






**THE ROLE OF HYDROGEN IN THE
DECARBONIZATION OF INDUSTRY**
EUWP INDUSTRY COORDINATION GROUP

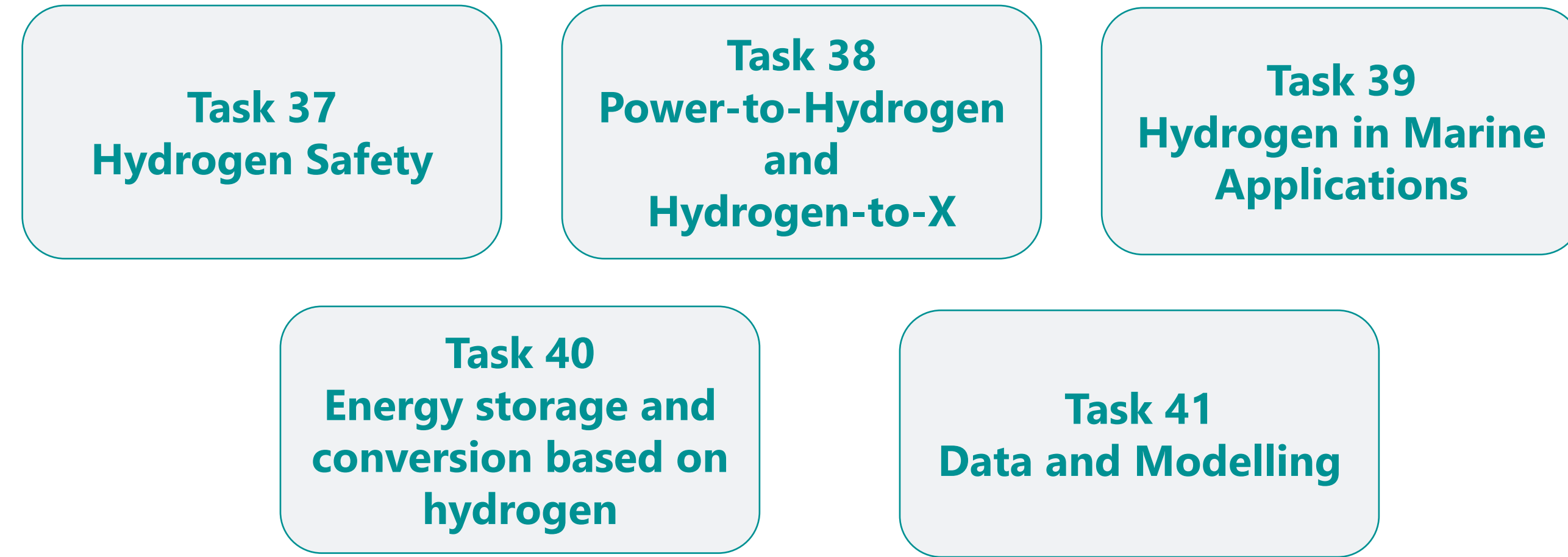
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Hydrogen TCP

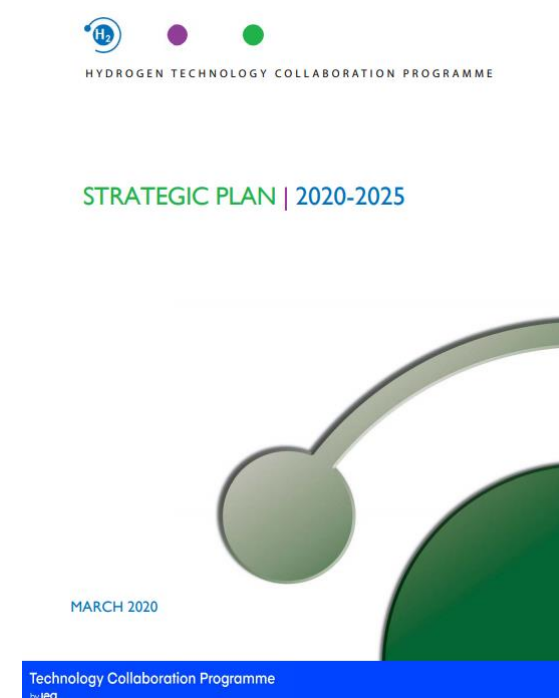
-  Created in October 1977
-  Over 40 R&D&D and analysis tasks
-  25 contracting parties and 6 sponsors



Close collaboration with:



What's next?



