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COURSE BROCHURE

# Hydrogen Storage Routes and Energy Carrier Selection Training Course

14 – 18 February 2027
Istanbul

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Hydrogen Storage Routes and Energy Carrier Selection is a 1-week training course for energy engineers and project developers who must choose how hydrogen is held, moved and released, and who leave with a storage route selection matrix for a live or planned project. As hydrogen moves into supply chains, the storage choice shapes cost, safety and siting. Jupiter Prime Training delivers this course on hydrogen storage routes and energy carrier selection.

## Why Hydrogen Storage Routes and Energy Carrier Selection Matters Now

Three pressures meet in hydrogen storage today. Electrolysers now outpace steady demand, so buffering variable supply has become a design problem. Shipping operators are testing carriers that travel further than compressed gas. Insurers and neighbours expect evidence that pressure, cold and toxicity hazards are controlled. Choosing by habit locks in poor efficiency, oversized vessels and difficult permits. The course rests on recognised pressure equipment design rules, process hazard review practice and life cycle cost comparison, described in general terms.

## Who Gains Most from Hydrogen Storage Routes and Energy Carrier Selection

- Engineers who size storage vessels, caverns and buffer capacity for electrolyser or fuel cell sites
- Project developers who weigh carrier choices when building supply chains between production and demand
- Process specialists responsible for liquefaction, conversion and release units in a hydrogen plant
- Safety and permitting staff who prepare hazard cases for pressurised, cryogenic or chemical stores
- Commercial analysts who compare delivered cost per kilogram across storage and transport routes

Project teams sending engineering, safety and commercial members together gain most.

## Hydrogen Storage Routes and Energy Carrier Selection Capabilities

Participants work from the physical behaviour of hydrogen towards defensible choices between gas, liquid, solid and chemical stores.

- Calculate usable stored mass, volumetric density and boil-off for each storage form — vessel and site sizing
- Compare round-trip energy penalties of compression, liquefaction, conversion and release — carrier choice
- Assess embrittlement, permeation and material compatibility for containment designs — equipment specification
- Weigh hazards of pressure, cold, flammability and carrier toxicity — safety case and permit approach
- Build a delivered cost comparison covering capital, energy and handling — investment committee
- Specify a preferred route for stationary or onboard duty with stated trade-offs — project owners

## Key Hydrogen Storage Routes and Energy Carrier Selection Terms

- Gravimetric capacity — Hydrogen mass stored as a share of total storage system mass.
- Volumetric density — Hydrogen mass held per unit of system volume, driving footprint.
- Boil-off — Vapour lost from a liquid hydrogen tank as heat leaks in.
- Liquid organic hydrogen carrier — An oil-like compound that binds hydrogen and releases it over a heated catalyst.
- Metal hydride — A solid alloy that absorbs hydrogen at modest pressure and releases it when warmed.
- Round-trip efficiency — Share of hydrogen energy still usable after storage and release.

## Hydrogen Storage Routes and Energy Carrier Selection Day by Day

### Day 1: Hydrogen Properties and Storage Duty

- Density, Diffusivity and Ignition Behaviour — Why Hydrogen Storage Differs From Natural Gas
- Storage Duty Profiles — Hours, Days or Seasons of Buffering Required
- Stationary Versus Onboard Requirements — Weight, Space and Refuelling Limits
- Gravimetric and Volumetric Targets — Screening Routes Against Application Needs
- Supply and Demand Mismatch Mapping — Where Storage Sits in the Chain

### Day 2: Compressed and Underground Gas Stores

- Pressure Vessel Types and Composite Tanks — Choosing Working Pressure and Material
- Compression Energy and Staging — Power Demand of Filling Stores
- Salt Caverns and Depleted Reservoirs — Large Seasonal Storage Feasibility
- Embrittlement and Permeation Checks — Containment Material Selection
- Tube Trailers and Bulk Gas Delivery — Short-Distance Supply Options

### Day 3: Liquid, Solid and Chemical Carriers

- Liquefaction Cycles and Cryogenic Tanks — Energy Penalty and Boil-Off Control
- Metal Hydrides and Porous Adsorbents — Low-Pressure Compact Storage Cases
- Liquid Organic Hydrogen Carriers — Loading, Shipping and Dehydrogenation Steps
- Ammonia and Methanol as Carriers — Conversion, Cracking and Release Losses
- Carrier Toxicity and Handling Rules — Terminal and Port Suitability

## Day 4: Safety, Efficiency and Cost Trade-Offs

- Hazard Identification for Hydrogen Stores — Separation Distances and Venting
- Leak Detection and Flame Monitoring — Instrument Placement Decisions
- Round-Trip Efficiency Balance Sheets — Comparing Energy Lost per Route
- Delivered Cost per Kilogram Models — Capital, Energy and Handling Shares
- Sensitivity Testing of Distance and Volume — Where Route Rankings Change

## Day 5: Practising the Storage Route Selection Matrix

- Duty Profile Applied to a Sample Project — Setting Selection Criteria
- Containment and Carrier Options Shortlisted — Eliminating Unsuitable Routes
- Hazard and Cost Results Combined — Weighting Criteria With Stakeholders
- Peer Challenge of Route Assumptions — Testing Robustness Before Approval
- Storage Route Selection Matrix — Recommending One Route for Approval

## Applying Hydrogen Storage Routes and Energy Carrier Selection After the Course

- Run a duty profile and delivered cost check on one current hydrogen proposal.
- Lead a hazard review of an existing or planned hydrogen store, confirming separation distances, venting and leak detection placement.

## Hydrogen Storage Routes and Energy Carrier Selection Questions FAQ

### What is hydrogen storage routes and energy carrier selection, and why does it matter now?

It is the choice of how hydrogen is held and moved: compressed gas, liquid, solid materials or chemical carriers. It matters because the route sets efficiency, safety and cost for decades.

### Which roles gain most from hydrogen storage routes and energy carrier selection?

Energy engineers, project developers, process specialists, safety staff and commercial analysts gain most. You benefit most if you size stores, compare carriers or price supply.

### How does a course on hydrogen storage routes and energy carrier selection differ from a hydrogen value chain course?

It goes deeper into one link of the chain. A value chain course surveys production and economics broadly; this one concentrates on containment, carrier losses, storage hazards and one recommended route.

## What do you bring back from hydrogen storage routes and energy carrier selection training?

You bring back a tested selection matrix. It ranks options for your project on duty, efficiency, safety and cost, with recorded assumptions.

## Hydrogen Storage Routes and Energy Carrier Selection: The Way Forward

The storage route selection matrix first informs the concept choice for a new hydrogen project: which form of store to carry into front-end design. Engineers, safety leads and investment reviewers use it together when agreeing the concept. After first use, revisit distance and volume assumptions, because carrier rankings shift as supply chains lengthen.