COURSE OVERVIEW PE1048
Low Carbon Hydrogen Production and Distribution

Course Title
Low Carbon Hydrogen Production and Distribution

Course Reference
PE1048

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	May 12-16, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 20-24, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	October 13-17, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
6	December 14-18, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Low Carbon Hydrogen Production and Distribution. It covers the s hydrogen basics, global hydrogen roadmaps and policy trends; the drivers and barriers for hydrogen deployment and hydrogen value chain; the hydrogen safety and risk management and steam methane reforming with carbon capture; the electrolysis-based green hydrogen production, biomass and waste-to-hydrogen technologies and methane pyrolysis for turquoise hydrogen; and the nuclear hydrogen and high-temperature electrolysis and comparative analysis of hydrogen production pathways.

During this interactive course, participants will learn the hydrogen compression and pipeline transport, hydrogen liquefaction and cryogenic storage and hydrogen carriers and chemical storage; the hydrogen refueling infrastructure for mobility, hydrogen storage for industrial and power use and distribution strategy and logistics planning; the industrial applications of hydrogen, hydrogen in power generation and grid support and hydrogen mobility; the techno-economic analysis of hydrogen projects and environmental and social life cycle assessment; the hydrogen energy systems integration, digital tools and smart hydrogen infrastructure; the hydrogen project development and risk management; and the hydrogen economics in emerging markets.

Course Objectives

Upon the successful completion of this course, each participant will be able to: -

- Apply and gain a good working knowledge on low carbon hydrogen production and distribution
- Discuss hydrogen basics and its role in energy transition and the classification of low carbon hydrogen
- Review global hydrogen roadmaps and policy trends, drivers and barriers for hydrogen deployment and hydrogen value chain
- Apply hydrogen safety and risk management and discuss steam methane reforming with carbon capture
- Describe electrolysis-based green hydrogen production, biomass and waste-to-hydrogen technologies and methane pyrolysis for turquoise hydrogen
- Explain nuclear hydrogen and high-temperature electrolysis and apply comparative analysis of hydrogen production pathways
- Discuss hydrogen compression and pipeline transport, hydrogen liquefaction and cryogenic storage and hydrogen carriers and chemical storage
- Determine hydrogen refueling infrastructure for mobility, hydrogen storage for industrial and power use and distribution strategy and logistics planning
- Carryout industrial applications of hydrogen and discuss hydrogen in power generation and grid support and hydrogen mobility in road, rail, maritime and aviation
- Employ techno-economic analysis of hydrogen projects and environmental and social life cycle assessment
- Integrate hydrogen energy systems and identify digital tools and smart hydrogen infrastructure
- Apply hydrogen project development and risk management and discuss hydrogen economics in emerging markets

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of low carbon hydrogen production and distribution for energy transition & sustainability professionals, chemical and process engineers, project managers in renewable energy, oil & gas industry professionals, policy makers & regulators, utility and grid operators, R&D scientists and technologists, environmental consultants and analysts, transport & logistics professionals, equipment manufacturers & suppliers, investors and financial analysts.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Dimitry Rovas, CEng, MSc, PMI-PMP, is a **Senior Engineer** with extensive industrial experience in **Oil**, **Gas**, **Power** and **Utilities** industries. His expertise includes **Gas Conditioning & Processing**, **Process Plant** Optimization, Effective **Production Operations** in the Oil & Gas Fields, Advanced Process Safety Management (**PSM**), **Process Equipment** Design, Applied **Process** Engineering, **Oil Production & Processing** Facilities, Pr**ocess Plant Optimization & Rehabilitation**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Operations Abnormalities & Plant Upset**, **Glass Reinforced Plastics**, **GRP Resins**, **Pipe Products & Applications**, **Pipe** System Designs & Installation, **Steel & Fiberglass** Construction, **GRP Linings** & Method Application, **Rubber Com**pounding, Elastomers, Thermoplastic, Industrial Rubber Products, Rubber Manufacturing Systems, **Heat Transfer**, **Vulcanization** Methods, **Energy Conservation**, **Energy Loss** Management in Electricity Distribution Systems, **Energy Saving**, **Thermal Power Plant** Management, **Thermal Power Plant** Operation & Maintenance, **Gas & Steam Turbines**, **Turbine Operations**, **Heat Transfer**, **Machine Design**, **Fluid Mechanics**, **Heating & Cooling Systems**, **Heat Insulation** Systems, **Heat Exchanger & Cooling Towers**, **Mechanical Erection**, **Heavy Rotating Equipment**, **HAZMAT & HAZCOM**, **Hazardous Materials & Chemicals MSDS**, Modern Heating, Ventilation, Air-Conditioning (**HVAC**) **& Refrigeration** Systems, Emergency **Air Compressors**, **Gas Turbine** Condition Monitoring & Fault Diagnosis, Modern **Valve** Technology, **Pumps & Valves**, Detailed Engineering Codes & Standards, **Hydraulic** System Overhaul & Troubleshooting, **Hydraulic** System Design & Troubleshooting, **Boiler** Maintenance & Inspection, **Pipe Stress** Analysis, Material Unloading & Storage, Commissioning & Start-Up. Further, he is also well-versed in MS project & AutoCAD, EPC Power Plant, Power Generation, Combined Cycle Powerplant, Leadership & Mentoring, Project Management, Strategic Planning/Analysis, Construction Management, Team Formation, Relationship Building, Communication, Reporting and Six Sigma. He was the **Project Manager** wherein he was managing, directing and controlling all activities and functions associated with the domestic heating/cooling facilities projects.

