Green Hydrogen and Power-to-X Technologies Training Course

14 - 18 Dec 2026

Tokyo

5800 € (Per Person)

Ref: #ERE2595_95019

Course Introduction / Overview:

The global energy landscape is undergoing a profound transformation, with green hydrogen emerging as a cornerstone of decarbonization strategies worldwide. This comprehensive training course provides an in-depth exploration of the entire green hydrogen and Power-to-X (PtX) value chain, from production to end-use applications. It is designed to equip professionals with the critical knowledge and strategic insights needed to navigate this rapidly evolving sector. Drawing upon foundational principles outlined by experts like Detlef Stolten in works such as "Hydrogen Science and Engineering", this program moves beyond theoretical concepts to address practical implementation challenges. Participants will gain a robust understanding of electrolysis technologies, PtX pathways for creating synthetic fuels and chemicals, and the complexities of storage and infrastructure development. BIG BEN Training Center has structured this course to empower attendees to analyze the economic viability, regulatory landscape, and safety protocols essential for successful project execution, making them key players in the future hydrogen economy.

Target Audience / This training course is suitable for:

- Engineers in the energy, chemical, and automotive sectors.
- Project managers and developers of renewable energy projects.
- Energy analysts and consultants.
- Policy makers and government regulators.
- Investment and financial analysts focused on clean energy.
- Corporate strategists and business development managers.
- Research and development scientists and technicians.
- Sustainability and environmental managers.
- Operations and maintenance supervisors in related industries.

Target Sectors and Industries:

- Energy and power generation utilities.
- Oil and gas industry (for transition strategies).
- Chemical and petrochemical manufacturing.
- Automotive and transportation industries.
- Aerospace and aviation sectors.
- Heavy industry and manufacturing (e.g., steel, cement).
- Renewable energy development (solar, wind).
- Logistics and maritime shipping.
- Governmental bodies, public sector agencies, and regulatory authorities.
- Financial services and investment banking.

Target Organizations Departments:

- Engineering and technical services.
- Research and development (R&D).
- Strategic planning and corporate strategy.
- Project management and project finance.
- Operations and production.
- Sustainability and corporate social responsibility (CSR).
- Regulatory affairs and compliance.
- Business development and sales.
- Supply chain and logistics.
- Health, safety, and environment (HSE).

Course Offerings:

By the end of this course, the participants will have able to:

- Analyze the fundamental principles of the hydrogen economy and its role in global decarbonization.
- Differentiate between various hydrogen production methods with a focus on green electrolysis technologies.
- Evaluate the technical specifications and operational parameters of AWE, PEM, and SOEC electrolyzers.
- Design and assess various Power-to-X pathways, including Power-to-Gas, Power-to-Liquids, and Power-to-Chemicals.
- Compare different hydrogen storage and transportation solutions based on cost, efficiency, and safety.
- Develop a preliminary economic model for a green hydrogen or PtX project.
- Identify key regulatory, policy, and market drivers shaping the hydrogen industry.
- Implement fundamental safety protocols and risk management strategies for hydrogen systems.
- Formulate a strategic roadmap for integrating hydrogen technologies into existing business operations.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a deep, practical understanding of green hydrogen and Power-to-X technologies through an immersive and interactive learning environment. We move beyond traditional lectures by integrating a dynamic blend of expert-led presentations, real-world case study analyses of pioneering hydrogen projects, and collaborative group workshops. Participants will engage in hands-on exercises focused on system design, economic modeling, and risk assessment, allowing them to apply theoretical knowledge to tangible scenarios. Interactive sessions, Q&A panels with industry experts, and peer-to-peer discussions are central to our approach, encouraging the exchange of diverse perspectives and problem-solving strategies. The course emphasizes a feedback-rich environment where participants can test their understanding and receive constructive input. This blended learning model ensures that attendees not only grasp the technical complexities but also develop the strategic thinking and practical skills necessary to lead and innovate in the burgeoning hydrogen sector.

Course Agenda (Course Units):

Unit One: Introduction to the Green Hydrogen Economy

- The strategic importance of hydrogen in the global energy transition.
- Understanding the hydrogen color spectrum (grey, blue, green, etc.).
- Global policies, regulations, and incentives driving the hydrogen market.
- The hydrogen value chain from production to end-use.
- Key stakeholders and major players in the hydrogen industry.
- Fundamentals of thermodynamics and electrochemistry for hydrogen systems.
- Introduction to Power-to-X (PtX) concepts and their role.

Unit Two: Green Hydrogen Production Technologies

- In-depth analysis of water electrolysis principles.
- Alkaline Water Electrolysis (AWE) technology, performance, and costs.
- Proton Exchange Membrane (PEM) Electrolysis technology and applications.
- Solid Oxide Electrolysis Cell (SOEC) and other emerging technologies.
- Integrating electrolyzers with variable renewable energy sources (solar and wind).
- Balance of plant (BoP) components for a hydrogen production facility.
- Efficiency metrics, degradation, and lifetime considerations for electrolyzers.

Unit three: Power-to-X (PtX) Conversion Pathways

- Fundamentals of Power-to-Gas (PtG): methanation and grid injection.
- Exploring Power-to-Liquids (PtL): production of e-fuels like e-kerosene and e-diesel.
- Understanding Power-to-Chemicals (PtC): green ammonia and green methanol synthesis.
- Techno-economic analysis of different PtX routes.
- Applications of PtX products in transportation, industry, and energy storage.
- Carbon capture and utilization (CCU) integration with PtX facilities.
- Process simulation and optimization for PtX systems.

Unit Four: Hydrogen Storage, Transport, and Infrastructure

- High-pressure compressed gas storage solutions.
- Cryogenic liquid hydrogen (LH2) storage and handling.
- Material-based storage: metal hydrides and chemical carriers.
- Hydrogen transportation via pipelines, tube trailers, and maritime shipping.
- Challenges and strategies for developing hydrogen refueling infrastructure.
- Repurposing existing natural gas infrastructure for hydrogen.
- Safety standards and codes for hydrogen storage and transport.

Unit Five: Project Development, Economics, and Safety

- Lifecycle of a green hydrogen and PtX project from feasibility to operation.
- Conducting techno-economic assessments and financial modeling.
- Identifying and mitigating project risks (technical, market, regulatory).
- Financing mechanisms and investment models for hydrogen projects.
- Health, safety, and environmental (HSE) considerations for hydrogen.
- Best practices in hydrogen detection, ventilation, and emergency response.
- Case study: developing a bankable green hydrogen project proposal.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

As Power-to-X technologies scale up, what are the unforeseen systemic risks and ethical considerations for global resource allocation and energy equity?

What unique qualities does this course offer compared to other courses?

This training course distinguishes itself by offering a holistic, 360-degree perspective that seamlessly integrates technical science with strategic business acumen. While many programs focus narrowly on the engineering aspects of electrolysis, this course broadens the lens to encompass the entire Power-to-X value chain, including the critical downstream applications in synthetic fuels and green chemicals. We place a strong emphasis on the practical realities of project development, dedicating significant time to techno-economic analysis, financial modeling, risk mitigation, and navigating complex regulatory landscapes. The curriculum is built around real-world case studies, enabling participants to learn from the successes and failures of pioneering projects globally. Rather than simply presenting information, our methodology challenges participants to think critically about market dynamics, policy impacts, and long-term infrastructure planning. This strategic, commercially-focused approach ensures that graduates are not just technically proficient but are also prepared to make informed investment decisions and lead impactful projects in the competitive hydrogen economy.