CONCEPT

Green Hydrogen Electrolyser Plants Course: PEM, Alkaline, Balance of Plant and Operation

9 – 13 August 2027
London - Central London four-star



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Introduction:

Green hydrogen electrolyser plants built on PEM and alkaline stacks, their balance of plant and their operation are the subject of this 1-week course for process, electrical, commissioning and maintenance engineers, ending with an Electrolyser Plant Commissioning and O&M Plan for a case organisation. Large electrolysis plants lose output and stack life when rectifiers, water treatment, purification and interlocks ignore stack behaviour under variable renewable power. Nominees already work on process or utility plants, and teaching is by inspection walkthrough of stack, power, water and gas sections. CoreConcept Training Center delivers this green hydrogen electrolyser plants course.

Course Objectives:

- Compare PEM and alkaline electrolyser stacks on cell voltage, current density, part-load range, pressure and catalyst supply risk for a given duty
- Specify rectifier and transformer arrangements, demineralised water treatment, gas-liquid separators, deoxidisers and dryers that form the electrolyser balance of plant
- Set operating envelopes for minimum load, ramp rate and hot standby so that a plant fed by variable solar and wind power stays within gas-purity and stack limits
- Track stack voltage drift, specific energy per kilogram and faradaic efficiency to detect degradation and plan stack refurbishment
- Apply gas crossover limits, hydrogen-in-oxygen interlocks, hazardous area classification and ventilation requirements to plant layout and shutdown logic
- Prepare a commissioning sequence and O&M plan for a multi-hundred-megawatt electrolysis plant

Target Audience:

- Process engineering staff responsible for electrolyser plant design reviews, mass and energy balances and operating envelopes
- Electrical engineering staff responsible for rectifiers, transformers, harmonics and grid or renewable power interfaces
- Mechanical and utilities staff responsible for water treatment, cooling, separators, compressors and gas drying equipment
- Commissioning staff responsible for pre-commissioning checks, start-up sequences and performance testing of new electrolysis units
- Operation and maintenance staff responsible for day-to-day running, stack condition monitoring and maintenance planning

Course Outline:

Day 1: Electrolysis Fundamentals and Plant Configuration Baseline

- Water Splitting Thermodynamics with Reversible and Thermoneutral Cell Voltage
- Polarisation Curve Losses Across Activation, Ohmic and Mass Transport
- Specific Energy per Kilogram and Higher Heating Value Efficiency
- Electrolyser Plant Block Diagram from Power Intake to Product Gas
- Current-State Plant Data Sheet for Capacity, Pressure and Purity

Day 2: PEM, Alkaline, AEM and SOEC Stack Technologies

- Alkaline Stack Design with Potassium Hydroxide Electrolyte and Zirfon Diaphragms
- PEM Stack Design with Iridium Anodes and Platinum Cathodes
- AEM and SOEC Cells Reviewed as Emerging Stack Options
- Pressurised Versus Atmospheric Stacks and Downstream Compression Duty
- ISO 22734 Requirements for Water Electrolysis Hydrogen Generators

Day 3: Balance of Plant Systems and Power Electronics

- Thyristor and IGBT Rectifier Selection with Harmonic Filtering
- Demineralised Water Train Using Reverse Osmosis and Electrodeionisation
- Gas-Liquid Separator, Lye Circulation and Stack Cooling Loop Sizing
- Catalytic Deoxidiser and Adsorption Dryer Purification Train
- Hydrogen Compressor Arrangements and Buffer Storage for Load Changes

Day 4: Dynamic Operation, Degradation and Safety Systems

- Renewable Power Profiles Driving Minimum Load and Ramp Rates
- Hot Standby, Cold Start and Frequent Cycling Effects on Stacks
- Stack Voltage Drift Trending and Refurbishment Decision Criteria
- Hydrogen-in-Oxygen Crossover Limits and Automatic Trip Interlocks
- IEC 60079 Hazardous Area Zoning, Ventilation and Gas Detection

Day 5: Inspection Walkthrough and Commissioning and O&M Plan

- Case Plant Walkthrough of Rectifier Hall and Stack Building
- Case Water Treatment and Gas Purification Train Inspection Checklist
- Pre-Commissioning Leak Testing, Purging and Inertisation Sequence
- Performance Test Protocol and Stack Condition Monitoring Schedule
- Electrolyser Plant Commissioning and O&M Plan Completion and Review

Skills You Will Gain:

- Electrolyser Technology Comparison
- Rectifier and Power Supply Specification
- Electrolysis Water Treatment Design
- Hydrogen Purification Train Sizing
- Dynamic Load Envelope Setting
- Stack Degradation Diagnosis
- Electrolysis Hazardous Area Assessment
- Electrolyser Commissioning Planning

Why Attend This Course:

- Deliver an Electrolyser Plant Commissioning and O&M Plan to the project director and the operations manager of a case organisation
- Decide when a stack should be refurbished or replaced, using voltage drift and specific energy trends rather than supplier schedules
- Avoid trips, off-specification hydrogen and shortened stack life caused by running below minimum load or ramping beyond limits
- Equip colleagues in electrical, utilities and safety teams with inspection checklists and trend sheets for the electrolysis plant

Conclusion:

Back at work, the participant hands the Electrolyser Plant Commissioning and O&M Plan to the project director, the operations manager and the maintenance planner. They use it to fix the start-up sequence, agree minimum load and ramp limits with the power supply team, set inspection intervals for rectifiers, water treatment and purification units, and budget for stack refurbishment. After the first months of operation, the unit should compare measured specific energy, voltage drift and trip records with the plan and revise the limits and intervals that proved wrong.

Frequently Asked Questions FAQ:

What should participants know before a green hydrogen electrolyser plants course?

Participants should already work on process, power or utility plants and read P&IDs and single-line diagrams. Bringing anonymised data sheets, operating trends or a vendor proposal for an electrolysis unit helps them apply the walkthrough and the final plan to their own project.

How does a green hydrogen electrolyser plants course differ from a hydrogen economy course?

It stays inside the plant fence: stacks, rectifiers, water treatment, purification, compression, safety and operation. Hydrogen economy courses cover the whole value chain, carriers, end uses and project economics, giving the electrolysis plant itself far less engineering detail.

Why does minimum load matter in green hydrogen electrolyser plants fed by renewable power?

Below minimum load, gas crossover rises and hydrogen in oxygen can approach safety trip limits, while rectifier losses climb. Alkaline units usually have a higher minimum load than PEM units, so plant design must match stack choice to the expected power profile.

What do participants take back from the green hydrogen electrolyser plants course?

Each participant takes back an Electrolyser Plant Commissioning and O&M Plan for a case organisation, with start-up sequences, operating limits, inspection checklists and a stack condition monitoring schedule that can be adapted to their own plant.