During his life career, Mr. Rovas has gained his practical and field experience through his various significant positions and dedication as the **EPC Project Manager**, **Field Engineer**, **Preventive Maintenance Engineer**, **Researcher**, **Instructor/Trainer**, **Telecom Consultant** and **Consultant** from various companies such as the Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and COSMOTE.

Mr. Rovas is a **Chartered Engineer** of the **Technical Chamber** of **Greece**. Further, he has **Master** degrees in **Mechanical Engineering** and **Energy Production & Management** from the **National Technical University of Athens**. Moreover, he is a **Certified Instructor/Trainer**, a **Certified Project Management Professional** (**PMP**), a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and a **Certified Six Sigma Black Belt**. He is an active member of Project Management Institute (**PMI**), Technical Chamber of Greece and Body of Certified Energy Auditors and has further delivered numerous trainings, seminars, courses, workshops and conferences internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Hydrogen Basics & Its Role in Energy Transition*** *Physical and Chemical Properties of Hydrogen • Comparison with Other Energy Carriers • Hydrogen in Decarbonization Pathways • Current Hydrogen Market Overview*
0930 – 0945	*Break*
0945 – 1045	***Low Carbon Hydrogen: Definitions & Classifications*** *Grey, Blue, Green, Turquoise, Pink Hydrogen • Carbon Intensity Metrics and Emissions Boundaries • Low Carbon Thresholds and Regulatory Criteria • Certification Schemes and Color Taxonomy*
1045 – 1130	***Global Hydrogen Roadmaps & Policy Trends*** *International Strategies (EU, Japan, USA, GCC, etc.) • Hydrogen Alliances and Global Cooperation • National Hydrogen Programs and Funding Mechanisms • Future Market Outlook and Projections*
1130 – 1230	***Drivers & Barriers for Hydrogen Deployment*** *Climate and Environmental Drivers • Economic and Technological Hurdles • Infrastructure and Policy Gaps • Social and Regulatory Acceptance*
1230 – 1245	*Break*
1245 – 1330	***Hydrogen Value Chain Overview*** *Production Technologies and Classification • Transportation and Storage Methods • Hydrogen Applications (Industry, Mobility, Power) • Value Chain Integration Challenges*
1330 – 1420	***Hydrogen Safety & Risk Management*** *Flammability and Explosion Risks • Leak Detection Technologies • Codes, Standards, and Certifications (ISO, IEC) • Safety in Transport and Storage*
1420 -1430	***Recap*** *Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Steam Methane Reforming (SMR) with Carbon Capture*** *SMR Process Fundamentals • Carbon Capture Technologies (MEA, PSA, Membranes) • Process Integration for Blue Hydrogen • Emission Factors and Cost Implications*
0830 – 0930	***Electrolysis-Based Green Hydrogen Production*** *Alkaline vs PEM versus SOEC Electrolysis • Renewable Energy Integration (Solar, Wind, Hydro) • System Components and Energy Requirements • Efficiency and Degradation Aspects*
0930 – 0945	*Break*
0945 – 1100	***Biomass & Waste-to-Hydrogen Technologies*** *Gasification and Pyrolysis Techniques • Feedstock Characteristics and Availability • Life Cycle Carbon Intensity • Techno-Economic Assessment*
1100 – 1230	***Methane Pyrolysis for Turquoise Hydrogen*** *Process Overview and Solid Carbon By-Product • Reactor Types and Material Handling • Energy Balance and Emission Profile • Current Research and Pilot Projects*
1230 – 1245	*Break*
1245 – 1330	***Nuclear Hydrogen & High-Temperature Electrolysis*** *Role of Nuclear in Hydrogen Production • Thermochemical Water Splitting Cycles • Safety, Policy, and Public Perception • Deployment Potential and Cost Analysis*
1330 – 1420	***Comparative Analysis of Hydrogen Production Pathways*** *Cost per kg of Hydrogen • Carbon Intensity of Each Pathway • Scalability and Infrastructure Needs • Regional Resource Suitability*
1420 - 1430	***Recap*** *Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 - 0830	***Hydrogen Compression & Pipeline Transport*** *Compression Technologies and Energy Use • Dedicated vs Blended Pipelines • Material Compatibility and Embrittlement • Leakage and Monitoring Systems*
0830 – 0930	***Hydrogen Liquefaction & Cryogenic Storage*** *Liquefaction Process and Technologies • Storage Vessels and Insulation Systems • Boil-Off Gas and Management Strategies • Applications and Challenges*
0930 – 0945	*Break*
0945 – 1100	***Hydrogen Carriers & Chemical Storage*** *Ammonia, LOHCs, and Metal Hydrides • Transport Economics and Reversibility • Dehydrogenation Processes • Safety and Handling Considerations*
1100 – 1230	***Hydrogen Refueling Infrastructure for Mobility*** *Refueling Station Components and Operation • Vehicle Interface and Safety Protocols • Standardization and Interoperability • Deployment Case Studies*
1230 – 1245	*Break*
1245 – 1330	***Hydrogen Storage for Industrial & Power Use*** *Salt Caverns and Underground Storage • Above-Ground Pressurized Tanks • Grid Balancing and Seasonal Storage • Hydrogen as Energy Backup Solution*