Potential tasks:

Market Deployment & Pathways to Scale, Supply Chains, Renewable H2 production, Conversion to energy and chemicals, Applications In Primary Sectors, Industrial Use of H2 in Middle Income Developing countries, Underground large storage...

Role of Hydrogen in Decarbonisation of Industry

Replace grey Hydrogen & use in new applications

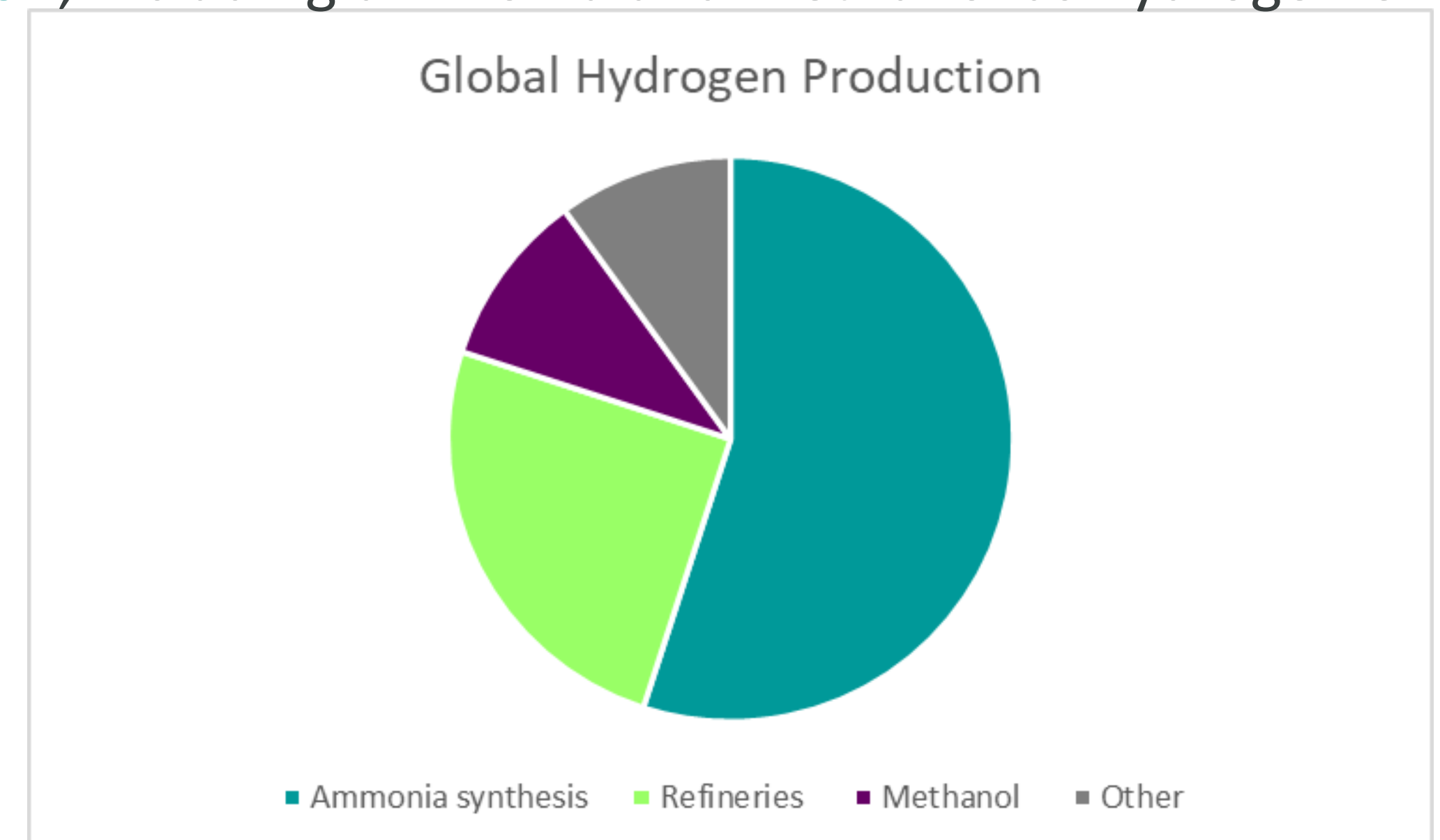
H₂ plays a critical role as energy carrier. It has **2 main uses for industry**:

