



***HyNE: Hydrogen from
Nuclear Energy, The Task
n°44 from the IEA /
Hydrogen Technology
Cooperative Program***

26th April, 2024

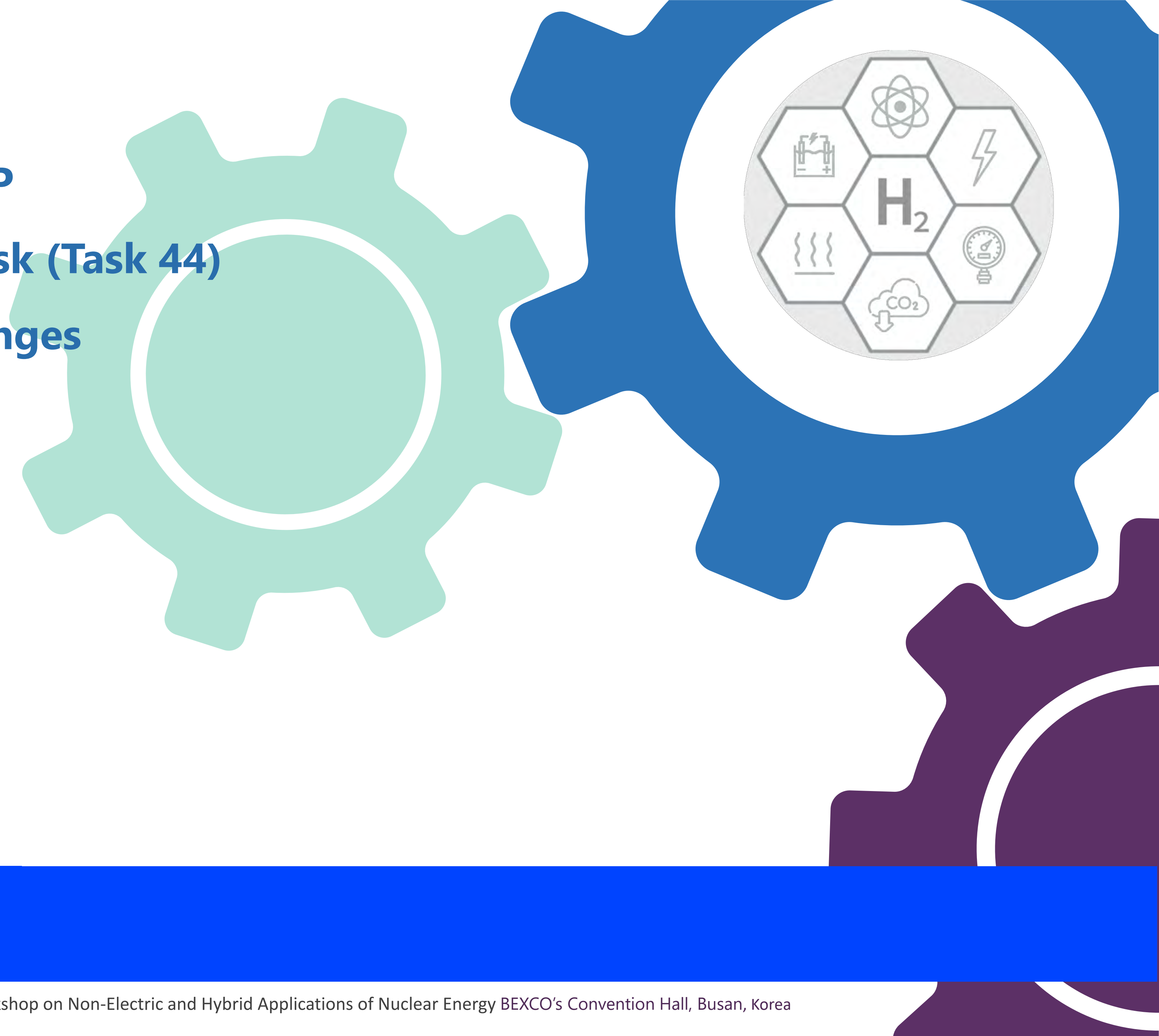
GENIV – Workshop on Non-Electric and Hybrid Applications
of Nuclear Energy

BEXCO's Convention Hall, Busan, Korea

Gilles RODRIGUEZ – CEA/France

Presentation

- 1) What is IEA HYDROGEN TCP
- 2) Description of the HYNE Task (Task 44)
- 3) Some objectives and challenges
- 4) Conclusions



What is IEA HYDROGEN TCP ?