1330 – 1420	***Distribution Strategy & Logistics Planning*** *Regional Hydrogen Hubs and Clusters • Transport Modes: Trucks, Ships, Pipelines • Infrastructure Layout and Investment Needs • Digital Tools and Hydrogen Logistics*
1420 - 1430	***Recap*** *Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Industrial Applications of Hydrogen*** *Refineries and Ammonia Production • Steel and Cement Industry Decarbonization • Methanol and Synthetic Fuels • Retrofit vs New Process Lines*
0830 – 0930	***Hydrogen in Power Generation & Grid Support*** *Hydrogen Turbines and Fuel Cells • Backup Power and Microgrids • Blending in Gas Turbines • Integration into Power-to-Gas Schemes*
0930 – 0945	*Break*
0945 – 1100	***Hydrogen Mobility: Road, Rail, Maritime, Aviation*** *Fuel Cell Vehicles and Fleets • Hydrogen Trains and Heavy-Duty Trucking • Maritime Fuel Potential and Bunkering • Hydrogen in Aviation and Air Mobility*
1100 – 1230	***Techno-Economic Analysis of Hydrogen Projects*** *Levelized Cost of Hydrogen (LCOH) • CAPEX and OPEX Considerations • Sensitivity Analysis (Energy Price, Scale) • Economic Incentives and Carbon Pricing*
1230 – 1245	*Break*
1245 – 1330	***Environmental & Social Life Cycle Assessment*** *Cradle-to-Grave GHG Emissions • Water Use and Resource Constraints • Social Acceptance and Community Impacts • Hydrogen Sustainability Metrics*
1330 – 1420	***Carbon Accounting & Hydrogen Certification*** *Carbon Intensity Calculation Frameworks • Book and Claim Systems • Guarantee of Origin and Hydrogen Labeling • Regulatory Compliance and Disclosure*
1420 - 1430	***Recap*** *Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

