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The role of Hydrogen in linking local energy sources

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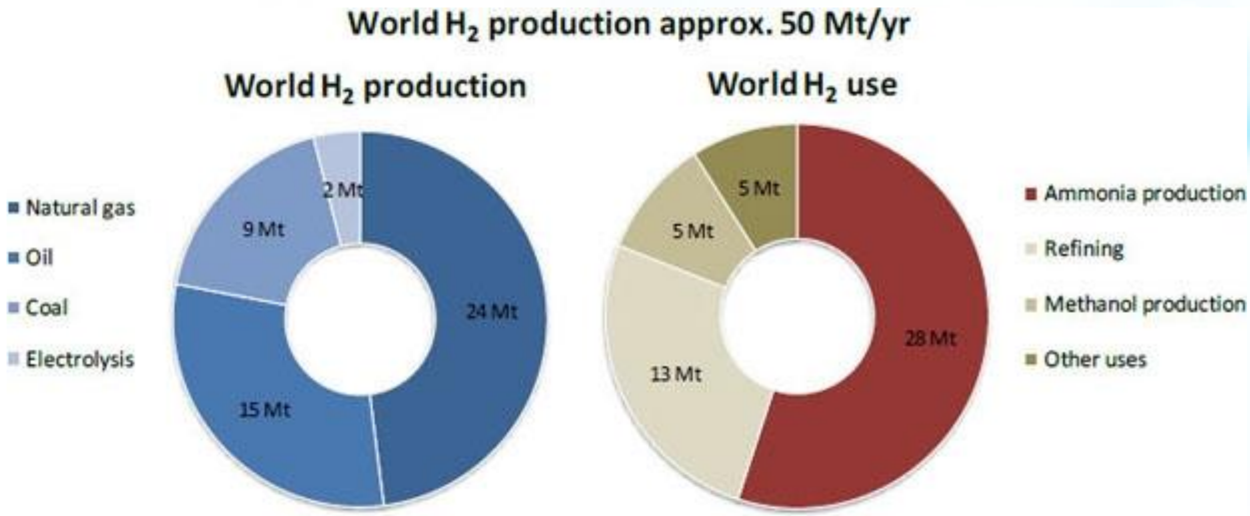
The FCH JU

- The Fuel Cells and Hydrogen Joint Undertaking is a PPP between the EU and European Industry and Researchers, supporting RTD activities in FCs and H_2 in Europe
- Launched in 2008 (FP7), 2^{nd} phase granted in 2014 (H2020)
- Total budget of > €2.2bn (0.94+1.33)
- Till now contracted 185 projects (155+30)
  - Supporting FC applications in Transport sector for zero emission vehicles and in Stationary sector for reliability & higher energy efficiency
  - Supporting H2 energy applications given its flexibility as an energy vector that can facilitate the integration of intermittent renewables