IEA: A three pillar organization
An unprecedented Modernization Plan

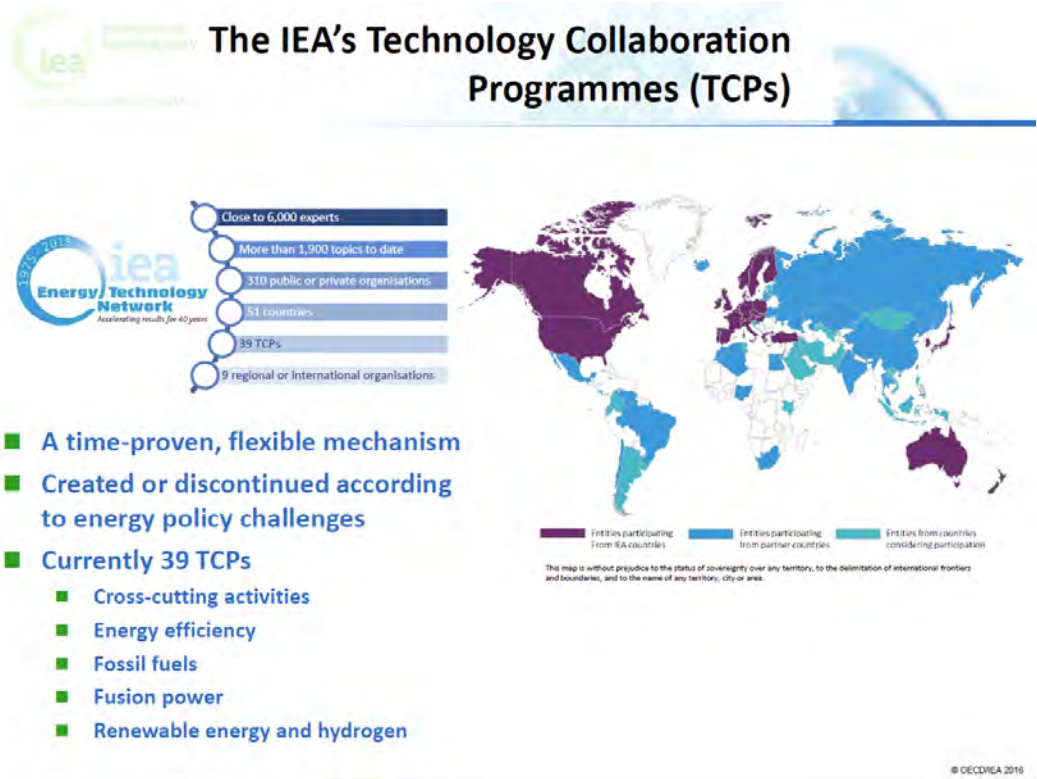
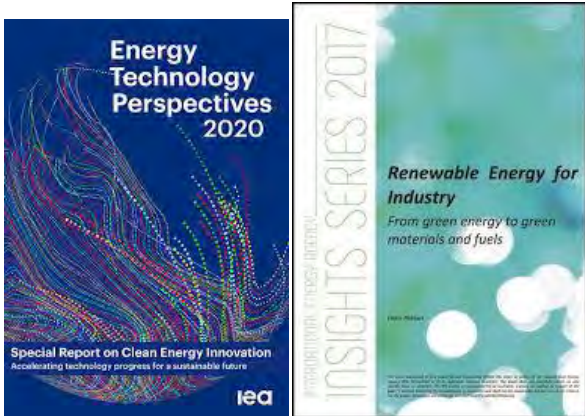
Network of 39 TCPs
6000 expert's network



An Influent expert international organizations



PARIS Secretariat Team (300 people) led by Fatih Birol
A referent expert in Energy analysis Scenarios Plus advisory or strategic bodies



Renewables, Smart Grid, oil gas, CCS, **Hydrogen**, Fuel cells, Electric vehicle, combustion, ICE, Fusion, Heat and Cooling, storage, heat pump...



What is IEA HYDROGEN TCP ?

