



Bringing clean hydrogen to life, safely – a sustainable pathway for the energy transition.

Master the hydrogen economy with the supporting
testing and certification services.

Across all industrial sectors, hydrogen is increasingly considered as an energy carrier of the future that can support decarbonization and energy transition. Green hydrogen plays an essential pillar of this hydrogen revolution. Total addressed market for hydrogen generation alone is forecasted to reach ca. US\$250bn by 2030 and potentially reach over US\$1tn by 2050 (Source: Hydrogen Equity Research: Goldman Sachs 2022). Since 2020, a new wave of interest on hydrogen has begun to translate into policy action and over 30 governments have released their national hydrogen strategies and roadmaps.

OVERCOME HYDROGEN HURDLES. TOGETHER WITH US.

Following the accelerating growth of the hydrogen economy, industry are addressing barriers and needs for ramp-up of large-scale hydrogen deployment. A transparent certification scheme of green or low-carbon hydrogen products for international hydrogen trading, safety consideration on hydrogen-based application and infrastructure, and technical guidance on retrofitting of existing supply chain for hydrogen roll-out are becoming more critical.

The path to a sustainable hydrogen economy has its challenges, but it's worth it.
Let's do this step together.

www.tuv.com/hydrogen

 **TÜVRheinland®**
Precisely Right.

Support along the entire value chain.

For a successful conversion to hydrogen

In our Hydrogen Competence Center, we bundle diverse services* from numerous disciplines to support players from the energy industry with the needed services in the conversion to hydrogen.



POWER

Testing, Certification and Inspection Services

- For wind turbines
- For solar and photovoltaic systems
- For the safety of nuclear power plants

PRODUCTION

Water Electrolyzer Testing & Certification

- Test and certify all types of your water electrolyzer product according to international standard (e.g. CE, ISO 22734).
- Safety and conformity assessments according to a variety of standards and directives (e.g. ISO 15916, PED, ATEX, MD).
- Provide an optimal certification scheme for your electrolyzer product, according to applicable legal framework and certification standard.

Approval of power-to-gas plants in Germany

- Accompaniment throughout the complex permitting procedures of Power-to-gas plant in Germany.
- Provide technical engineering support to assist your compliance of a variety of legal requirement (e.g. BImSchG, BImSchV, BetrSichV, WHG, etc.)

STORAGE

We support you among others with:

- Hydrogen storage tank testing and inspection
- Conformity assessments for hydrogen storage facilities

TRANSPORT

Hydrogen Blending in Existing Gas distribution network

- Support for implementing pilot project on hydrogen admixture to natural gas pipelines. The step-wise approach increases the percentage of hydrogen in the distribution network gradually and creates the conditions for safe operation with pure hydrogen. Our one-stop services include preliminary data

USE/APPLICATION

Hydrogen Condensing Boiler Testing & Certification

- Testing of hydrogen condensing appliances (e.g. boilers, burners and instantaneous water heaters) on a variety of parameters, including performance efficiency, safety, endurance, and others upon your R&D requirement.
- Type approval of hydrogen admixture gas condensing boiler up to 20%, issued by German Technical and Scientific Association for Gas and Water (DVGW) standard. We are also working on a certification scheme to certify 100% hydrogen appliance.

Hydrogen-powered vehicle components testing & certification

- Testing and certification for fuel system components for hydrogen gas-powered vehicle according to HGV 3.1, accredited by ANSI/ CSA.
- Type approval of hydrogen storage systems and components for hydrogen-powered vehicle according to EU VO 2021/535, issued by German Federal Motor Transport Authority (KBA) and TÜV Rheinland

Hydrogen-powered steel plant conformity testing

- Determination of requirements and conformity assessment of a direct reduction shaft furnace for a hydrogen-powered steel plant in compliance with EU legal requirements (e.g. Machinery Directive, PED)

* In TÜV Rheinland, the neutrality, objectivity, independency and impartiality of our activities are of utmost importance. Our conformity assessment activities follow these values in compliance with the applicable accreditation requirements. All the necessary structural, organizational and processual measures are in place in all levels of the organization in order to avoid conflicts of interest (e.g. rigorous separation of consultancy and certification) and to ensure impartiality.

SERVICES AT ALL STAGES OF THE VALUE CHAIN*

Risk & Safety Management

Compared to conventional gas, handling hydrogen presents alternative safety risks and requires appropriate protection measures. With our specialized risk management tools and methods (e.g. Bowtie, FMEA / HAZOP / HAZID / QRA, etc.), we provide customized solutions to manage the risk across the entire lifecycle of your hydrogen facilities and equipment.

Project management consultancy

We supervise and monitor your worldwide projects using professional and comprehensive processes and procedures to support completing your projects on time and on budget while ensuring quality and compliance with design and statutory rules.

Hydrogen training

We support you to handle hydrogen safely, on your way into the future with hydrogen. We offer modular training courses ranging from hydrogen technologies, applicable regulations to hydrogen safety assurance. With our flexible training channel, you will gain knowledge at a learning style fitting you best, and have the possibility of gain a TÜV Rheinland certified qualification.

Bring hydrogen to life, safely. With our global hydrogen competence center as your partner.

The global expert team bundle the needed know how of different technical areas to support plant operators, grid operators, manufacturers or hydrogen users with the necessary structural change. We provide you with a comprehensive package of integrated services that includes testing, inspection, training and consulting. Our expertise will help you to manage the risks to people, plants, businesses and the environment and to create safe operating conditions.

As an experienced partner to the industry, we accompany you during the hydrogen revolution.

Have a look at the hydrogen projects we have already successfully realized.



www.tuv.com/hydrogen-projects

Abbreviation:

ATEX directive – Appareils destinés à être utilisés en ATmosphères EXplosibles (French for „Equipment intended for use in explosive atmospheres“)

ArbSchG – Arbeitsschutzgesetz (German federal law)

AwSV – Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (German federal law)

BetrSichV – Betriebssicherheitsverordnung (German federal law)

BImSchG – Bundes-Immissionsschutzgesetz

(German federal law)

BImSchV – Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes

(German federal law)

CSA ANSI HGV 3.1 – Standard for fuel system components for compressed hydrogen gas powered vehicles

DVGW – Deutscher Verein des Gas- und Wasserfaches e.V.

FMEA – Failure Mode and Effects Analysis

HAZID – Hazard Identification

HAZOP – Hazard and operability

MD – Machinery Directive

PED – Pressure Equipment Directive

ProdSG – Product Safety Act

QRA – Quantitative Risk Assessment

WHG – Wasserhaushaltsgesetz

(German federal law)

Ask our experts about hydrogen.

ONLINE CONTACT

TÜV Rheinland Industrial Services
Global Hydrogen Competence Center
Am Grauen Stein
51105 Cologne, Germany
industrial-services@tuv.com

www.tuv.com/hydrogen

