
Services along the hydrogen value chain

Distribution/transport:

Tankers (lorry, train, ship)



TÜV®



TÜV NORD GROUP

H₂ competence @ TÜV NORD

1. Energy generation

Wind energy ■■■

2. H₂ generation

Electrolysis ■■■

Seawater desalination plants ■■■

3. Distribution/transport

Electrical grid ■■■

Pipelines ■■■

District heating ■■■

Intelligent networks ■■■

Pipelines ■■

Refuelling stations/
filling systems ■

Tankers (lorry, ■
train, ship)

4. Storage

Battery storage ■■■

Gas tanks ■■■

Cavern storage ■■■
(H₂ and CO₂)

Pressure vessels ■■■

H₂ hybrid storage ■

5. Consumption/use

Fuel cell systems ■■■

Methanol synthesis ■■■
units

Refinery ■■■

Mobility ■■

In every field of services, we support you in the following phases:

■ Concept/planning

■ Production

■ Operation



Concept/planning

We support you in the concept phase with comprehensive services that will give your project the security it needs in technical and legal aspects from the very start. From product design through the assessment of requirements and technical specifications to plant development and process optimisation, our specialists have the details and the desired goal in view and are equipped and prepared for your tasks with ultra-modern IT and AI instruments as well as a broad spectrum of risk analysis, certification, test and evaluation services.



Production

With specific testing, auditing and approval services, we provide neutral and technically competent support as a notified and accredited body for manufacturers. This includes assessment and certification as a material manufacturer, obligatory for the production of certain products. Our range of services also includes the assessment of manufacturing processes, material assessments, stress tests, damage appraisal and product certifications. In addition, on top of monitoring production, we also support commissioning, assembly works and personnel instruction in production processes.



Operation

After setup and commissioning, we help you when operations are up and running to avoid shutdowns, eliminate technical sources of danger and reduce costs with the use of software-supported maintenance systems. We take on the task of carrying out all recurring inspections and specific tests of electrical and mechanical plants and systems. We can also create risk-based maintenance plans and provide you with tailor-made strategies to reduce operational risks and increase plant safety over the long term.

Hydrogen tankers on land and sea

Alongside the option of carrying gaseous hydrogen (GH_2) in dedicated pipelines and converted ones in the natural gas network, it is also possible to transport it by lorry, train or ship in its gaseous phase or as liquid hydrogen (LH_2). While hydrogen lorries are already used to flexibly supply small quantities of hydrogen to consumers such as hydrogen refuelling stations and industrial plants, trains with suitable tank and cooling systems could carry much larger quantities. For transport by sea, special liquid hydrogen ships are under consideration, similar to LNG transporters.

We are your partner for the development, inspection and bringing to market of safe transport systems for gaseous and liquid hydrogen. With the most modern analysis and measurement methods and competent specialists, we are there for you to ensure you can complete your project safely and successfully and benefit from subsidies where available. Do get in touch.

Transport by lorry: local delivery

Where no pipeline or gas network connections are available at a local and regional level, lorries take on the task of delivering hydrogen. As standard in Europe, semi-trailer trucks are used to transport gaseous hydrogen (GH₂) in high-pressure vessels at levels of 200 to 500 bar, with the containers collected in bundles and contained by a protective frame. The transportation of cryogenic liquid hydrogen (LH₂) requires specially insulated tanks and uses a pressure of up to approx. 3.5 bar. The quantity of hydrogen that can be transported in this way by a lorry is around 1,100 kilograms of GH₂ (at 500 bar) or 4,000 kilograms of LH₂.

As part of potential studies on the technologies of hydrogen transport, consideration is being given to the intermodality of road and rail, particularly to the use of standard container sizes allowing the transport of GH₂ in type IV pressure vessels and flexible handling within the current logistics standards at loading and unloading points.

Transport by rail: national and international transport

As there are no regulatory limits for hazardous goods in rail transport, the movement of hydrogen by this mode is only limited by individual line limitations and the maximum permissible axle load and length of goods trains. The pressurised gas tank wagons used to transport gases to date, however, do not reach the required pressure and insulation levels to hold GH₂ and LH₂.

Pilot projects on the development of hydrogen logistics by rail should demonstrate that transport by train is both lower in emissions and more efficient than road transport.




Transport by ship: global transport

To move larger quantities of LH₂ at a global level, specially fitted ships are required using vacuum-insulated, double-shelled tanks and a system to manage boil-off gases. The world's first liquid hydrogen tanker started operation at the start of March 2021, transporting liquid blue hydrogen from Australia to Japan.

Because of its very low temperature (-253 °C), high upper explosive limit and extended flammability range, LH₂ has not previously been considered as a regular mass product to be transported by sea. The findings of the pilot phase will help the shipping industry to formulate future guidelines for safe transportation of LH₂.

Our services

We offer you comprehensive services in the fields of testing, inspection and certification – in the following phases of the project at hand:

	Concept / planning	Production	Operation
Certification of rail systems			
Certification of components for rail systems			

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