Hydrogen TCP President:

Paul Lucchese (France)

Ongoing:

Task 47: Hydrogen Certification
Period of operation - 2023-2025

Task 46: Offshore Hydrogen Production
Period of operation - 2023-2025

Task 45: Renewable Hydrogen Production
Period of operation - 2023-2026

Task 44: Hydrogen from Nuclear Energy
Period of operation - 2023-2025

Task 43: Safety and RCS of Large Scale Hydrogen Energy Applications
Period of operation - 2022-2025

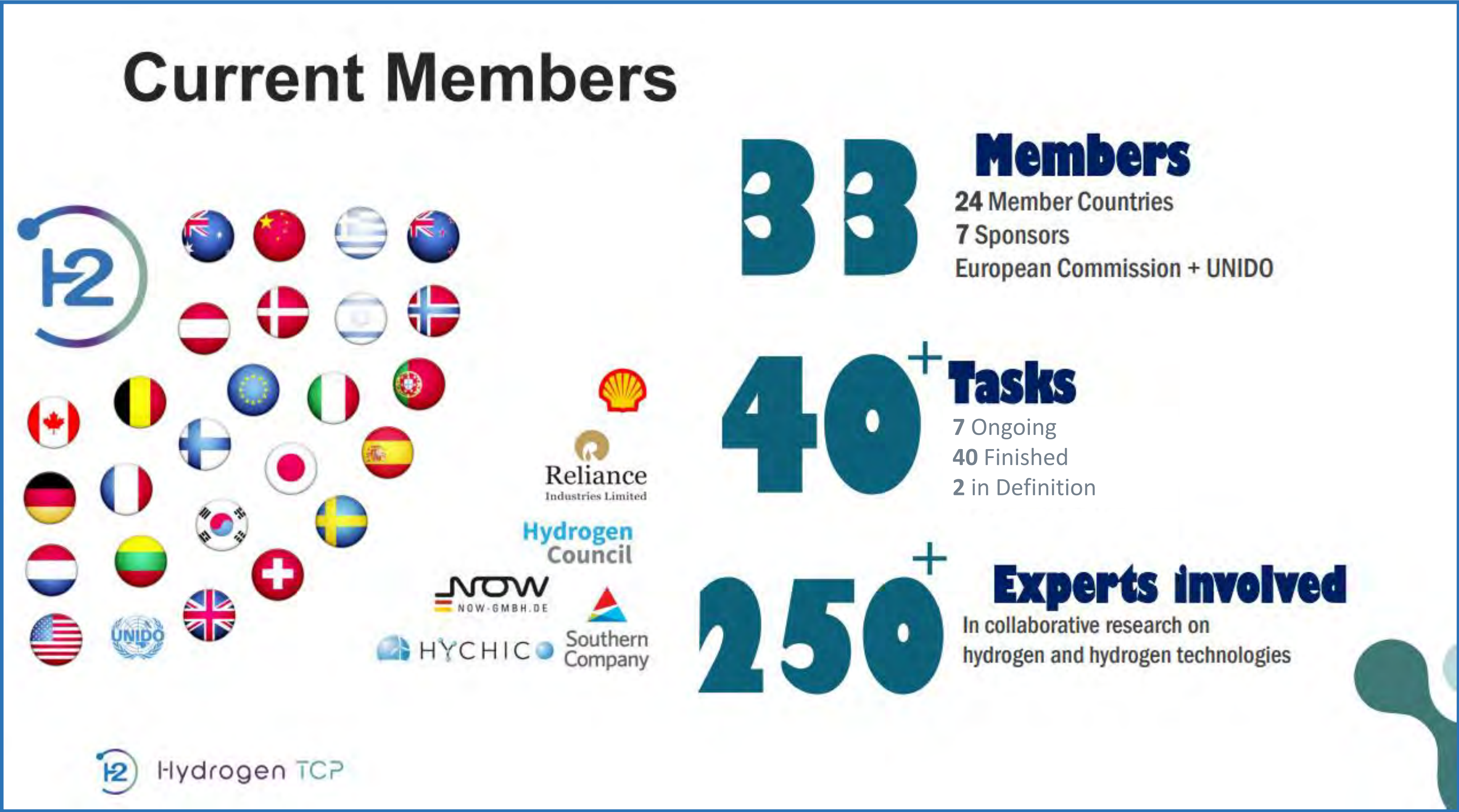
Task 42: Underground Hydrogen Storage
Period of operation - 2022-2024

