Power-to-X Technologies 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

Power-to-X (PtX) is emerging as a strategic pathway for converting renewable electricity into green hydrogen, green ammonia, e-methanol, e-fuels, synthetic fuels, and other low-carbon energy carriers. By connecting renewable power with hydrogen production, carbon and nitrogen feedstocks, chemical synthesis, storage, transport, and end-use sectors, PtX can support industrial decarbonization, energy-system flexibility, long-duration energy storage, and hard-to-abate sector transformation. Current PtX training increasingly emphasizes not only technology fundamentals but also techno-economics, sustainability, certification, infrastructure, safety, project development, and market applications.

Power-to-X Technologies Training Course provides a practical, multidisciplinary understanding of the complete PtX value chain from renewable energy integration and electrolyzers to hydrogen derivatives, downstream synthesis, logistics, markets, and project deployment. Participants explore PEM, alkaline, and SOEC electrolysis, hydrogen storage and transport, Power-to-Ammonia, Power-to-Methanol, Power-to-Fuels, sustainable carbon sourcing, certification, business models, and ESG/EESG considerations. Case-based learning connects the concepts to real-world applications in shipping, aviation, green chemicals, fertilizers, steel, export hubs, and industrial energy systems, reflecting the growing emphasis on hands-on and scenario-based PtX competency development.

Programme Curriculum

Power-to-X Technologies Training Course

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Course Duration

5 days

Course Objectives

1. Understand the Power-to-X ecosystem and its role in the global energy transition.
2. Evaluate renewable power integration for PtX production.
3. Explain PEM, alkaline, AEM, and SOEC electrolyzer technologies.
4. Assess green hydrogen production, storage, compression, and transportation pathways.
5. Analyze Power-to-Ammonia and green fertilizer value chains.
6. Examine e-methanol and sustainable carbon utilization pathways.
7. Evaluate e-fuels and synthetic fuel applications for aviation, shipping, and industry.
8. Apply techno-economic analysis, CAPEX/OPEX, LCOH, and project bankability concepts.
9. Understand PtX infrastructure, export hubs, logistics, and offtake strategies.
10. Apply process safety, hydrogen safety, chemical safety, HAZOP, and operational readiness principles.
11. Understand certification, guarantees of origin, sustainability, ESG/EESG, and regulatory frameworks.
12. Develop PtX project concepts, business cases, and investment decision frameworks.
13. Assess emerging decarbonization, energy-security, circular-carbon, and cross-sector coupling opportunities.

Target Audience

1. Energy and renewable-energy professionals
2. Hydrogen and PtX project developers
3. Chemical, process, mechanical, and electrical engineers
4. Oil, gas, utilities, and energy-transition professionals
5. Shipping, aviation, and sustainable-fuels specialists
6. Government officials, regulators, and policymakers
7. Investors, financiers, consultants, and project managers
8. Researchers, academics, technology providers, and sustainability professionals

Course Modules

Module 1: Power-to-X Fundamentals and Energy-System Integration

- PtX value chains.
- Renewable integration.

- Sector coupling.
- System optimization.
- Case Study: Analyze a hypothetical renewable-powered hydrogen hub and identify suitable PtX products for local industrial demand. Current PtX training frameworks similarly emphasize production pathways, infrastructure, economics, sustainability, and downstream applications.

Module 2: Green Hydrogen and Electrolyzer Technologies

- Electrolysis fundamentals.
- Compare PEM, alkaline, AEM, and SOEC technologies.
- Dynamic operation.
- Hydrogen balance-of-plant.
- Case Study: Compare electrolyzer configurations for a solar-and-wind-powered green hydrogen project, considering flexibility, efficiency, and operating requirements.

Module 3: Hydrogen Storage, Transport, and Infrastructure

- Compressed hydrogen.
- Liquefied hydrogen.
- Hydrogen carriers.
- Pipeline, terminal, port, and export-hub infrastructure.
- Case Study: Develop a conceptual PtX export hub linking renewable generation, hydrogen production, storage, and international shipping markets. Export hubs are increasingly being examined as infrastructure for transporting hydrogen, ammonia, and methanol to global markets.

Module 4: Power-to-Ammonia and Green Fertilizers

- Green ammonia fundamentals.
- Haber-Bosch synthesis.
- E-fertilizer value chains.
- Ammonia storage, transportation, utilization, and market opportunities.
- Case Study: Evaluate a conceptual green ammonia and e-fertilizer project serving agricultural demand while integrating renewable electricity and hydrogen production. PtX training programs increasingly treat green ammonia and e-fertilizer as dedicated application areas.

Module 5: E-Methanol, E-Fuels, and Sustainable Carbon

- E-methanol pathways
- Carbon sourcing.
- Synthetic fuels.
- Hard-to-abate sectors.
- Case Study: Assess an e-methanol project for export to Europe, including CO? sourcing, renewable hydrogen, production configuration, offtake, and regulatory considerations. Recent research highlights modular carbon-to-methanol designs and their integration challenges.

Module 6: PtX Safety, Operations, and Risk Management

- Hydrogen safety.
- Chemical-process safety.
- HAZOP, LOTO, emergency response, and operational readiness.
- Competency-based safety culture for operators, contractors, EPCs, and site personnel.

- Case Study: Conduct a simplified PtX plant safety assessment covering hydrogen production, chemical synthesis, storage, and emergency-response scenarios. Industry training increasingly combines technical knowledge with practical safety and operational-readiness exercises.

Module 7: PtX Economics, Certification, Policy, and Project Finance

- CAPEX, OPEX, LCOH, levelized fuel costs, and sensitivity analysis.
- Project bankability.
- Certification.
- Carbon accounting, ESG/EESG, CBAM, and regulatory compliance.
- Case Study: Build a simplified green hydrogen/PtX business case and test how electricity prices, electrolyzer utilization, CAPEX, carbon costs, and offtake prices influence project economics.

Module 8: PtX Markets, Applications, and Future Project Development

- Green shipping and aviation.
- Green steel and industrial decarbonization using hydrogen and PtX derivatives.
- Power-to-Chemicals.
- Project development
- Case Study: Develop a conceptual integrated PtX industrial hub combining renewable power, green hydrogen, e-methanol or ammonia, logistics, offtake, and sustainability objectives. PtX training programs already use sector-specific applications spanning aviation, shipping, chemicals, certification, project finance, green steel, and green ammonia.

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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