

## Hydrogen Chain Outlook - Remote training

2 days  
Overview

PFH-EN-D

### LEVEL

Knowledge

### PURPOSE

In the context of climate change policies and stimulus packages post-covid, many countries have placed hydrogen at the heart of their energy strategies. Currently used in chemistry and refining, hydrogen could contribute to decarbonize industry, transportation sectors, as well as electricity storage from renewable power. The hydrogen sector, source of hope but still in the process of industrialization, highly relies on costs reduction and infrastructures development.

### LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

- understand the increasing role of hydrogen within the energy transition,
- comprehend the different options to produce, store and transport H<sub>2</sub>,
- analyze the benefits and limits of hydrogen,
- decrypt the different strategies of the stakeholders,
- discover the current and future applications of H<sub>2</sub>,
- anticipate the upcoming shifts and transformations for the sector.

### WAYS AND MEANS

Quiz.  
Sub-groups activities and case studies.

### LEARNING ASSESSMENT

Participants will be evaluated during the training through quiz and exercises.

### PREREQUISITES

To fulfill at least one of the following criteria:

- to have a Master degree or equivalent,
- to have a 6 months of proven professional experience in the energy sector.

## Agenda

### HYDROGEN WITHIN THE ENERGY TRANSITION

0.5 d

Climate change: state of play, regulatory framework, impact on companies.  
Reduction of carbon intensity in the energy mix: constraints, commitment to carbon neutrality, carbon taxation.  
Hydrogen: definition, physicochemical properties, orders of magnitude.  
Presentation of the value chain: supply, demand, import-export, stakeholder.

### HYDROGEN PRODUCTION

0.5 d

Green, grey, blue, yellow hydrogen: classification, costs, orders of magnitude, advantages and limits.  
Outlook of production methods: electrolysis of water, hydrocarbon reforming process, photosynthesis.  
Production of decarbonized H<sub>2</sub>: native H<sub>2</sub>, combustion in situ, plasma torch.  
Limits of each process and technological perspectives.

## HYDROGEN STORAGE & TRANSPORTATION

0.5 d

Compression and liquefaction.  
Solid storage, liquid storage, pressurized gas storage.  
Direct-attached storage, surface and subsurface, filling.  
Market structure: production hubs, transport corridors.  
Environment and safety: accidentology, risks analysis, aggravating factors.

## TODAY'S & TOMORROW'S APPLICATIONS

0.5 d

Feedstock and fuel for the industry: refining, petrochemistry.  
Road, marine, rail and air transport: fuel cell, combustion engine.  
Electricity storage and injection in the distribution grid.  
Housing and construction: combination with gas networks, electricity, heating.  
Comparison between actors and stakes for different countries (for example France, Germany, USA, China).  
Outlook and forecasts: supply chain structuration, technology strategies and investments, penetration scenarios.