Task 40: Energy Storage and Conversion Based on Hydrogen
Period of operation - 2019-2021 (extended until 2024)

In Definition:

Natural Hydrogen

Future Demand of Hydrogen in Industry



<https://www.ieahydrogen.org/>

HYNE Hydrogen from Nuclear Energy: The Task 44 in a nutshell



Task n°44 = Hydrogen from Nuclear Energy

Duration: 3 years, Started in Feb. 2023

Task Leader : Gilles RODRIGUEZ (CEA/IRENE)

Over 50 international experts from 12 different countries coming from international agencies, industries, research institutes, universities, gvt bodies, and start-up.

This Task will serve as a platform and framework for sharing and contributing information on the different possibilities of Hydrogen production from Nuclear Energy by:

- identifying the on-going and planned activities in this subject
- providing an holistic analysis of the situation, context and constraints to identify all conditions to fulfill for this technology to be deployed,
- identifying the specificities and the scenario cases where nuclear energy will have a specific role compared to current low carbon electricity.

The major objectives of the HyNE Task (Hydrogen from Nuclear Energy)

Hydrogen TCP

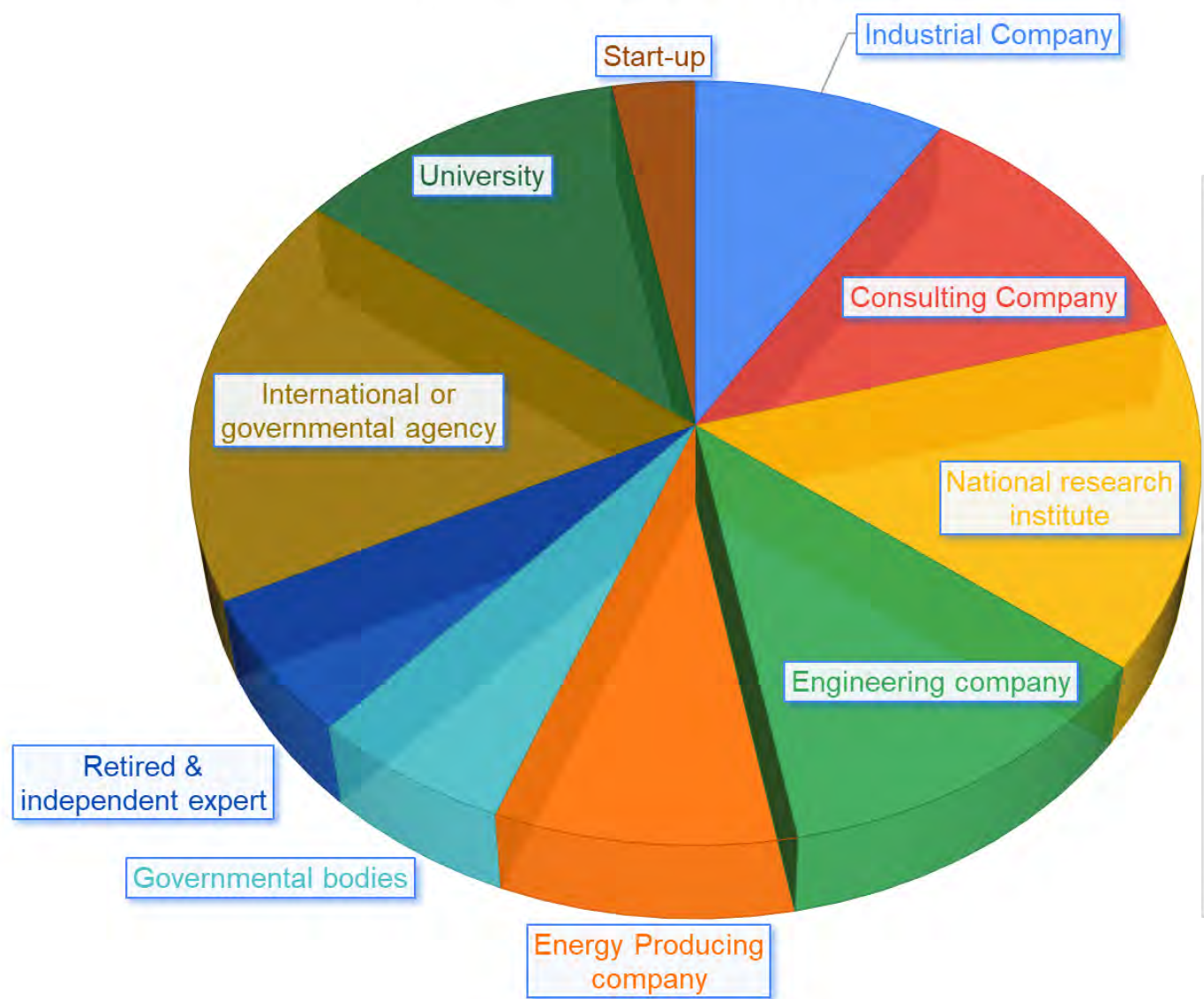
- Explain
- Clarify
- Anticipate
- Analyse
- Recommend
- Advise

