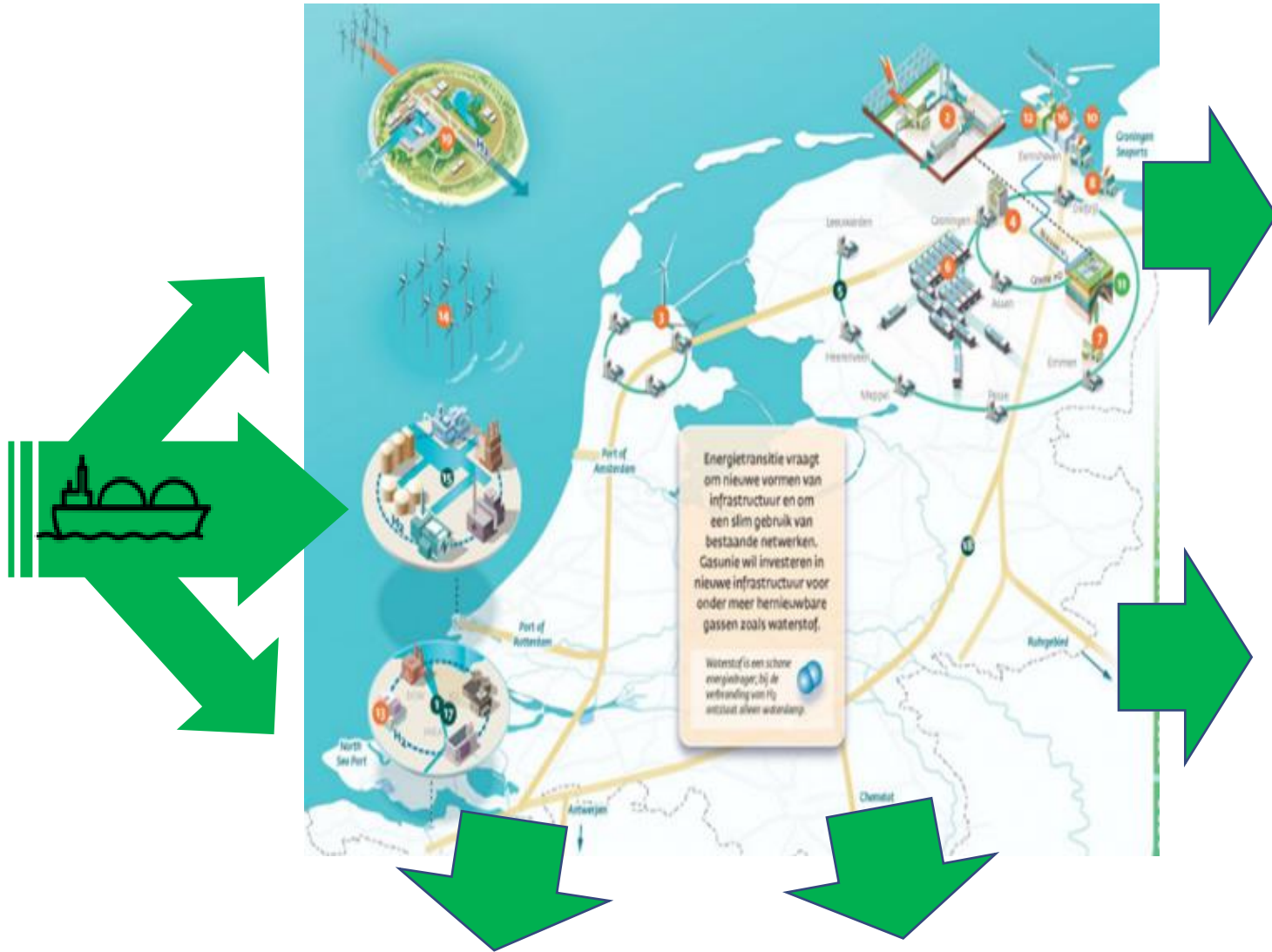
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Based on report commissioned by Dutch Ministry of Economic Affairs and Climate Policy
<https://www.government.nl/documents/reports/2020/09/24/a-hydrogen-exchange-for-the-climate>
and further work by the Hydrogen Exchange Definition project, including consultation meetings.

