Hydrogen Production by Electrolysis 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

Hydrogen Production by Electrolysis Training Course provides a practical, industry-focused foundation in green hydrogen, renewable hydrogen, electrolyzer technology, water electrolysis, energy transition, decarbonization, and clean-energy systems. The course examines how electricity can be used to split water into hydrogen and oxygen, with particular attention to alkaline electrolysis, PEM electrolysis, solid oxide electrolysis, renewable power integration, hydrogen efficiency, system optimization, and safety. The topic is increasingly important as global electrolyzer deployment expands: the IEA reports that installed electrolysis capacity surpassed 4 GW in 2025, while low-emissions hydrogen production is expected to achieve record growth in 2026.

Designed for professionals, engineers, project teams, policymakers, energy specialists, and aspiring clean-energy practitioners, the training connects technical fundamentals with real-world project development, techno-economic analysis, lifecycle considerations, hydrogen storage, industrial applications, infrastructure, and market development. Participants explore current challenges such as CAPEX, electricity costs, water availability, offtake agreements, project bankability, certification, regulatory frameworks, and renewable-energy intermittency. The course uses practical case studies and applied exercises to help learners translate electrolysis concepts into scalable, commercially relevant hydrogen projects. The IEA identifies investment, demand creation, infrastructure, regulation, and financing as important factors affecting the sector’s scale-up.

Programme Curriculum

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Course Objectives

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

1. Explain the fundamentals of green hydrogen, renewable hydrogen, and water electrolysis.
2. Compare alkaline, PEM, and solid oxide electrolyzer technologies.
3. Evaluate electrolyzer efficiency, power consumption, capacity factor, and system performance.
4. Assess solar PV, wind, grid, and hybrid renewable-energy integration for hydrogen production.
5. Understand water treatment, water quality, resource efficiency, and sustainable water management.
6. Conduct preliminary hydrogen production calculations and techno-economic assessments.
7. Analyze CAPEX, OPEX, LCOH, financing, and project bankability.
8. Identify opportunities for industrial decarbonization and hard-to-abate sectors.
9. Examine hydrogen storage, compression, transportation, and downstream applications.
10. Apply principles of process safety, risk assessment, hazardous-area awareness, and operational safety.
11. Understand hydrogen certification, carbon-intensity accounting, standards, and regulatory compliance.
12. Evaluate project development, offtake strategies, infrastructure requirements, and investment risks.
13. Develop an integrated perspective on scalable hydrogen projects, energy transition, net-zero strategies, and emerging hydrogen markets.

Target Audience

1. Chemical, mechanical, electrical, and energy engineers
2. Renewable-energy and clean-technology professionals
3. Hydrogen project developers and EPC professionals
4. Oil, gas, refining, ammonia, and industrial-sector professionals
5. Energy consultants and sustainability specialists
6. Government officials, regulators, and policymakers
7. Researchers, academics, and technical students
8. Business leaders, investors, entrepreneurs, and energy-transition professionals

Course Modules

Module 1: Hydrogen Economy and Electrolysis Fundamentals

- **Hydrogen economy** fundamentals and the role of hydrogen in decarbonization
- Green, renewable, low-emissions, and conventional hydrogen pathways
- Fundamentals of **water electrolysis** and electrochemical reactions
- Hydrogen production system architecture and major balance-of-plant components
- **Case Study:** Comparing a renewable-powered electrolyzer project with conventional hydrogen production

Module 2: Electrolyzer Technologies and System Design

- Alkaline electrolyzers
- PEM electrolyzers
- Solid oxide electrolysis
- Electrolyzer stacks, power electronics, cooling, gas separation, and balance of plant
- **Case Study:** Selecting an electrolyzer technology for a variable solar-and-wind hydrogen project

Module 3: Renewable Energy Integration

- Solar PV and wind integration for **green hydrogen production**
- Renewable-power intermittency and electrolyzer operating strategies
- Grid-connected, off-grid, hybrid, and behind-the-meter configurations
- Energy management, load profiles, curtailment, and capacity utilization
- **Case Study:** Optimizing electrolyzer operation using a hybrid solar-wind power profile

Module 4: Water, Hydrogen Quality, and Process Optimization

- Water requirements and **water treatment** for electrolysis
- Sustainable water sourcing and water-stressed project considerations
- Hydrogen purity, oxygen handling, drying, separation, and conditioning
- Energy efficiency, degradation, maintenance, and performance monitoring
- **Case Study:** Designing a water-management strategy for a large-scale electrolyzer facility

Module 5: Techno-Economic Analysis and Project Bankability

- **CAPEX, OPEX, LCOH**, electricity costs, and production economics
- Sensitivity analysis for electricity price, utilization, electrolyzer cost, and financing
- Project financing, **bankability, FID**, risk allocation, and investment structures
- Offtake agreements and demand creation for low-emissions hydrogen
- **Case Study:** Evaluating the commercial viability of a 100-MW green hydrogen project

Module 6: Hydrogen Storage, Infrastructure, and Applications

- Hydrogen compression, storage, transportation, and distribution fundamentals
- Pipelines, trailers, ports, and emerging **hydrogen infrastructure**
- Hydrogen applications in refining, ammonia, methanol, steel, mobility, and power
- Hydrogen derivatives including **ammonia and e-fuels**
- **Case Study:** Developing a hydrogen supply chain connecting renewable production to an industrial offtaker

Module 7: Safety, Standards, Certification, and Sustainability

- **Hydrogen safety** fundamentals and process-risk management
- Hazard identification, risk assessment, emergency planning, and operational controls
- Hydrogen standards, certification, carbon-intensity accounting, and traceability
- Lifecycle emissions, renewable-energy additionality, and sustainability considerations
- **Case Study:** Building a compliance and certification framework for an export-oriented hydrogen project

Module 8: Project Development, Markets, and Future Trends

- Hydrogen project lifecycle from **concept and feasibility to FID and commissioning**
- Project development risks, permitting, infrastructure, and stakeholder management
- Global hydrogen markets, policy mechanisms, incentives, and emerging demand
- **Digitalization, AI-enabled optimization, advanced electrolyzers, and clean-energy integration**
- **Case Study:** Developing a preliminary roadmap for a scalable renewable hydrogen hub

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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