Creation of a multidisciplinary network of international experts

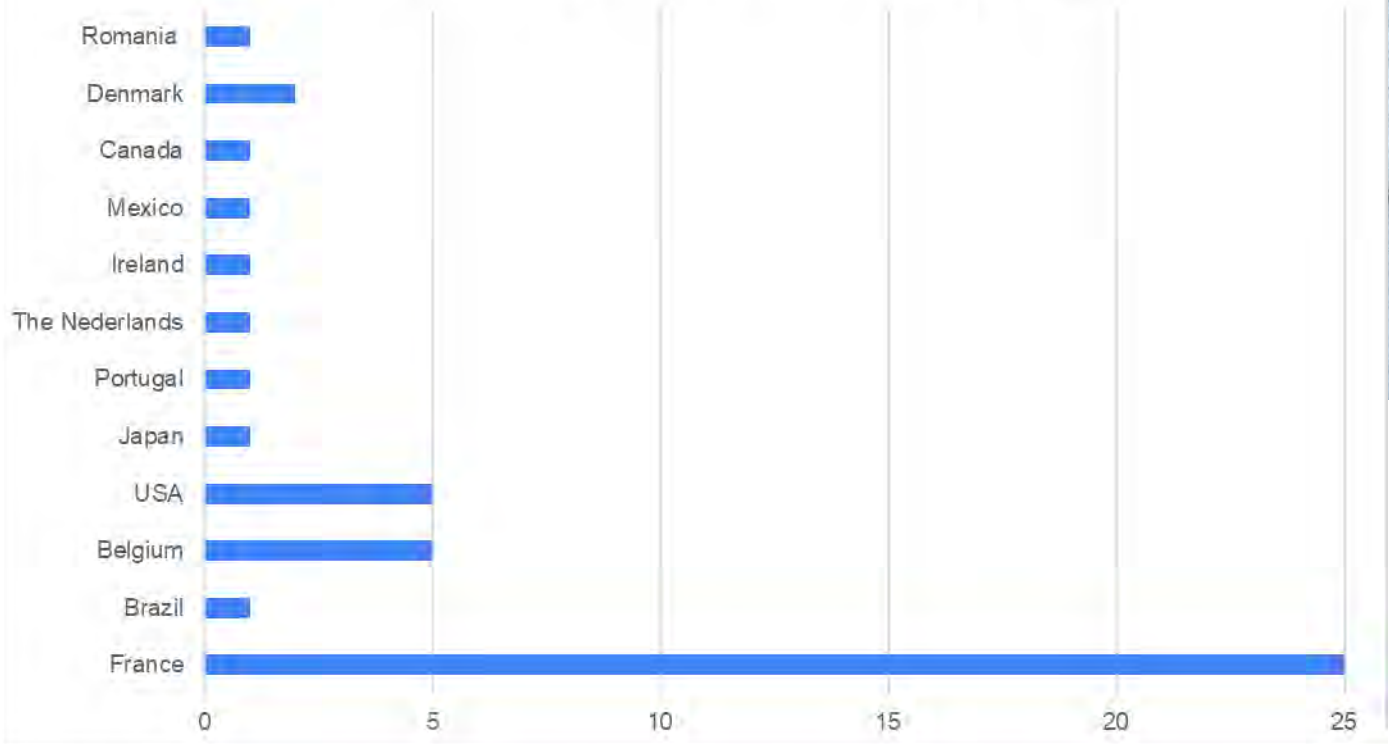


iea
International Energy Agency

HYNE COMPANY DISTRIBUTION



HYNE MEMBER DISTRIBUTION BY COUNTRY

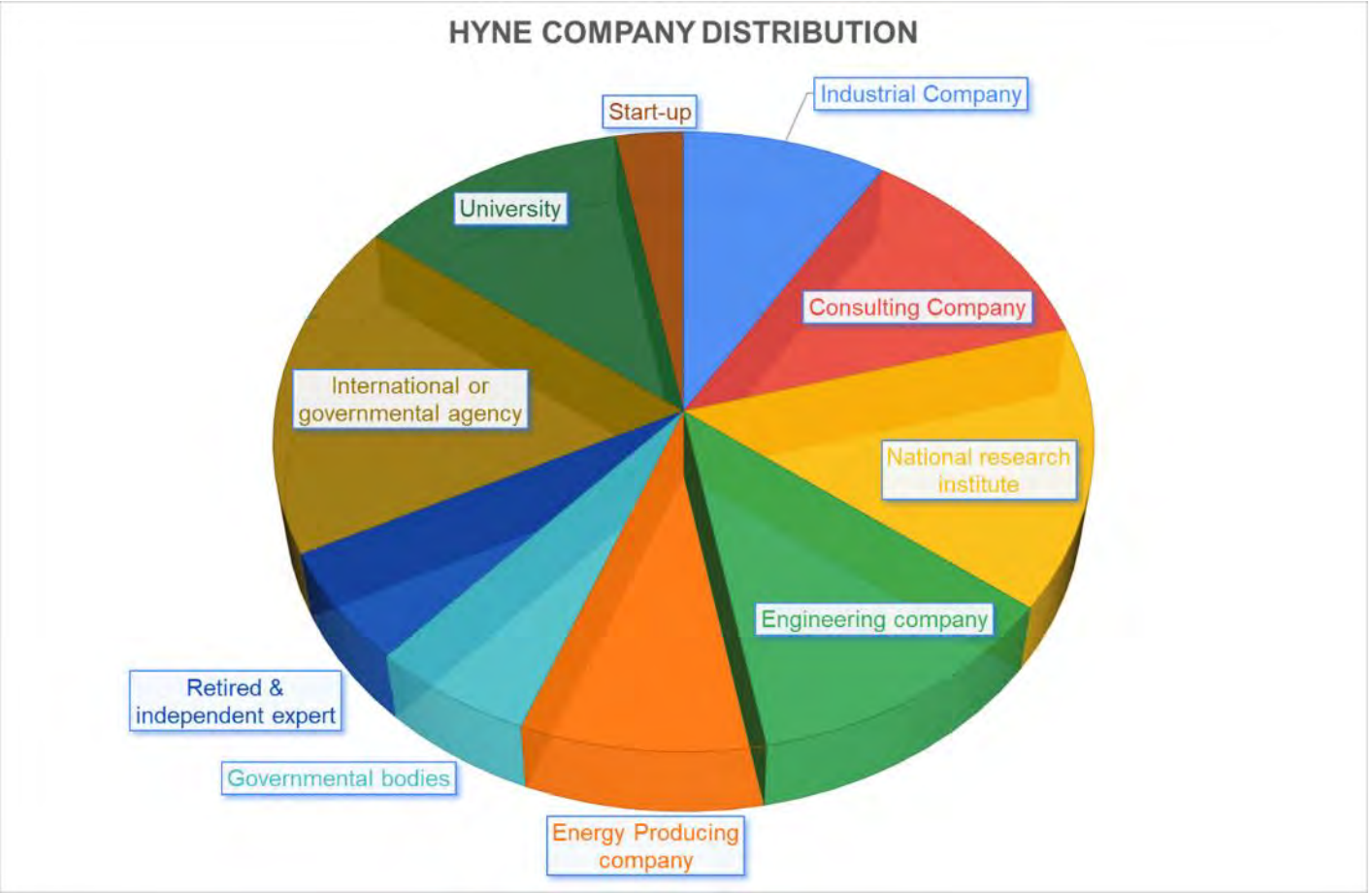


Task 44 Participants

From now we have 57 participants belonging to Task 44

The Task is still open to new members joining this Task during its progress
Last newcomers: TOPSOE (Denmark), TERRAWATER (France), INL (USA), Air Liquid (USA)

In 2023 we have largely increased our connection to many organizations
(one of the Task 44 objective)



Members from TASK 44, Idaho National Lab., IAEA, OECD/NEA, Generation IV International Forum, TANDEM European project gathering at IDAHO Falls, Jan 2024.

The major objectives of the HyNE Task (Hydrogen from Nuclear Energy)