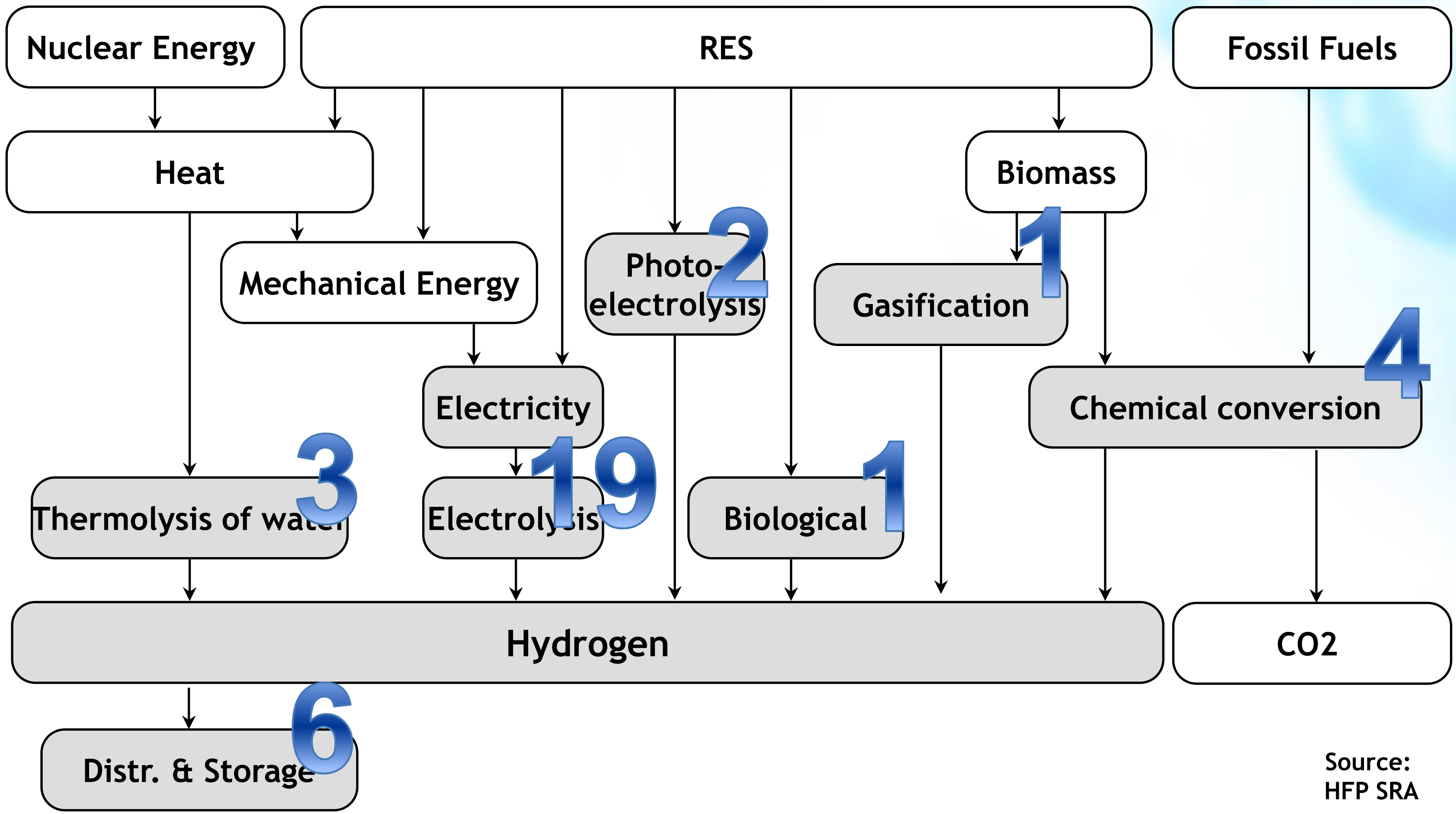
The H_2 molecule



H2 Production	NG SMR	Electrolysis (grid mix)	Electrolysis (Wind)
Emissions (gCO_2/kWh_{H2})	300	450	27
Cost (€/kg)	2	6	10