Precondition 1:

TPA for all new hydrogen transportation & storage

- TPA for new hydrogen infrastructure*: to be like TPA and trading for natural gas.



NL example

- Hyway 27: re-using gas infrastructure Gasunie for a common H₂ infrastructure “backbone” + storage
- Connecting all ports & industries & international for all hydrogen
- Hydrogen exchange initiative funded by Gasunie and 4 Dutch sea ports

* including from re-used gas infrastructure

H₂ market: larger, more actors, variety, time variations

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

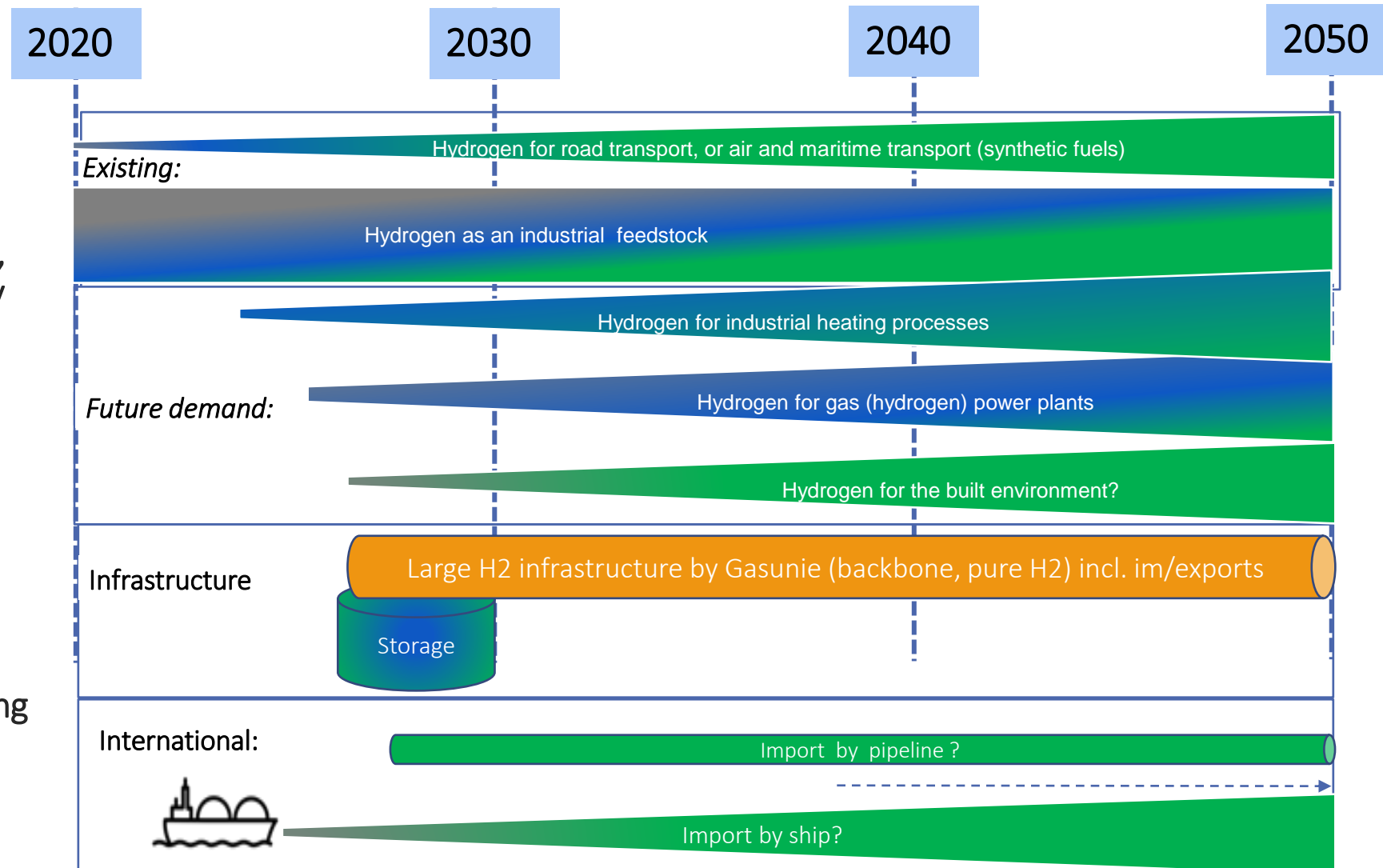
New H₂ market will bring change:

- Blue H₂ + Green H₂ (+ byproduct H₂, pyrolysis H₂) towards CO₂ 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



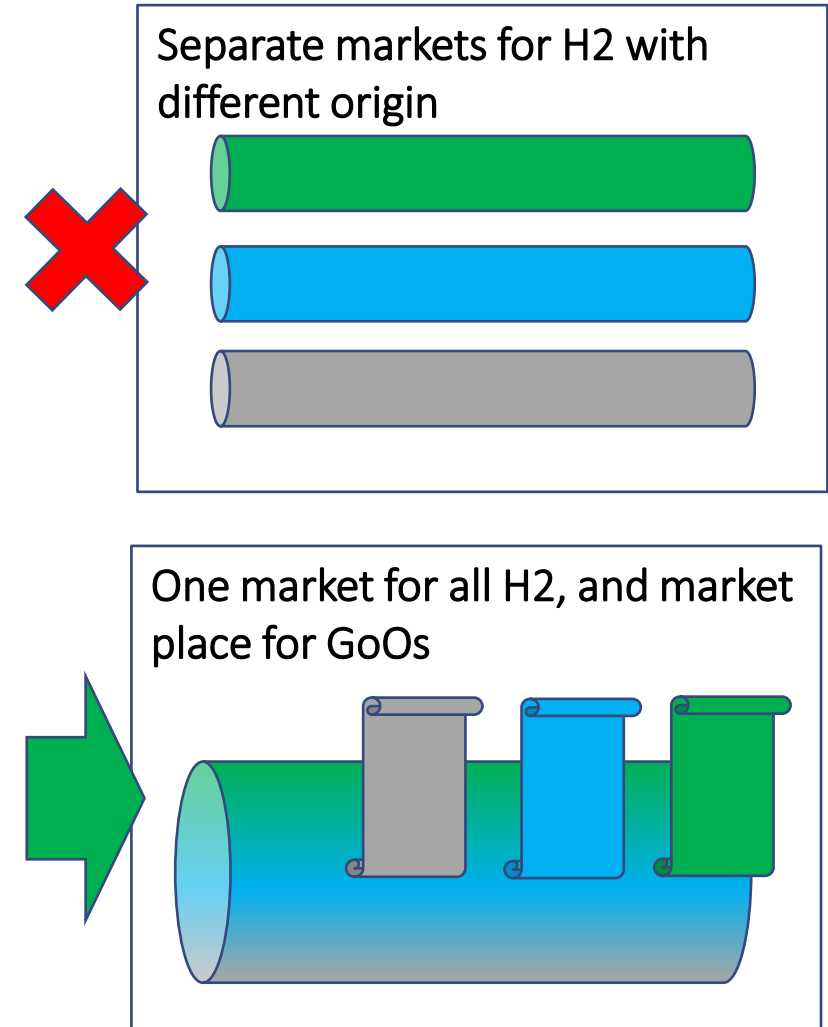
Precondition 2: One infrastructure and one market place for all hydrogen

Separate markets for each hydrogen origin

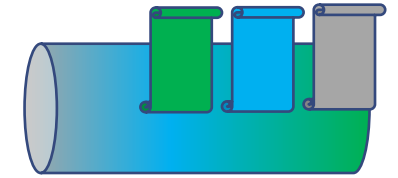
- Fragmentation of market liquidity
- Sub-optimal use of infrastructure
- No optimization of variations physical hydrogen
- Higher cost, lower speed of introduction

One market for all hydrogen (all origins) and a market place for H₂ Guarantees of Origin (CO₂ related)