- Explain
- Clarify
- Anticipate
- Analyse
- Recommend
- Advise

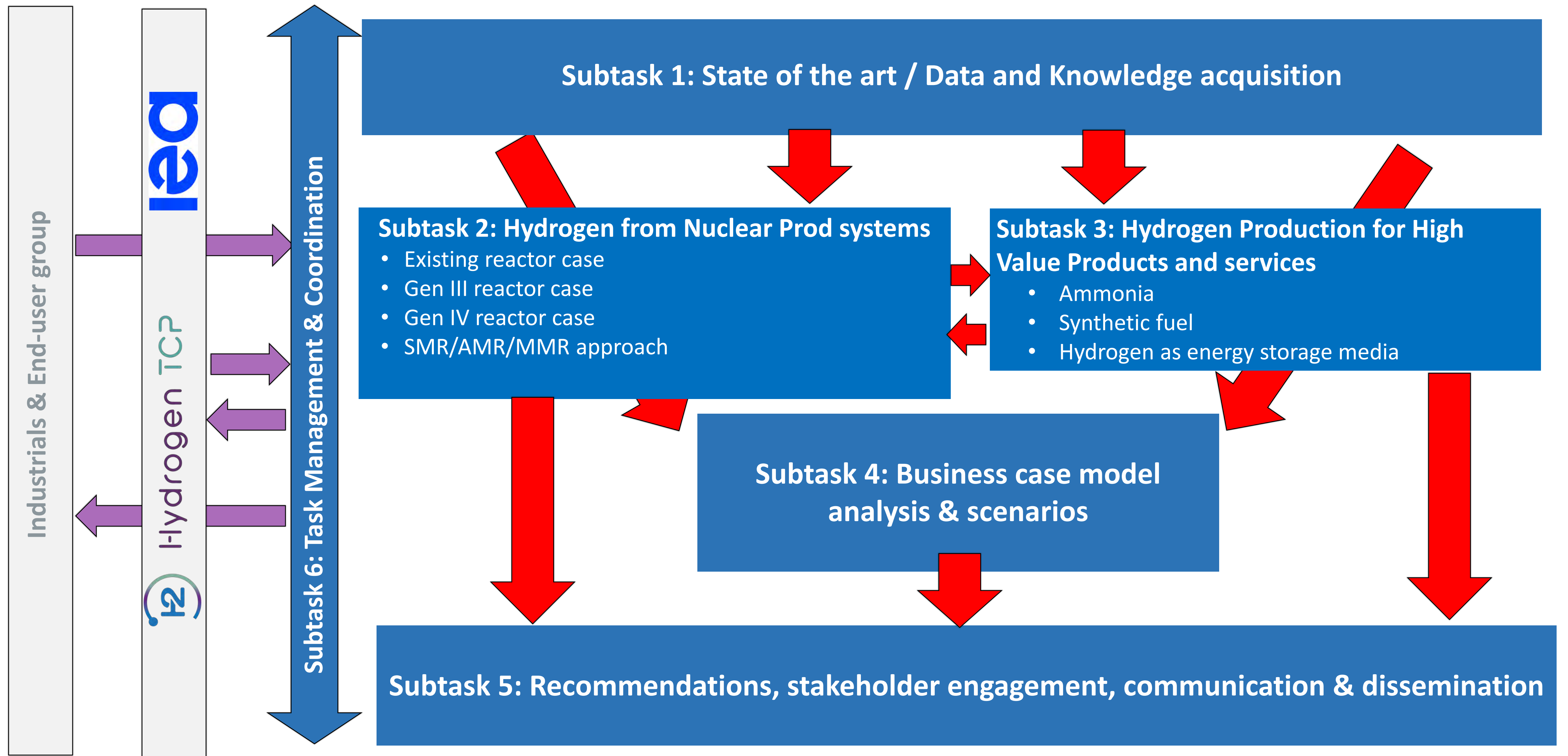
Creation of a multidisciplinary network of international experts

 Hydrogen TCP



Back row (left to right): Sam Suppiah, Ron Boring, Shannon Bragg-Sitton, Oliver Martinez, Pierre Gavaille. Middle row: Justin Aborn, Chukwudi (Chuk) Azih, Carlos Leipner, Adrian Vega, Aymeric Canton. Front row: Brent Wilhelm, Claire Vagilo-Gaudard, Alina Constantin, Gilles Rodriguez, Chris Lefrere, Pierre Serre-Combe. Other in-person attendees not shown: Olga Marina, Richard Boardman, Aaron Epiney,

Task 44 structuration: 6 Subtasks



Subtask 4: Business case model analysis & scenarios

- This Subtask will focus on the technical-economical approach of several HYNE scenarios. Only specific aspects of nuclear electricity and heat will be considered
- Several position paper being produced by Task44
 - ➔ 9 June 2023, Comparing hydrogen using emissions intensity rather than colours from EDF
 - ➔ March 2024, Funding of hydrogen produced with nuclear energy projects by Chris Lefrère (main author)

