



The importance of collaborative R&D in the hydrogen sector

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Executive Committee
Representative for Germany

Outline

- The Hydrogen TCP
- Activities: current and planned
- Hydrogen value chain challenges
- Benefits of joining the Hydrogen TCP – Member perspective

The Hydrogen TCP

- The [Hydrogen Technology Collaboration Programme](#) was established in **1977** under the auspices of the [International Energy Agency](#) to pursue international collaborative research in the hydrogen field
- It carries out R,D&D activities through projects focused on specific topics called **Tasks**
- Its **Executive Committee** is formed by representatives and alternates of its 24 Member Countries, the European Commission, UNIDO and 6 Sponsors

The Hydrogen TCP



32

Members

24 Member Countries
6 Sponsors
European Commission + UNIDO

40+

Tasks

4 Ongoing
37 Finished
≈ 10 in definition

250+

Experts involved

In collaborative research on hydrogen and hydrogen technologies

Activities - 2021

Task 37 Hydrogen Safety

Successor Task in 2022!

Challenges:

- H₂ Safety Concerns

Task Goals:

- Develop H₂ safety integration models and tools
- Management strategies to ensure safe deployment
- Quantitative Risk Assessment
- Consequence analysis

Task 38 Power-to-Hydrogen and Hydrogen-to-X

Closed in July 2021

Joint Workshop with IEA
[Check our Blog!](#)

Challenges:

- Increasing interest on PtX, lack of consistent information

Task Goals:

- Techno-economic analysis of PtX pathways
- Database of demonstration projects
- Assessment of existing legal frameworks
- Guidelines and recommendations for business developers and policy makers



Challenges:

- Need for greener shipping
- Lack of information on the use of H₂ for marine applications

Task Goals:

- Provide knowhow on the use of H₂ in different marine vessels
- Monitor, review and contribute to new concepts, technologies and components
- Network of international experts

Final Report to be released soon
Keep posted!



Task 39 Hydrogen in Marine Applications

20-21 October 2021, Messe Bremen

Hydrogen Technology Expo Europe

Activities - 2021

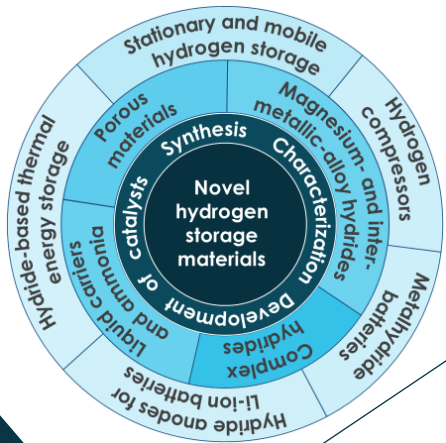
Task 40 Energy storage and conversion based on hydrogen

Challenges:

- Energy storage
- H₂ storage Optimization of materials (solid and liquid)

Task Goals:

- Develop materials and systems for energy storage and conversion based on H₂
- Develop reversible or regenerative H₂ storage materials



New papers to be published in Spring 2022 ("Progress in Energy" Journal, IOP Publishing)



New paper "A taxonomy of models for investigating hydrogen energy systems" to be published on "Renewable and Sustainable Energy Reviews" Journal

Challenges:

- Lack of consensus on H₂ data and how to represent H₂ in Energy models

Task Goals:

- Data consolidation by developing a robust and updatable database on H₂ parameters
- Develop knowledge of how to best model H₂ in the value chain

Task 41 Data and Modelling

Activities – planned

- New challenges
- New topics of interests for our members
- Update SoA and compare different methods for renewable H₂ production
- Need to store H₂ in large quantities/for long periods of time
- How would offshore conditions and direct coupling with intermittent renewables affect H₂ production
- Alternative pathways for low-carbon H₂ production
- Use of H₂ in specific hard to abate sectors
- International H₂ trade



Tasks in Definition

- Renewable Hydrogen Production
- Underground Hydrogen Storage
- Offshore Hydrogen Production
- Hydrogen from Nuclear Energy
- Hydrogen in the Mining, Mineral Processing, and Resource Sectors
- Hydrogen Export Value Chains

Did you know...?

Experts from member and non-member countries are welcome to participate in the definition process

