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# Renewable Ammonia Synthesis and Hydrogen Cracking Training Course

30 August – 3 September 2027
Barcelona

# Renewable Ammonia Synthesis and Hydrogen Cracking Training Course

**Ref:** 2997_113615 **Date:** 30 August – 3 September 2027 **Location:** Barcelona **Fees:** 6200 GBP

Renewable Ammonia Synthesis and Hydrogen Cracking is a 1-week training course for energy, process and project engineers who turn renewable electricity into ammonia, move it as a hydrogen carrier and crack it back for power, ending with an ammonia carrier route screening dossier. Ammonia matters now because hydrogen export and storage plans depend on a liquid that ships and stores at scale. Jupiter Prime Training delivers Renewable Ammonia Synthesis and Hydrogen Cracking for technical teams.

## Why Renewable Ammonia Synthesis and Hydrogen Cracking Matters Now

Variable solar and wind supply makes electrolysers and synthesis loops run in ways older ammonia plants never did, buyers ask for carbon intensity evidence on every cargo, and turbine makers now accept ammonia and cracked hydrogen as fuels. Sizing buffers, loop turndown and cracker duty well means cheaper molecules and safer sites; copying fossil plant habits strands capital in idle equipment. The course rests on mass and energy balances, hazard identification studies and levelised cost reasoning.

## Who Gains Most from Renewable Ammonia Synthesis and Hydrogen Cracking

- Engineers who size electrolysers, compressors and power supply for green molecule plants
- Process staff responsible for synthesis loop performance, refrigeration and storage tanks
- Project engineers who build cost estimates and schedules for hydrogen carrier projects
- Power plant engineers assessing ammonia firing or cracked hydrogen for turbines and engines
- Safety and risk engineers who review toxic and flammable inventories on new sites

Development teams mixing electrical, process and commercial engineers gain most, since power, loop and cargo trade-offs cross all three.

## Renewable Ammonia Synthesis and Hydrogen Cracking Capabilities

These outcomes trace hydrogen from wind turbine to turbine flame and price each step.

- Calculate electrolyser and air separation power demand per tonne of ammonia — power purchase and grid connection sizing
- Specify hydrogen buffer storage and synthesis loop turndown — operations planners facing variable supply
- Weigh refrigerated against pressurised ammonia storage — terminal and site layout decisions
- Assess cracker catalyst, heat duty and hydrogen purity — turbine, engine and fuel cell users
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Apply hazard identification to toxic release and fire scenarios — site safety and emergency planning
- Build a levelised cost of delivered hydrogen comparison — investment committees and offtake negotiators

## Key Renewable Ammonia Synthesis and Hydrogen Cracking Terms

- Synthesis loop — the high-pressure recycle circuit where hydrogen and nitrogen react over a catalyst to form ammonia.
- Ammonia cracking — heating ammonia over a catalyst to split it back into hydrogen and nitrogen for use as fuel.
- Loop turndown — the lowest stable production rate of the synthesis loop, setting how far output can follow renewable supply.
- Hydrogen buffer — compressed hydrogen storage that smooths electrolyser output before it enters the synthesis compressor.
- Carbon intensity — the greenhouse gas emitted per unit of delivered product, counted across production, shipping and reconversion.
- Round-trip efficiency — the share of original electrical energy recovered as power after synthesis, transport, cracking and combustion.

## Renewable Ammonia Synthesis and Hydrogen Cracking Day by Day

## Day 1: Hydrogen Carriers and the Ammonia Case

- Carrier Comparison Of Ammonia, Liquid Hydrogen And Organic Liquids — Export Route Choice
- Ammonia Properties, Toxicity And Flammability Limits — Siting And Separation Distances
- Renewable Supply Profiles From Solar And Wind — Plant Capacity Factor
- Carbon Intensity Accounting Across The Chain — Buyer Evidence Requirements
- Offtake Markets In Fertiliser, Shipping Fuel And Power — Demand Assumptions

## Day 2: Electrolysis, Air Separation and Power Supply

- Alkaline And Proton Exchange Membrane Electrolysers — Stack Selection And Degradation
- Electrolyser Power Electronics And Rectifier Design — Grid Connection And Harmonics
- Nitrogen From Cryogenic Or Membrane Air Separation — Power Draw Per Tonne
- Water Treatment And Desalination For Electrolysis — Feedwater Quality Limits
- Hydrogen Buffer Storage Sizing — Smoothing Variable Electrolyser Output

## Day 3: Synthesis Loop and Ammonia Storage

- Synthesis Converter, Catalyst And Recycle Ratio — Conversion Per Pass
- Loop Turndown And Flexible Operation Strategies — Following Renewable Supply
- Synthesis Gas Compressor Selection — Energy Use And Reliability
- Refrigerated Versus Pressurised Storage Tanks — Inventory And Boil-Off
- Loading Arms, Jetties And Ship Transfer — Terminal Throughput Planning

## Day 4: Cracking, Power Use and Economics

- Cracker Reactor Design, Catalyst And Heat Duty — Conversion And Footprint
- Hydrogen Purification And Residual Ammonia Removal — Fuel Cell Purity Needs
- Direct Ammonia Firing In Turbines And Engines — Nitrogen Oxide Control
- Round-Trip Efficiency Calculation — Comparing Ammonia With Direct Transmission
- Levelised Cost Of Delivered Hydrogen Model — Investment And Offtake Pricing

## Day 5: Practising the Carrier Route Screening

- Hazard Identification For Toxic Release And Fire — Emergency Response Planning
- Plant Power Balance From Electrolysis To Synthesis — Grid And Renewable Sizing Check
- Storage And Buffer Sizing Case — Operating Through Low Wind Periods
- Cost Sensitivity To Electricity Price And Utilisation — Project Go Or Hold
- Ammonia Carrier Route Screening Dossier — Recommendation To Project Sponsors

## Applying Renewable Ammonia Synthesis and Hydrogen Cracking After the Course

- Lead a power balance review of a planned site, testing buffer storage and loop turndown against hourly renewable profiles.
- Run a levelised cost comparison of ammonia cracking against another carrier for one target customer.

## Renewable Ammonia Synthesis and Hydrogen Cracking Questions FAQ

### What is renewable ammonia synthesis and hydrogen cracking, and why does it matter now?

It is the chain turning renewable electricity into ammonia and back into hydrogen at the point of use. It matters because hydrogen trade relies on a carrier that ships in existing tankers.

### Which roles gain most from renewable ammonia synthesis and hydrogen cracking training?

Engineers who size power supply, run synthesis and storage, estimate costs or assess ammonia fuels gain most.

### How does renewable ammonia synthesis and hydrogen cracking differ from a hydrogen value chain overview?

It goes deeper into one carrier: electrolyser power, synthesis loop flexibility, storage, cracker design and delivered cost for ammonia, rather than a broad survey of hydrogen uses.

## What do you bring back from renewable ammonia synthesis and hydrogen cracking training?

You bring back a route screening linking power balance, storage sizing, safety findings and delivered cost.

## Renewable Ammonia Synthesis and Hydrogen Cracking: The Way Forward

The ammonia carrier route screening dossier first informs whether a site moves into front-end engineering. Project sponsors, process leads and power supply engineers use it to agree capacity, buffer storage and target customers. After its first use, revisit electricity price and utilisation assumptions, which move delivered cost more than any equipment choice.