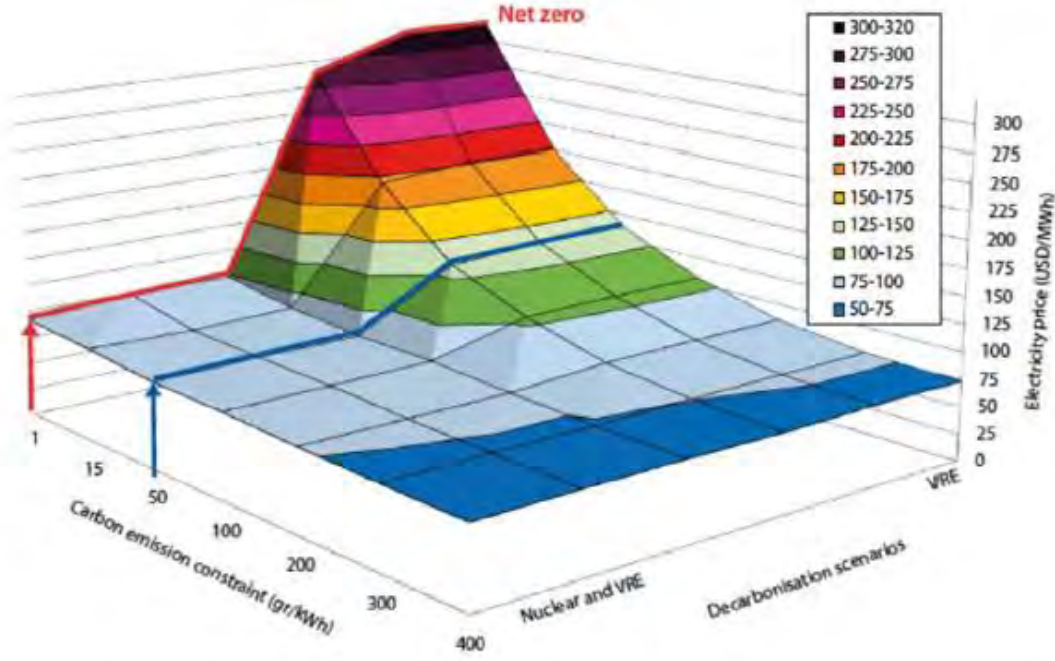
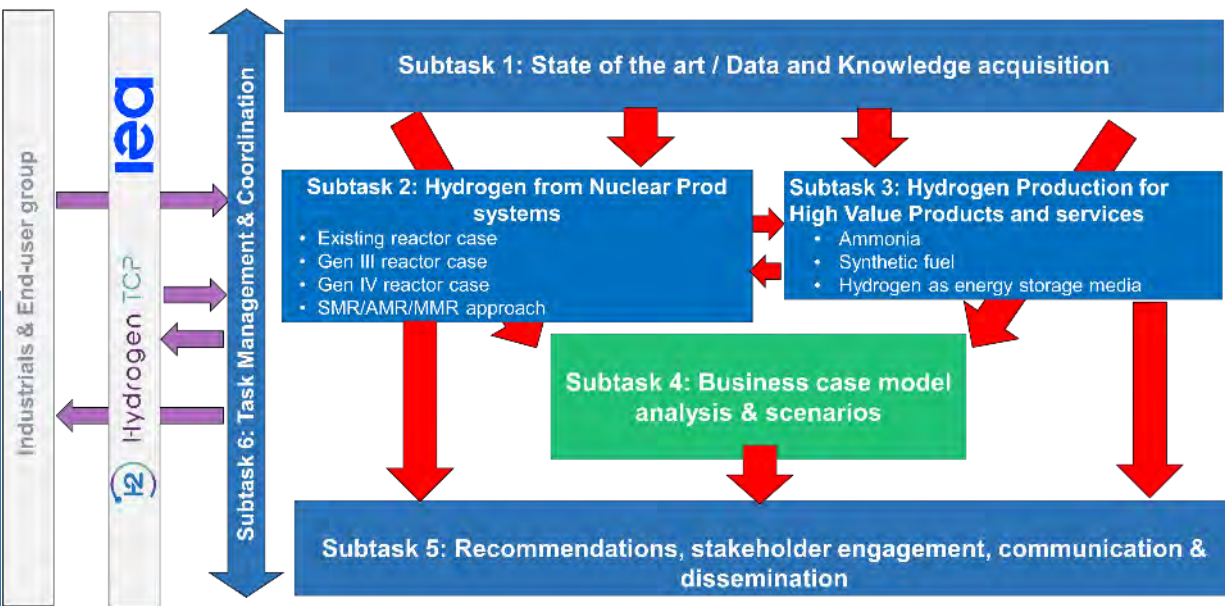
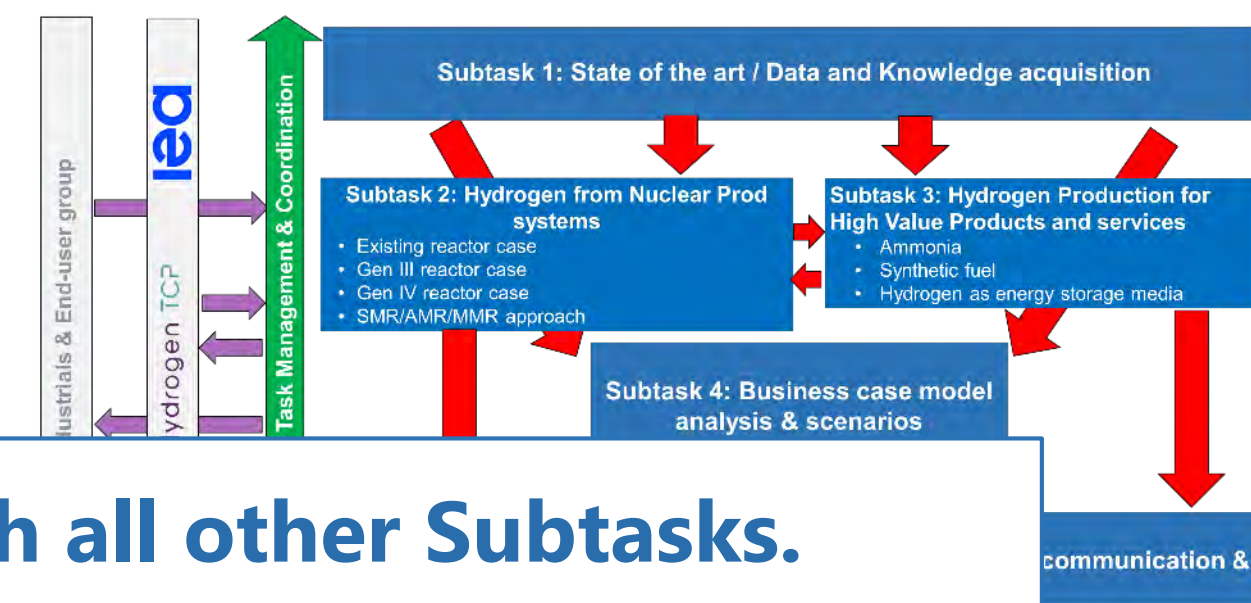