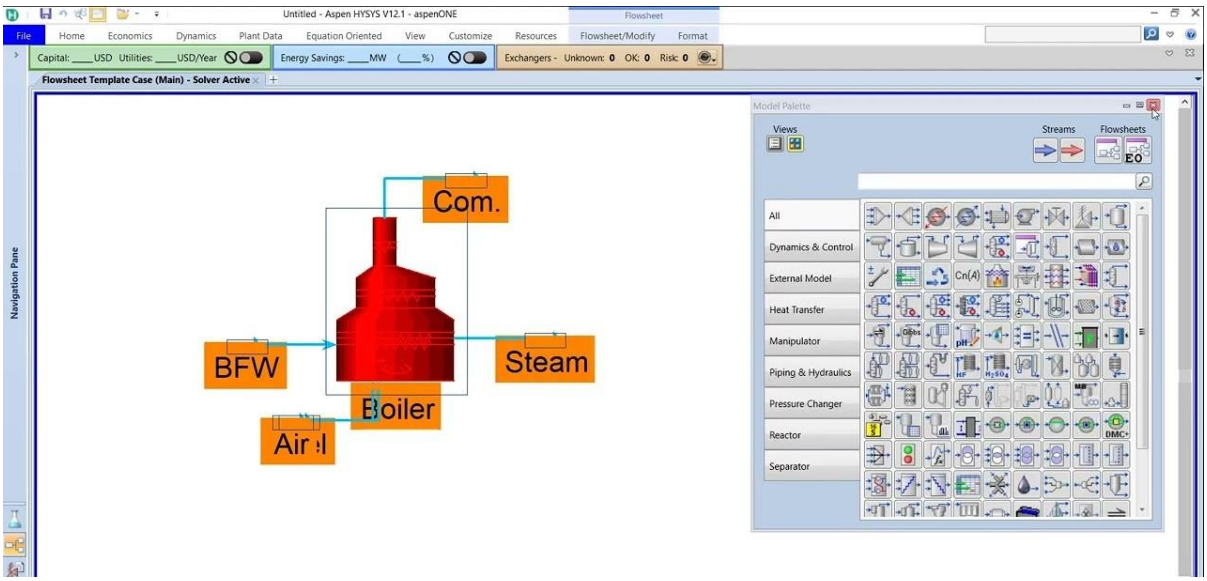
Day 5

0730 – 0830	***Integrated Hydrogen Energy Systems*** *Sector Coupling (Industry, Power, Transport) • Smart Grid and Demand-Side Integration • Hydrogen and Renewable Synergies • Systems Modeling and Optimization*
0830 – 0930	***Digital Tools & Smart Hydrogen Infrastructure*** *IoT in Hydrogen Plants and Pipelines • AI/ML for Predictive Maintenance • SCADA and Control Systems for Safety • Blockchain for Hydrogen Traceability*
0930 - 0945	*Break*

0945 – 1045	***Hydrogen Project Development & Risk Management*** *Feasibility and Front-End Engineering • Stakeholder Engagement and Permitting • Risk Identification and Mitigation Plans • Case Studies and Lessons Learned*
1045 – 1130	***Hydrogen Economics in Emerging Markets*** *MENA Hydrogen Export Strategies • Hydrogen Diplomacy and Trade Routes • Local Workforce and Supply Chain Development • Financing Models and PPPs*
1130 – 1230	***Case Studies of Operational Hydrogen Projects*** *Japan's Fukushima Hydrogen Energy Research Field • Germany's Hydrogen Valleys • UAE's Masdar and NEOM Projects • Lessons from Pilot to Commercial Scale*
1230 – 1245	*Break*
1245 – 1345	***Future Outlook & Innovation in Hydrogen Technologies*** *Solid Oxide Fuel Cells and New Materials • Hybrid Production Systems • Hydrogen from Ocean and Geothermal Sources • Next-Gen Mobility and Infrastructure*
1345 - 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 - 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art simulators "ASPEN HYSYS" simulator.



ASPEN HYSYS V12.1 Simulator

Course Coordinator

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