

UNECE Group of Experts on Renewable Energy

10th Session

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Hydrogen
Council |

Panel discussion: Synergies between H2 & RES

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Hydrogen Energy Ecosystem Key Differentiators:

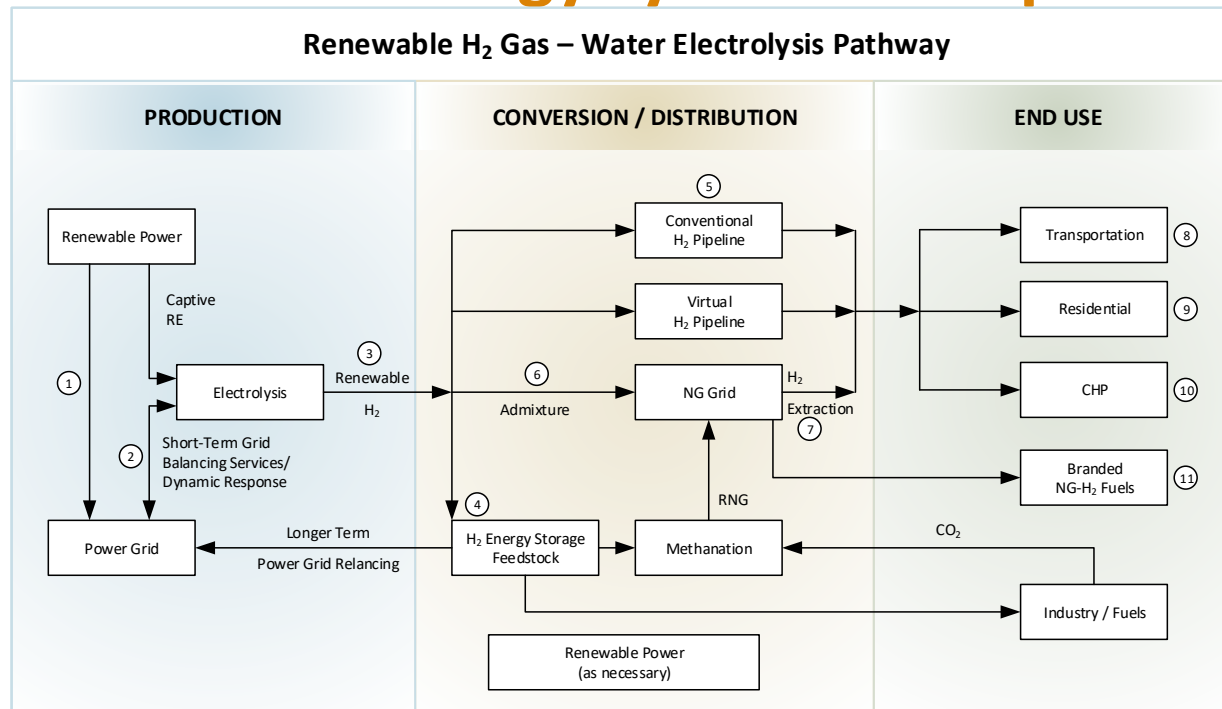
- ❑ Electrification
- ❑ Energy grid integrator
- ❑ Deep decarbonisation
- ❑ Diversity of transport
- ❑ Manufactured energy carrier



- ✓ Deep bi-directional linkages to the electrical grid and electrification (via grid balancing and FCs)
- ✓ Integration of RES with electrical and gas grids via energy storage
- ✓ Wide spectrum of derivatives and carriers such as ammonia, LOHC, Direct Reduced Iron, others
- ✓ Will be moved in all forms in pipelines and on the seas
- ✓ Not recovered from the earth as a product – it is a manufactured carrier of energy

Renewable Hydrogen Economy

Integrated horizontal energy system example



Areas for Standardization

- | | |
|--|---|
| ① Certification of renewable power | ⑦ H ₂ extraction |
| ② Dynamic power grid service | ⑧ Road and off-road transportation – all applications |
| ③ Certification of renewable hydrogen | ⑨ H ₂ for residential appliances and cooking |
| ④ H ₂ energy storage | ⑩ Combined heat & power / stationary FC |
| ⑤ H ₂ pipelines | ⑪ Use of NG-H ₂ blended fuels / fuel quality |
| ⑥ Addition of H ₂ to NG pipelines
- Mixing and concentration control | |

Hydrogen Cross-cutting Attributes

Hydrogen is:

- A cross-cutting carbon-free energy carrier and fuel
- An integrator of renewables into the energy system
- Connector between natural gas and electricity grids
- Central link in multi-fuel multi-sector energy chain

Modelling hydrogen integration in the energy system:

Hydrogen Council report to be released in the coming months

Three regional systems covered:



**Central Western
Europe**



Japan



Texas

Renewable hydrogen production will add flexibility to energy systems and consequently reduce the cost to decarbonise

- Electrolyzers can respond to market prices to help alleviate supply-demand crunches in systems relying on high levels of intermittent wind and solar
- Hydrogen to power provides resilience against most challenging part of the year when renewable load is low and energy demand is high. It complements the role of batteries and CCS in doing so

Hydrogen integration - paving the way for a resilient, cost-effective net zero energy system

Goes hand in hand with electrification

- Enabling greater and faster integration of renewable energy capacity in the energy system, including through efficient long distance transport of renewable electrons through molecules

Maximises climate and cost-efficiency benefits of RES-E uptake

- Helping make sure renewable electricity does not go to waste with curtailment

Fosters greater resilience, cost-efficiency & optimization of the energy system

- Enabling both short term flexibility of the energy system thanks to power grid balancing and long-term flexibility thanks to synergies with repurposed gas infrastructure and hydrogen storage to help serving seasonal demand

Support healthy competition of net zero solutions

- Uptake of such solutions as FCEVs in transport can not only have a material impact on system efficiency but also help spur competition

The logo for the Hydrogen Council is centered on a dark blue background with a repeating pattern of lighter blue hexagons. The word "Hydrogen" is written in a bold, light blue sans-serif font. Below it, the word "Council" is written in a bold, white sans-serif font. To the right of the text is a vertical orange bar.

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