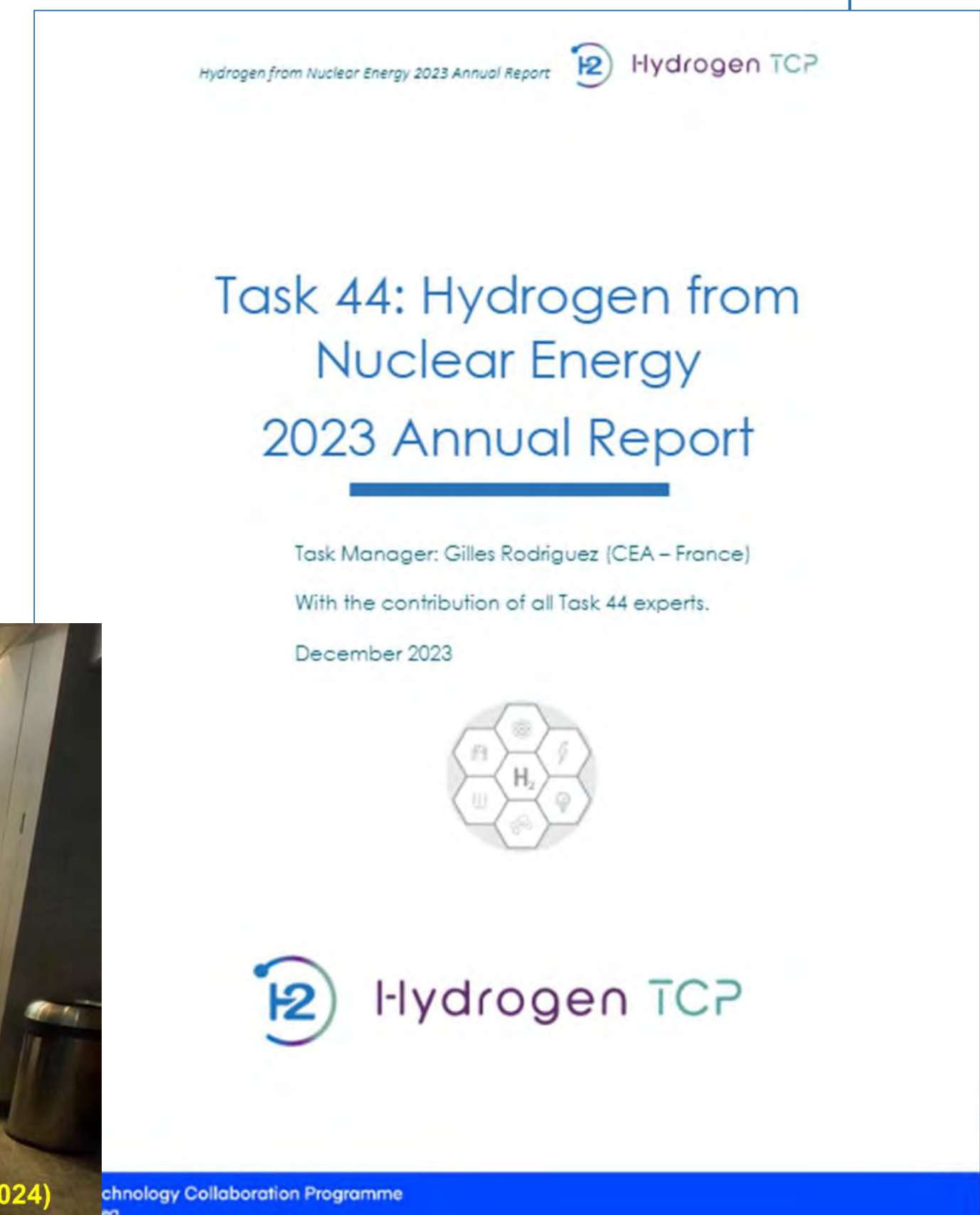
Figure 2: Full system electricity cost in function of % Variable Renewable Energy (VRE) versus Nuclear and in function of carbon emission constraint²

the new low carbon industry plant or hub energy demand, the investors in the SMR mitigate their commercial risk. In return for their long-term demand and optional co-investment in the SMRs and energy transformation infrastructures, new low carbon industry plants 1. have access to a long term predictable stable supply of energy at a long-term competitive cost, 2. can isolate their business case from the unpredictable and costly public grid and 2. so make their business case for a new low carbon industry plant fundable again. Sure, they will need to forge partnerships with experienced nuclear power plant operators and hydrogen and other molecule operators.

Subtask 6: Task management and coordination



- The management and coordination of this Task is a cross-cutting activity in interaction with all other Subtasks.
- We have a strong willing to provide an agile approach of this Task management
- A large preference is given to short reactive notes and position papers than large documents. Some key questions examples:
 - Position on stop talking about colors of Hydrogen => Done
 - Where the finance is going to come? => Done Mid-March
 - Where the market is going to go? => Done end of March
 - How going from small scale testing to large-scale application? => Planned in April
- TASK 44 1ST ANNUAL REPORT => Done
- Task 44 2024 In-Person meeting => Done in INL (USA)



Next meetings and workshops

A Workshop early October on the Safety of coupling nuclear reactors and hydrogen production factory (early oct 2024 (1-4)): co-embedded with G4SR-5 => 90% Confirmed

A Workshop end October on the Codes & Standards related to hydrogen production from nuclear energy: Oct 28-29-30 in Pescara (Italy) hosted by Walter Tosto company (Bora Haydin)



walter tosto



Thank You!

For more informations or if you wish to join HYNE:
please contact gilles.rodriquez@cea.fr

