

## METADATA (\*)

### TOPIC C – Training Unit 3: Hydrogen

#### Source

Partner: **TICASS** is responsible for creating and maintaining Lesson 1. – Different hydrogen colors and production processes and Lesson 3.- Hydrogen Utilization

Partner: **TSK** is responsible for creating and maintaining Lesson 2.- Hydrogen Storage and Transportation

Project: TRINEFLEX - Transformation of energy intensive process industries through integration of energy, process, and feedstock flexibility, Grant agreement ID: 101058174

#### Ownership

Lesson 1 and 3: Elisabetta Arato, full professor of Principles of Chemical Engineering in the Department of Civil, Chemical and Environmental Engineering DICCA of University of Genoa; President of TICASS Scrl.

Lesson 2: Luis Millan & Tomas Gonzalez, R&D engineers in TSK Technology Department

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#### Abstract

Hydrogen is seen as a very promising tool to reduce our dependency on fossil fuels in different areas of sectors of our economy (transport, industry, power production, etc). Therefore, the hydrogen energy carrier can potentially represent a key component for a future sustainable energy system, constituting an incentive towards the widespread use of renewable sources, but already in the short-medium term it can make fossil fuels compatible with environmental needs. However, many aspects relating to the full development of the complete supply chain still requires in-depth studies.

This training unit deals with the production, storage, transportation and use of hydrogen.

#### Structure

- Lesson 1: Different hydrogen colors and production processes  
The lesson illustrates the color code, used within the energy industry to differentiate among the different types of hydrogen based on the GHG emission profile of the energy source or process used to extract it. The different processes for its production are also illustrated.
- Lesson 2: Hydrogen Storage & Transportation  
This lesson covers different methods and technologies for hydrogen transport and storage, such as pipelines, liquefaction, compression, LOHC, metal hydrides, underground reservoirs or transformation of H<sub>2</sub> into other chemical compounds (NH<sub>3</sub>, CH<sub>3</sub>OH).
- Lesson 3: Hydrogen utilization  
The different uses of hydrogen are quickly analyzed ranging from its use to produce other chemical compounds, to produce energy, in the metallurgical industry for the treatment of metals or for petroleum refining industry.

### Learning Outcomes

The trainees will be able to:

- understand the common classification of hydrogen based on its different colors and learn about the different technologies used to produce it;
- identify the difficulties associated with the transport and storage of H<sub>2</sub> due to its physical properties and its problems of embrittlement with metals. They will also get a general knowledge about physical storage, chemical storage and power to X technologies;
- the main industrial applications of hydrogen.

### Intended Audience

The three short lectures provide an introductory description of hydrogen classification by energy source and technology used, distribution and storage, and main applications. They are ideal for students and the general public interested in an introduction to hydrogen technology.

### Pre-requisites

There is no pre-requisite required though a technical background would help to understand the information to a greater extent

**Language:** English

**Format:** Video mp4, PDF

### Expected workload

30 minutes for the three webinars.

(\*) The structure of the Metadata for the Training Units derives from the training Metadata model developed within the Leonardo da Vinci project LINKVIT (2013-15, GA N. 2013-IT1-LEO05-04046)