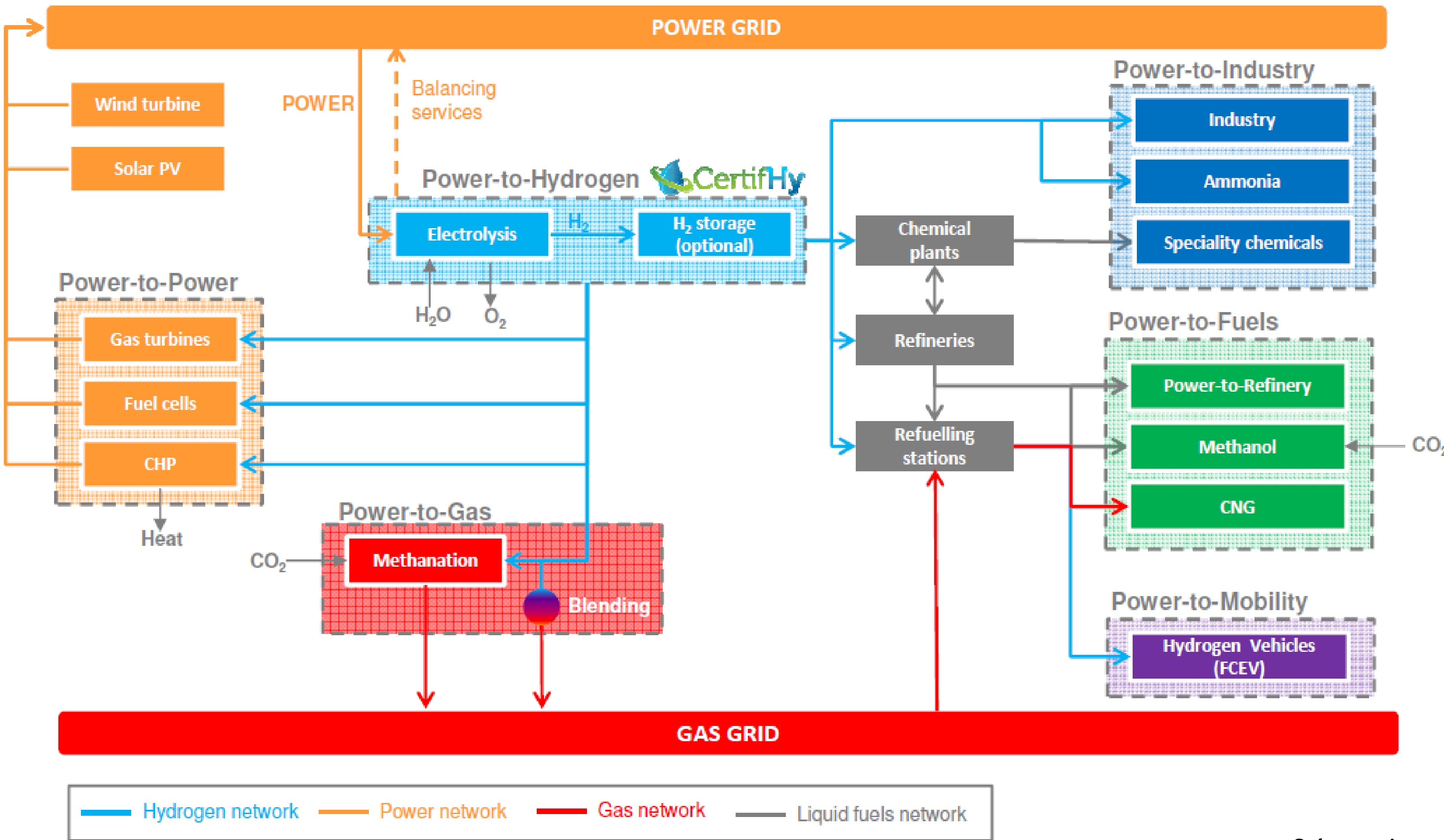
ENERGY APPS	Density (kg/Nm^3)	LHV (kWh/kg)	LHV (kWh/m^3)
H_2	0.09	33	3
CH_4	0.7	13	10

Hydrogen Production - FCH JU Technical Coverage



Source:
HFP SRA

H2: Connecting Power, Gas, Transport and Heat



Schematic: Hydrogenics

Regulatory change is key for a viable storage business case in the early markets

From …	… to
Little regulatory acknowledgement of storage and hence a lack of storage-specific rules and insufficient consideration of the impact of new regulation on storage	Storage acknowledged as a **unique and specific component of the energy system** and new regulation is explicitly taking impact on storage into account
Payments for curtailment to RES producers, creating a disincentive to productive use of the curtailed electricity	**Remove price signal distortions** caused by compensating curtailment (without necessarily reducing support for renewables)
Lack of clarity on the rules under which storage can access markets – in particular the inability of TSOs and DSOs to own and operate storage in some countries and lack of rules on access of storage to the ancillary services market	Define **conditions**, under which **network operators can own and operate storage** or purchase T&D deferral service from market Define **conditions** under which storage can **participate in the ancillary services market**, including time for which service has to be pro-vided, minimum time before reactivation, etc.
Application of final consumption fees to storage, even though storage does not constitute final use of the energy	**Exemption** of storage from **final consumption fees** (taxes, levies) and double grid fees

Each of these regulatory changes has impact on multiple stakeholders and its overall costs and benefits need to be further analyzed

Source: http://fch.europa.eu/studies

Role for Hydrogen

- Hydrogen is the ideal, flexible energy carrier for linking local energy sources with local users
- Hydrogen can interact with and facilitate the electricity and NG sectors and help green a number of industries and sectors (P2H & H2X)
- Technical and regulatory barriers still remain but past technical push is currently supported by industry pull

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