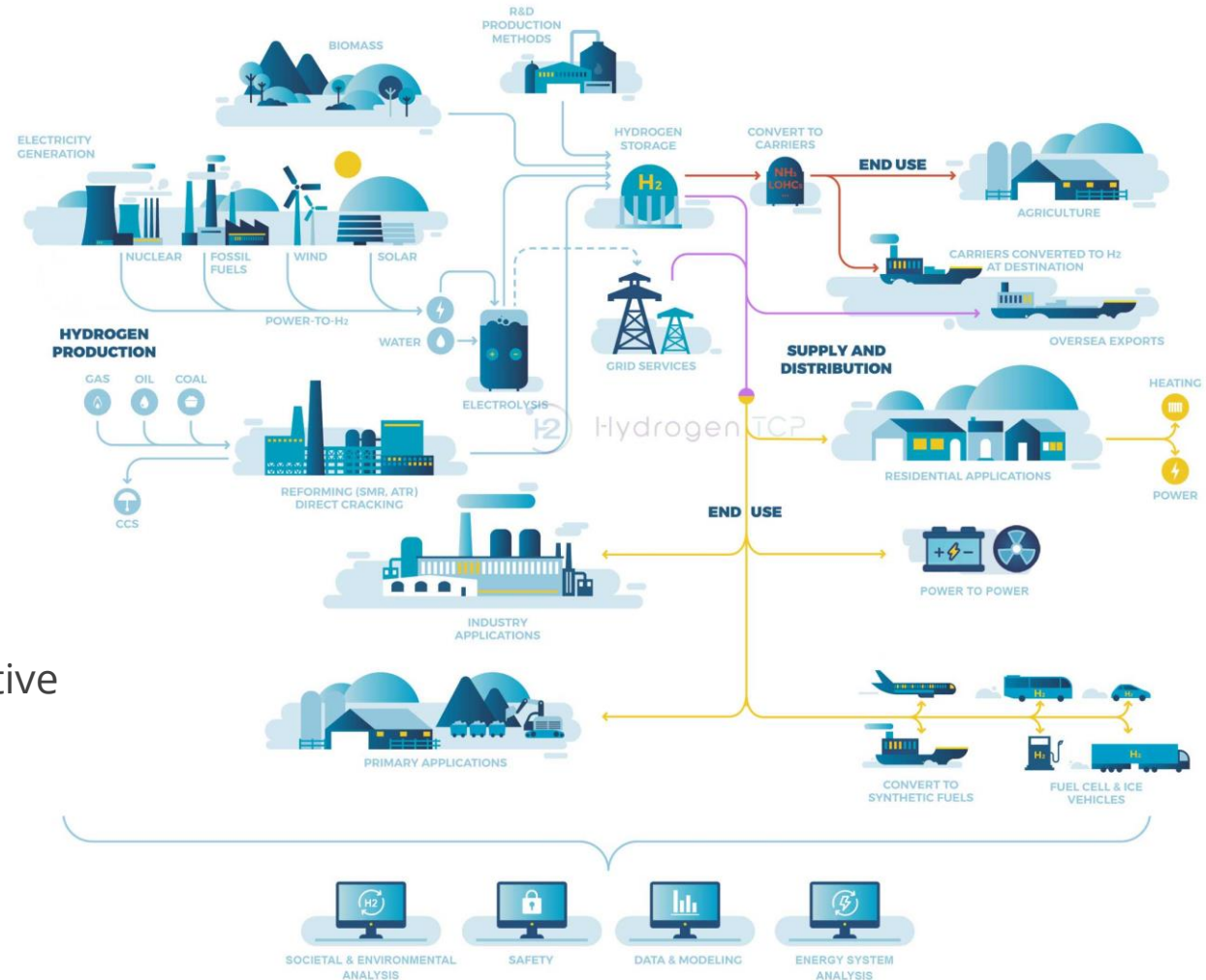
Hydrogen Value Chain Challenges

Cross-cutting challenges:

- Legal framework
- Standardization
- Scale-up
- Improve process efficiencies
- Reduce costs (CAPEX, OPEX...)
- Available data, success-stories...

Specific technical challenges:

- Addressed by international collaborative R&D through Hydrogen TCP Tasks



Benefits of joining the Hydrogen TCP – Member perspective



Stay updated of hydrogen developments around the world



Increase and share hydrogen expertise



Identify countries/entities with similar priorities and challenges and collaborate to solve them



Connect with scientists, and national leaders committed to reliable, sustainable, and clean energy

Did you know...?

When a country joins the Hydrogen TCP all the country's experts and institutions can participate in Tasks

20-21 October 2021, Messe Bremen

Hydrogen Technology Expo Europe



A German success story...

German-led Task 32 (Task 40 is now its successor) achieved "Highly cited paper" (top 1%) and "Hot paper" (top 0,1%) on their Final Report

Task Manager: Michael Hirscher Max Planck Institute for Intelligent Systems



Journal of Alloys and Compounds

Available online 31 December 2019, 153548

In Press, Journal Pre-proof



Materials for hydrogen-based energy storage – Past, recent progress and future outlook

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Highlights

- A comprehensive review of materials, techniques and methods for hydrogen storage.
- International Energy Agency, Task 32 "Hydrogen-based Energy Storage".
- Hydrogen storage in porous materials, metal and complex hydrides.
- Applications of metal hydrides for MH compression, thermal and electrochemical storage.
- Hydrogen energy systems using metal hydrides.

Citation Network

In Web of Science Core Collection

129

Times Cited


Highly Cited Paper

Hot Paper

As of January/February 2021, this highly cited paper received enough citations to place it in the top 1% of its academic field based on a highly cited threshold for the field and publication year.

This hot paper was published in the past two years and received enough citations in January/February 2021 to place it in the top 0.1% of papers in its academic field.



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Thank you!

For more information, please contact

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