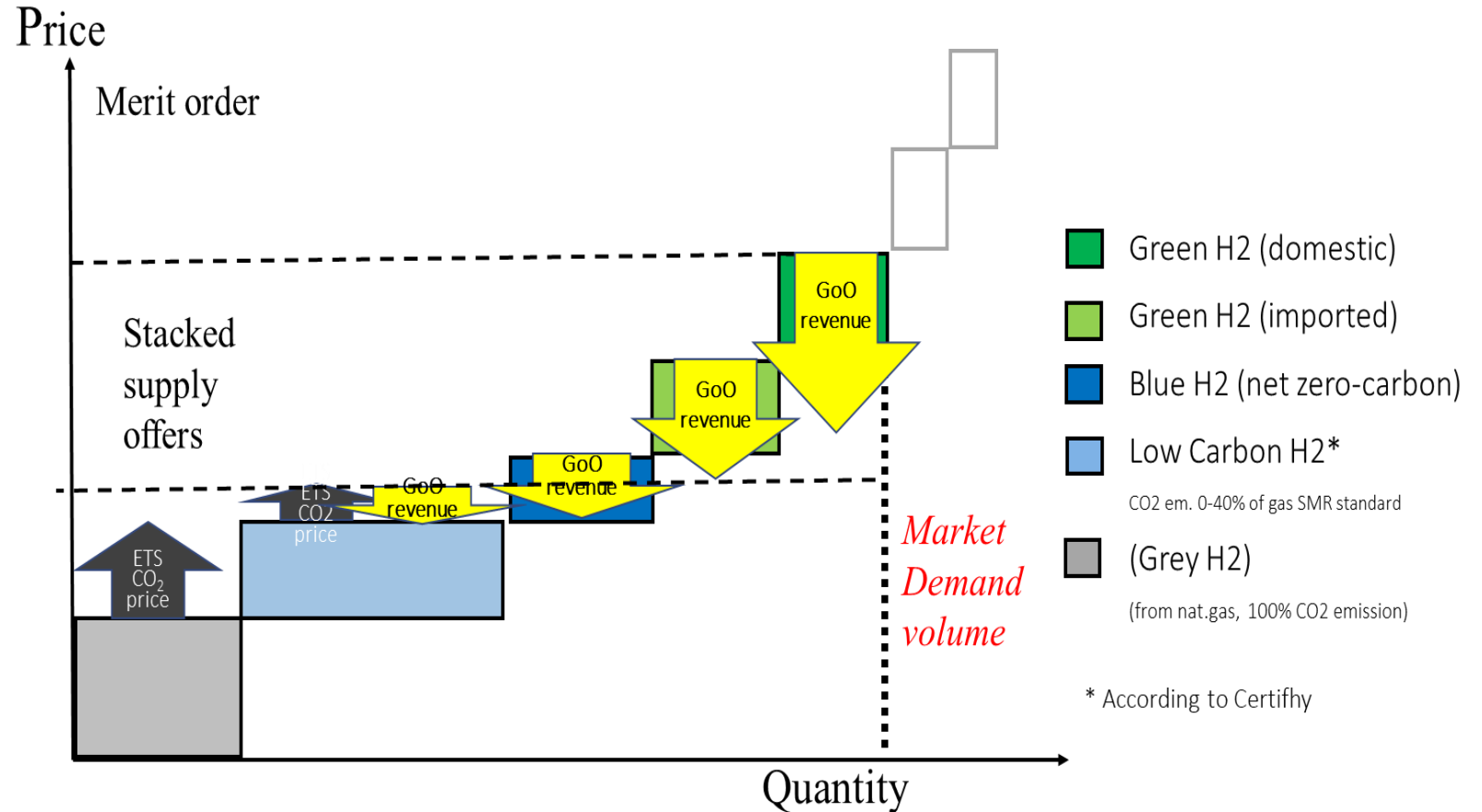
- Integration and sharing of liquidity
- Optimal use of infrastructure
- Optimization of variations in physical hydrogen
- Lower cost, higher speed of introduction



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



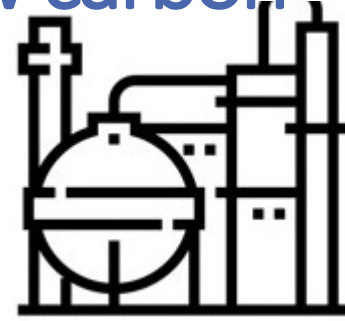
Source: Hydrogen Exchange definition Project

