
Services along the hydrogen value chain

Distribution/transport:

Pipelines



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.

Natural gas pipelines and their potential for hydrogen

The planned expansion of production capacities for green hydrogen is making solutions for storage and transport urgently necessary. In this regard, Germany's gas infrastructure offers the greatest potential. Alongside setting up a dedicated hydrogen network, the use and conversion of existing gas pipelines is the subject of intensive research, dealing with the suitability of materials and the development of proper standards, safety regulations and national and international directives. We can foresee a phase where the existing gas network makes ever greater contributions to decarbonisation and the successful coupling of the industry, mobility and heating sectors.

We are your experienced partner for the energy transition in the gas network – both in the development of new networks and with a view to the testing and use of existing systems. With the most modern analytical methods, measurement processes and competent specialists, we are at your side to carry out your project safely and successfully, and to help you benefit from subsidies as available. Do get in touch.

Connecting industrial consumers

Pipelines allow the transportation of large quantities of gaseous hydrogen. For industrial consumers who largely draw their energy from natural gas, such as the steel and chemicals industry, the connection to a hydrogen network offers the possibility of withdrawing from fossil energy media.

In the Ruhr and central Germany's "Chemical Triangle", larger hydrogen networks have existed for decades and are today part of plans to set up model regions for a green hydrogen economy – from production through storage and transport to use by various sectors.

A powerful transport and storage medium

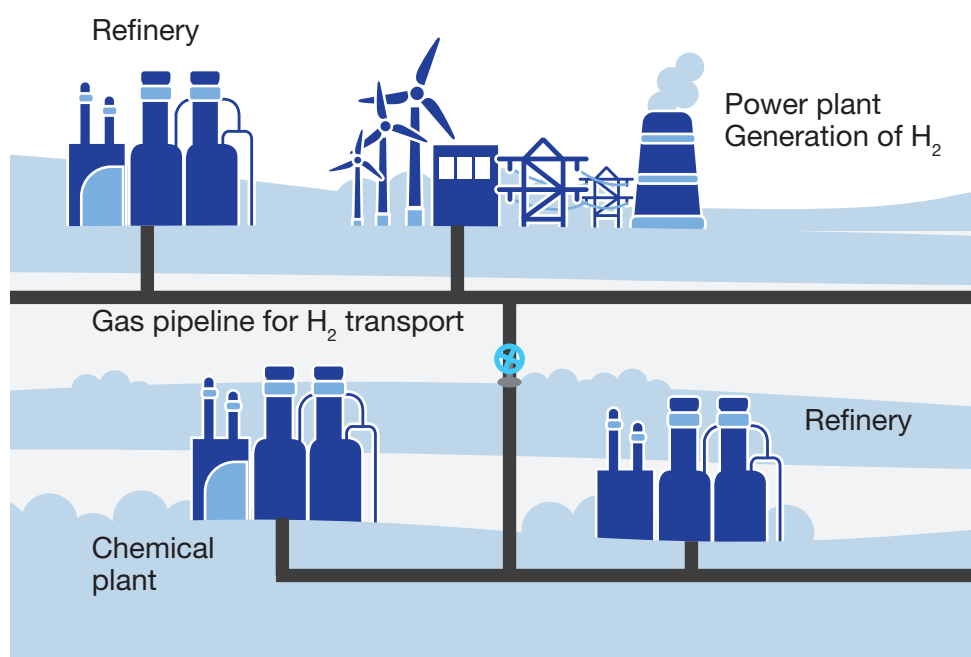
Alongside functioning as a transport system, gas pipelines offer the advantage of providing flexible storage. Unlike electrical grids, where the quantity of energy fed in and out is always constant, gas networks can buffer large quan-

ties of energy. Thanks to the range of pressures at which pipelines can be operated, overcapacity can be returned to the network and recovered when needed.

Use of existing gas networks

The development of a dedicated hydrogen network is connected with high investment costs. One option to reduce these is to use or convert existing gas pipelines. The suitability of pipelines, compressors, valve stations etc. for the transportation of gas containing a high proportion of hydrogen is currently the subject of studies regarding, say, hydrogen embrittlement, fracture toughness, corrosion and the alteration of ex-protected zones. The knowledge gained is used to derive maintenance and safety concepts. Together with standards and regulatory frameworks to be newly developed, they will allow the operation of converted gas pipelines.

The idea of developing the future hydrogen network from the existing gas one arose from the conversion from L-gas to H-gas in north-west Germany, to take place by 2030. This makes it possible to modify lines previously used for the transport of L-gas and lay the foundations, with them, for a hydrogen network which allows not only the internal transportation of green hydrogen but also its importation from abroad, say, from the Netherlands. To help drive forward this development of the hydrogen network, the HydroHub is aiding the conversion of a natural gas pipeline located in the Ruhr to operation with hydrogen.




On the path to a new gas infrastructure

Already today, Germany's gas networks are carrying biomethane and hydrogen as additives at varying levels by region. Against the backdrop of the goal of achieving greenhouse gas neutrality by 2045, the entire German gas network is involved in a process of transforma-




tion, in which fossil natural gas is to be almost completely replaced and a new gas infrastructure created as part of the National Hydrogen Strategy – for green hydrogen, synthetic methane and biogas.

Our services

We will support you at the concept creation stage, providing all the tests, conformity assessments and certifications required, monitoring production and standing at your side during acceptance and operation. To this end, we offer you comprehensive services in the fields of testing, inspection and certification – in all phases of the project at hand:

	Concept / planning	Production	Operation
			
Inspection of concepts to current legal requirements, standards and regulations	■		
Inspection of requirements specifications	■		
Inspection of technical specifications	■		
Inspection of component designs on the basis of standards, third-party requirement catalogues or customer demands	■		
Certification of protective devices	■		
Inspection of staggered power system protection plans, protection tests	■		
Analysis of electrical grids	■		
Certification of the grid connection	■		
Certification of protective devices, inspection, safety design	■		
Conformity assessments of electronic components/systems	■		
Inspection of the design, construction, functioning and reliability of hoists, cranes and load handling equipment	■		
Inspection of risk analyses to determine the potential risk of intervention by unauthorised persons	■		
Inspection of safeguarding concepts	■		
Inspection on determination of intervention measures by guarding/security company or police	■		
Inspection on determination of administrative security measures	■		

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	Concept / planning	Production	Operation
			
Inspection commissioning and periodic inspection concepts	■		
Technical due diligence	■		
Technical, financial, legal due diligence (with external partners)	■		
Testing electromagnetic compatibility	■		■
Inspection of documents for the conversion of existing high-pressure gas pipelines to H ₂	■		
Inspection on installation and operation of alarm receiving stations		■	
Production monitoring and auditing		■	
Inspection and support for commissioning and assembly works		■	
Acceptance and functional tests		■	
Acceptance tests (commissioning, periodic inspection) of isolated grids with involvement of e.g. decentralised generator units, electrolyzers and any necessary storage systems (on and offshore)		■	
Inspection of switchgears/control cabinets to EN 61439-1			■
Inspection of electrical and mechanical safeguarding systems			■
Recurring inspections			■

Your contact

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