Industrial Hydrogen Applications Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Industrial Hydrogen Applications Training Course provides a practical, industry-focused understanding of how hydrogen can support industrial decarbonization, energy transition, clean energy integration, and net-zero strategies. The course examines hydrogen as both a chemical feedstock and energy carrier, with emphasis on established applications such as petroleum refining, ammonia and fertilizer production, and methanol, alongside emerging applications in steelmaking, industrial heat, synthetic fuels, power generation, energy storage, and heavy-duty mobility. Current industry evidence shows that global hydrogen demand exceeded 100 Mt in 2025, while low-emissions hydrogen production continued to expand, making hydrogen applications increasingly relevant to industrial strategy and investment decisions.

Participants will explore the complete hydrogen value chain from production pathways and purification to compression, storage, distribution, safety, end-use integration, techno-economic assessment, and project development. Particular attention is given to green hydrogen, low-emissions hydrogen, electrolyzers, hydrogen-ready processes, hydrogen-based direct reduced iron (H?-DRI), ammonia, refining, industrial process heat, fuel cells, hydrogen infrastructure, lifecycle emissions, and carbon reduction. The course uses industry case studies and application-based exercises to connect technical concepts with real-world decision-making, including the growing use of hydrogen as a reducing agent in steelmaking and as a feedstock for ammonia, methanol, and synthetic fuels.

Programme Curriculum

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Course Duration

5 days

Course Objectives

By the end of the course, participants will be able to:

1. Explain hydrogen fundamentals, hydrogen economy concepts, and clean-energy transition pathways.
2. Evaluate green, blue, low-emissions, and conventional hydrogen production pathways.
3. Understand electrolyzer technologies, renewable-power integration, efficiency, and system integration.
4. Assess hydrogen applications in petroleum refining, ammonia, fertilizer, and chemical manufacturing.
5. Examine hydrogen-based steelmaking, H?-DRI, green steel, and industrial decarbonization.
6. Evaluate hydrogen for industrial process heat and high-temperature applications.
7. Analyze hydrogen storage, compression, transportation, distribution, and infrastructure requirements.
8. Understand hydrogen safety, risk management, codes, standards, and operational considerations.
9. Apply techno-economic analysis, levelized cost concepts, and project feasibility assessment.
10. Explore hydrogen derivatives, including ammonia, methanol, and synthetic fuels.
11. Assess carbon-abatement potential, lifecycle emissions, sustainability, and ESG performance.
12. Understand hydrogen project development, offtake agreements, investment risks, policy drivers, and market dynamics.
13. Develop practical strategies for hydrogen deployment, industrial competitiveness, net-zero transformation, and energy resilience.

Target Audience

1. Energy and hydrogen professionals
2. Chemical and process engineers
3. Oil & gas and petroleum-refining professionals
4. Steel, metals, cement, and manufacturing professionals
5. Renewable-energy and electrolyzer specialists
6. Project developers, investors, and infrastructure planners
7. Government, regulators, policymakers, and sustainability professionals
8. Technical managers, consultants, researchers, and business leaders

Course Modules

Module 1: Hydrogen Fundamentals and the Emerging Hydrogen Economy

- Hydrogen properties, production pathways, applications, and **hydrogen value chains**.
- Conventional versus **clean and low-emissions hydrogen**.
- Hydrogen demand trends, market drivers, policy developments, and industrial opportunities.
- Mapping an integrated hydrogen ecosystem from renewable electricity through production, storage, and industrial consumption.
- **Case Study:** Using current global market data to evaluate the transition from traditional hydrogen demand toward emerging applications.

Module 2: Hydrogen Production and Electrolyzer Technologies

- **Water electrolysis**, renewable hydrogen, and electricity-to-hydrogen systems.
- PEM, alkaline, and solid-oxide electrolyzer fundamentals.
- Renewable-energy integration, dynamic operation, efficiency, and system optimization.
- Designing a conceptual renewable-powered electrolyzer system for an industrial facility.
- **Case Study:** Evaluating the scale-up challenges associated with rapidly expanding global electrolyzer capacity.

Module 3: Refining, Ammonia, Fertilizer and Chemical Applications

- Hydrogen as a **chemical feedstock** in refining and ammonia production.
- Hydrogen applications in methanol and other chemical pathways.
- Opportunities for **low-carbon hydrogen substitution** in existing industrial facilities.
- Replacing conventional hydrogen with low-emissions hydrogen in a refinery.
- **Case Study:** Assessing clean-hydrogen integration into ammonia production and fertilizer supply chains.

Module 4: Hydrogen in Steel, Metals and Heavy Industry

- Hydrogen as a **direct reducing agent** for iron ore and its role in H?-DRI.
- Hydrogen-based steelmaking and **green steel** pathways.
- Hydrogen opportunities in metals processing and other energy-intensive industries.
- Comparing conventional blast-furnace production with a hydrogen-based direct-reduction pathway.
- **Case Study:** Assessing the technical and economic requirements for scaling hydrogen-based iron and steel production.

Module 5: Industrial Heat, Power and Energy Storage

- Hydrogen for **high-temperature industrial heat** and process applications.
- Hydrogen combustion, fuel cells, turbines, and integrated energy systems.
- Hydrogen as an energy-storage medium and potential long-duration energy resource.
- Evaluating hydrogen as a substitute for fossil fuels in a high-temperature industrial process.
- **Case Study:** Developing a conceptual hydrogen-based energy system combining renewable power, storage, and industrial demand.

Module 6: Hydrogen Storage, Transport and Infrastructure

- Compressed and liquid hydrogen fundamentals and infrastructure requirements.
- Pipelines, terminals, distribution networks, and **hydrogen hubs**.
- Hydrogen derivatives and carrier concepts, including ammonia.
- Planning a hydrogen supply chain connecting production with an industrial offtaker.
- **Case Study:** Evaluating infrastructure constraints and supply-chain risks for a regional hydrogen project.

Module 7: Hydrogen Safety, Sustainability and Regulatory Frameworks

- Hydrogen hazards, **risk assessment, process safety, emergency planning, and operational controls**.
- Codes, standards, permitting, and regulatory considerations.
- Lifecycle emissions, carbon intensity, sustainability, and environmental performance.
- Conducting a conceptual hydrogen facility risk-identification exercise.
- **Case Study:** Comparing hydrogen pathways using lifecycle-emissions and sustainability criteria.

Module 8: Hydrogen Project Development, Economics and Future Applications

- **Techno-economic analysis**, project economics, investment decisions, and cost drivers.
- Offtake agreements, market creation, financing, policy incentives, and project bankability.
- Hydrogen derivatives, synthetic fuels, heavy-duty transport, maritime applications, and emerging markets.
- Building a simplified business case for an industrial clean-hydrogen project.
- **Case Study:** Developing a hydrogen deployment roadmap aligned with **net-zero, industrial competitiveness, energy security, and decarbonization objectives**.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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