Markets needed for optimization of threefold Hydrogen sourcing

1. EU Renewable



2. EU low carbon

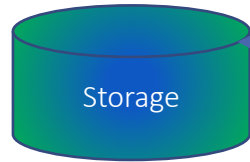
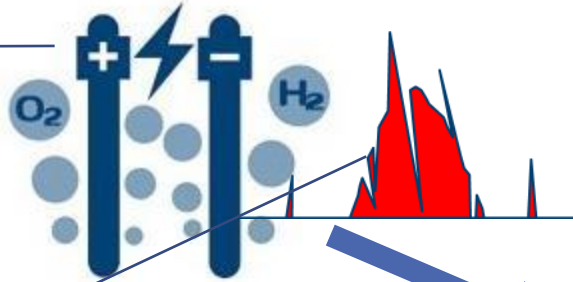


3. Global renewable

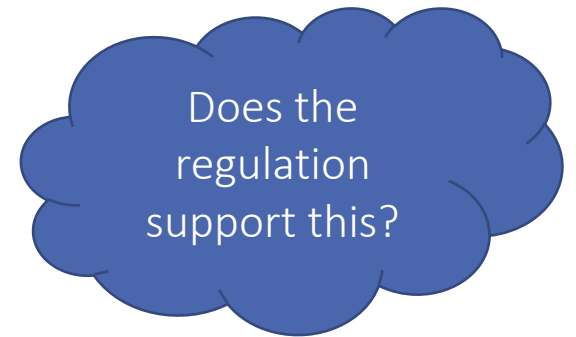


Multiple Renewable sources, for maximum operating hours of electrolyzer

Still, electrolyzer output varying in time; part-time production



Balancing varying electrolyzer H2 output with flexible H2 output of low-carbon SMR+CCS: market pilot



Secure Baseload Climate Neutral Hydrogen

Good steps, concerns, potential for improvement

- RED II: Good step for the renewable transport fuel segment.
- Worries on input in electrolysis: geographical & temporal correlation, adverse additionality restrictions
- Difficult to combine with free (exchange) trading: blocking optimization, efficiency, low-cost solutions.
- No implementation yet for low-carbon hydrogen, non-EU renewable imports (*although RED II allows this*)
- Different conditions between H2 for transport fuels and H2 for other sectors: danger of fragmentation

Sectors: Sources:	Transport fuels (RED II)	Industry	Power Generation	Built environment
EU renewables	Implementation ongoing	ETS incentive only	ETS incentive only	Not covered
EU low carbon	Not implemented yet	ETS incentive only	ETS incentive only	Not covered
Non-EU renewables import	Not implemented yet	Not covered	Not covered	Not covered

Challenge: an integrated system striking a balance between the REDII RFNBO rules and incentives for other sectors (industry, built environment, power generation)

Pre-condition 3: 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 in the making.
- Monitoring injected / withdrawn certified hydrogen consignments in the network.
- 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.

Summary: a hydrogen exchange for all H2 in all sectors

A hydrogen exchange is needed, as the new hydrogen will come from multiple sources; demand will show much bigger time-variations and imbalances.

Such a hydrogen exchange is to facilitate a threefold hydrogen sourcing (EU Renewable, EU low carbon, Global renewable) for all demand sectors.

Needed:

1. Hydrogen infrastructure with TPA for all hydrogen: Renewable, Low-Carbon, Renewable Imports
2. Integrated certification system valuating all these hydrogen sources (Renewable, Low-Carbon, Renewable Imports), with passporting and CO2 (reduction) info.
3. All hydrogen certified before grid injection, monitoring injected / withdrawn consignments
4. Value for all sectors: transport fuels, industry, power generation, built environment.
5. Balanced and integrated regulation, market-facilitating.

Benefits:

- Efficient Hydrogen, much needed for the transition to -55% en carbon neutrality.
- Positioning Europe as the global hub with Hydrogen benchmark priced in Euro €.

Preconditions for establishing a hydrogen exchange

Thank you for your attention

- 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
- Proposed: committee for connecting practice and regulation
- We invite all parties to discuss further



Source: "Extending the European Hydrogen Backbone"

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