

## **PROGRAM OF TRAINING**

### **HYDROGEN TRAINING**

As part of policies to combat global warming, many countries have placed hydrogen at the center of their energy strategies.

Used to date in chemicals or refining, hydrogen could contribute to the decarbonization of industry, transport and the storage of renewable electricity. The sector, source of many hopes but still in the process of industrialization, depends largely on the reduction of their costs and the construction of infrastructures.

The upskilling of industrialists and territories in the specificities of hydrogen is therefore crucial.

Thus the professional training of people in this new sector is necessary because they are the actors or actresses of tomorrow who will perpetuate the development of this new sector.

**PREREQUISITES** : No prerequisites

#### **TRAINING AIMS :**

At the end of this training, the trained people will be able to:

- Understand the role of hydrogen in the energy transition;
- Study the different modes and equipment of production, storage and transport and distribution of hydrogen;
- Study the advantages and limits of hydrogen according to its production;
- Discover the current and future applications of hydrogen;
- Know how to carry out engineering and feasibility studies for the establishment of infrastructures hydrogen;
- Know the regulations related to the installation, commissioning, operation, maintenance maintenance, the safety of hydrogen infrastructures and the safety of users of hydrogen;
- Know-how in the maintenance of hydrogen infrastructures;
- Develop hydrogen incubator projects.

**DURATION** : 3 days

**PUBLIC CONCERNED:** Accessible to all

#### **TERMS AND DEADLINES FOR ACCESS:**

The training is open for registration throughout the year.

We are committed to starting your training no later than 5 working days following your first contact.

**PRICES** : 1500€ without VAT

**PLACE** : Training realized at 28 rue du Chemin Vert, 75011 Paris.

#### **TEACHING MEANS :**

- Evaluation of the needs and profile of the participant
- Pedagogical sequences grouped into different modules
- Alternation of theoretical and practical content

- Practical cases
- Lessons, videos and exercises

### **EVALUATION PROCEDURES:**

- An evaluation is carried out at the entrance of the training, it will allow to evaluate your initial level
- An evaluation is carried out at the end of each training session, in order to check your knowledge and validate your achievements.

### **EXECUTION MONITORING:**

- An invitation is given to the trainees before the training.
- A certificate of end of training mentioning the objectives, the nature and the duration of the action is given to the trainees after the training
- Lessons materials are given to trainees by email at the end of each day

**ACCESSIBILITY:** For any specific need in terms of disability, we invite you to contact us directly at [k.camara@siccogen.com](mailto:k.camara@siccogen.com), in order to study together the possibilities of following the training.

### **TRAINING CONTENT :**

Session 1 of 2 days:

<b>1<sup>st</sup> day: from 08h30 to 12h30 and from 14h to 18h</b>		<b>Acquired Skills</b>
Lesson 1: Fundamentals of hydrogen <ul style="list-style-type: none"> <li>- History of hydrogen to today</li> <li>- Objectives of sustainable development, energy transition and focus on green energy</li> <li>- Hydrogen chemistry</li> <li>- General information on hydrogen: Hydrogen production processes, electrolyser and fuel cell technologies, the different uses of hydrogen</li> </ul>	4h	Know the history of the progress of technological inventions from hydrogen to today, know the chemistry around hydrogen, the operation of hydrogen production and distribution equipment
Lesson 2: Hydrogen storage <ul style="list-style-type: none"> <li>- The reasons for storing hydrogen</li> <li>- Types of storage</li> <li>- Storage methods</li> <li>- Storage materials, regulations</li> <li>- Storage station providers</li> </ul>	2h	Understand why and how to store hydrogen, know hydrogen storage station suppliers
Lesson 3: Hydrogen Standards and Regulations <ul style="list-style-type: none"> <li>- Standards on the production, storage, distribution of hydrogen</li> <li>- Standards on the design, installation, commissioning, operation, maintenance of hydrogen infrastructure</li> <li>- Standards on safety and risks related to the installation of hydrogen infrastructures, their use,</li> <li>- Standards on hydrogen safety for the environment and the population</li> </ul>	2h	Know the standards and regulations related to all hydrogen topics
<b>2<sup>nd</sup> day : from 08h30 to 12h30 and from 14h to 18h</b>		<b>Acquired Skills</b>
Lesson 4: Carbon balance of the hydrogen chain - Calculation methods	2h	Know the calculation methods to evaluate the carbon balance of a chain

Lesson 5: Hydrogen market - Hydrogen players - Manufacturers, suppliers, installers of hydrogen equipment, research center, test center and certification of hydrogen equipment at national and international level - National and international deployment of hydrogen infrastructure projects	2h	Know the players in the hydrogen market and the strategies for deploying hydrogen in France and in Europe
Lesson 6: Hydrogen investment plan at the level national and international	1h	Know the hydrogen investment plans
Lesson 7: Methodology for carrying out technical, economic, financial, administrative, environmental studies for different hydrogen applications	2h	Know the methodologies for calculating and carrying out engineering studies and the installation of hydrogen infrastructures

- 1 hour lesson comprehension exam: quiz
- Correction of the exam: between 30 min and 1 hour.

Session 2 of 1 day :

Practical case studies: from 08h30 to 12h30 and from 13h30 to 17h30		Acquired Skills
Study of the deployment of H2 stations for charging light and heavy vehicles	1h30	Know how to carry out engineering studies for a project to install a hydrogen station for recharging hydrogen vehicles
Study of the deployment of H2 stations for industrial use and Study of a 10 MW hydrogen fuel cell power plant	2h30	Know how to carry out engineering studies for a hydrogen station installation project for industrial use and electricity production
Study of the valorization of hydrogen for the production of fertilizers	1h30	Know how to carry out engineering studies for a project to install a hydrogen station for the production of fertilizers

- Examination of hydrogen project studies of 2 hours: 2 case study exercises: heavy mobility and industry
- Correction of the exam: 30 min

### **OPPORTUNITIES AND FIELDS OF EMPLOYMENT:**

This training aims to validate knowledge and skills in the engineering and construction professions of the hydrogen sector and allows trainees to carry out internships in companies in the hydrogen sector in order to subsequently be hired.

Fields of employment: transport (land, sea, air), industry, agriculture, research and development.

Training opportunities:

- Hydrogen study engineer
- Hydrogen R&D engineer
- Manager of hydrogen infrastructure deployment projects (vehicles, stations, test centers)
- Manager of hydrogen station construction projects
- Technical director of hydrogen projects

- Commercial director of hydrogen projects
- Creation of start-ups for the development of hydrogen projects

**THE HYDROGEN TRAINER:**

Khadidiatou CAMARA, graduated in energy engineering and renewable energies from Polytech' Montpellier in 2016, has been working in the industrial sector and the transport of hydrogen and renewable energies in Europe for 6 years now.

Since 2022, She has been training students in the 4th year of the Energy-Engineering sector of the energy transition at ESIEE Paris. She has also set up practical sheets on hydrogen, green natural gas and renewable energies for Techniques de l'ingénieur Paris.

She is subcontracted by the S2E2 competitiveness cluster to also offer professionals from the S2E2 competitiveness cluster (Smart Electricity Cluster, which is a cluster supporting innovative business projects), training in design engineering and installation engineering of hydrogen infrastructure in France via her SICCOGEN enterprise.