Hydrogen Economy and Technologies: Production, Storage, Transport and Applications

1 – 5 March 2027
London - Central London four-star



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Introduction:

Hydrogen economy and technologies are moving from announcements to investment decisions, yet many organisations still compare production routes on headline efficiency, overlook the storage and transport cost between plant and user and sign offtake terms before the levelised cost of hydrogen is understood. This Core Concept course follows the whole value chain: grey, blue and green production, electrolyser choice, compression, liquefaction and ammonia or LOHC carriers, pipelines, industrial and mobility end uses, safety and project economics. Participants build a Hydrogen Project Screening Pack with an LCOH model for a case of their own.

Course Objectives:

- Classify hydrogen supply by production route and carbon intensity using the grey, blue and green labels as sources define them
- Compare steam methane reforming with carbon capture against alkaline, PEM and SOEC electrolysis on efficiency, flexibility and cost drivers
- Size a renewable-powered electrolysis plant at overview, matching electrolyser capacity, power supply profile and buffer storage
- Select a storage and delivery chain from compressed gas, liquid hydrogen, ammonia, LOHC and pipelines for a given distance and demand
- Apply hydrogen safety controls for flammability, embrittlement, leak detection and area classification to plant and transport design
- Build an LCOH model and structure offtake, certification and development steps for a hydrogen project

Target Audience:

- Engineers who evaluate production, compression, storage and pipeline options for new hydrogen assets
- Energy planners who assess hydrogen demand and supply against other decarbonisation routes
- Strategy and business development staff who screen hydrogen opportunities and prepare investment cases
- Operations and HSE staff who will run or oversee hydrogen handling at industrial sites
- Commercial staff who negotiate hydrogen and ammonia supply, offtake and certification terms

Course Outline:

Day 1: Hydrogen Economy Foundations: Properties, Colours and Demand

- Hydrogen Physical Properties: Energy Density by Mass and Volume, Diffusivity and Flame Characteristics
- Hydrogen Colour Labels: Grey, Blue and Green Production Pathways and Carbon Intensity
- Current Hydrogen Demand Map: Refining, Ammonia and Methanol Feedstock Volumes
- Hydrogen Value Chain Diagram from Production to Storage, Transport and End Use
- Decarbonisation Role Screening: Where Hydrogen Competes with Direct Electrification

Day 2: Production Routes: Reforming, Carbon Capture and Electrolyser Technologies

- Steam Methane Reforming Process Flow, Water-Gas Shift and Purification Steps
- Blue Hydrogen: CO2 Capture Points, Capture Rates and Residual Emissions
- Alkaline Electrolysis: Nickel Catalysts, Stack Design and Efficiency Range
- PEM and SOEC Electrolysis: Catalyst Materials, Operating Temperature and Load Following
- Alternative Routes at Overview: Coal and Biomass Gasification and Methane Pyrolysis

Day 3: Green Hydrogen Plant Design, Storage and Delivery Chains

- Renewable-Powered Electrolysis Sizing: Electrolyser Capacity, Capacity Factor and Water Demand
- Compressed Gas Storage: Pressure Classes, Tube Trailers and Salt Cavern Storage
- Liquid Hydrogen: Liquefaction Energy Penalty and Boil-Off Management
- Hydrogen Carriers: Ammonia Synthesis and Cracking and LOHC Hydrogenation Cycles
- Hydrogen Pipelines: Dedicated Lines, Natural Gas Blending and Repurposing Screening

Day 4: End Uses, Hydrogen Safety and Levelised Cost of Hydrogen

- Industrial End Uses: Refinery Hydrotreating, Ammonia Synthesis and Direct Reduced Iron Steel
- Mobility and Power Uses: Fuel Cell Vehicles, Shipping Fuels and Gas Turbine Co-Firing
- Hydrogen Safety Controls: Flammability Limits, Invisible Flame Detection and Leak Sensors
- Hydrogen Embrittlement: Material Selection and Pipeline Integrity Checks
- LCOH Cost Stack: Capex, Electricity Price, Utilisation and Stack Replacement Sensitivity

Day 5: Hydrogen Project Development Modelling Build and Screening Pack

- Certification and Standards Overview: Guarantees of Origin and Low-Carbon Hydrogen Criteria
- Offtake Structuring: Take-or-Pay Volumes, Price Indexation and Delivery Point Terms
- Modelling Build: LCOH Model for a Participant Production and Delivery Case
- Modelling Build: Project Risk Register and Development Stage-Gate Plan
- Hydrogen Project Screening Pack Presentation and Peer Review

Skills You Will Gain:

- Hydrogen Pathway Classification
- Electrolyser Technology Selection
- Electrolysis Plant Sizing
- Hydrogen Carrier Evaluation
- Hydrogen Hazard Control
- LCOH Modelling
- Offtake Term Structuring
- Hydrogen Project Screening

Why Attend This Course:

- Return with a Hydrogen Project Screening Pack and a working LCOH model for a case from your own organisation
- Judge supplier and consultant claims on electrolyser efficiency, carrier losses and delivered hydrogen cost
- Follow one value chain from production through storage, transport and end use instead of isolated technology briefings
- Compare hydrogen cases with engineers, planners and commercial staff from refining, chemicals, steel, power and transport

Conclusion:

Hydrogen projects hold value only when production, delivery chain, end use, safety and cost are decided together. The week moves from hydrogen properties and colour labels through reforming and electrolysis, into renewable-powered plant sizing, compressed, liquid and carrier-based storage and pipelines, then end uses, safety controls and LCOH. The final day applies certification and offtake structuring to a modelling build, producing a Hydrogen Project Screening Pack ready for internal review.