- **HEAT**: The industrial processes used in the production **of steel, cement, glass, and chemicals** require **high temperature heat**. For these hard-to abate sectors, there is essentially no way to reach net-zero emissions at the scale required without using H₂.
- **FEEDSTOCK**: raw material in the chemical industry & **reductor agent in the metallurgic industry**. H₂ is a fundamental building block for the manufacture of **ammonia**, and hence fertilizers, and of **methanol**, HMD and other chemicals used in the manufacture of many polymers. It is also a key element in oil refining processes.
- H₂ can be used to enhance **biofuels and new e-fuels production**, including ammonia and methanol as hydrogen energy carrier or new fuel for mobility!

About **55 %** of the hydrogen produced around the world is used for **ammonia synthesis**, **25 %** in **refineries** and about **10 %** for **methanol** production.

The **other** applications worldwide account for only about **10 %** of global hydrogen production.

Source: Hydrogen Europe



Role of Hydrogen in Decarbonisation of Industry

By **2030**, it is expected **40 million tons** additional hydrogen for energy purposes. One important part of that should be used for industrial applications (current or new applications) (IEA ETP 2020).

By **2050**, the demand for hydrogen could rise to **400-500 million tons** in current and new applications, driven by the growth in global chemicals production.



If it is **Green hydrogen**, it would produce **zero carbon** emissions, reducing **1 Gt CO₂/year**

By **2050**, **12%** of the world industry's energy demand (16 EJ) will be obtained by hydrogen, which will mean a reduction of approximately

1 Gt of CO₂ per year.

Low Carbon H₂ can be produced from...

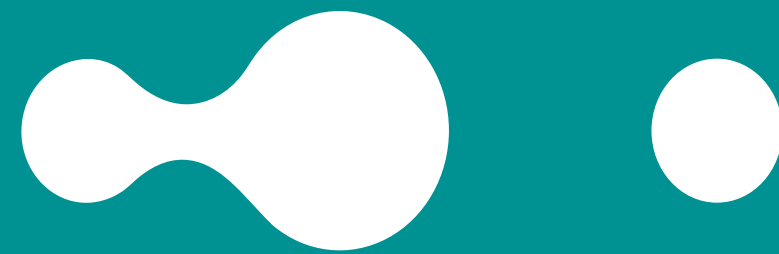
- ✓ Renewables through electrolysis (locally or imported from low-cost renewables)
- ✓ Biomass (pyrogasification, fermentation etc...)
- ✓ Low carbon electricity (nuclear, hydraulic...)
- ✓ Natural gas with CCS or directly with NG pyrolysis

Potential topics for collaboration

- ✓ Analysis and economic study: **Will low cost hydrogen area** (Australia, South America, Middle East) **generate new industrial activities on site** to get benefits from low cost hydrogen feed stock and avoid hydrogen transport ?(export of added value products)
- ✓ Analysis studies and modeling work: **how to optimize low carbon electricity plant** stand alone or grid connected plant, big electrolyser capacities and usage in heavy industry ? From geographical, economical and technical point of view and issues to overcome: intermittency, impact on grid management, interest of reliable source of electricity like a nuclear plant dedicated to and industrial application
- ✓ **Hydrogen carrier** (methanol, LOHC, NH₃, Silane, and others): R&D to improve energy efficiency
- ✓ How to **combine low carbon Hydrogen and « zero emissions » carbon** (from biomass, direct air capture) to produce and substitute ex-fossils fuel chemical products ?
- ✓ Technical topics : R&D and innovation on introduction of **hydrogen in steel, cement** etc.. What are the remaining hurdles ?
- ✓ Launch a joint action to **track progress on usage of hydrogen in different industries**: TRL, economics etc...



Thank you



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