

Hydrogen

**Your energy
transition partner**

LRQA



Introduction

As the global shift towards cleaner, more sustainable energy gains momentum, hydrogen is emerging as a key contender to replace fossil fuels in achieving Net Zero ambitions.

Recognizing its potential to drive a wide range of applications across various industries, hydrogen is one of the solutions available now to support the transition to a low-carbon economy. However, the development and integration of hydrogen systems into existing energy infrastructures come with significant challenges. The complexities of manufacturing, procurement, operation, and maintenance of these systems require a sophisticated approach to risk management and performance optimization throughout the project lifecycle.

LRQA's expertise in the hydrogen sector is sharply focused on addressing these challenges. We provide a comprehensive suite of services that support your hydrogen projects from start to finish. We'll help you gain assurance around equipment adaptation, stay one step ahead of the regulatory landscape, and address facility challenges for safe hydrogen production, storage, and distribution – ensuring that each project phase adheres to the highest standards of safety, quality, and efficiency. By partnering with LRQA, you benefit from our deep understanding of the technical and global regulatory demands of the hydrogen industry, ensuring that your projects are not only compliant and safe but also competitive in the evolving energy market.





Market outlook: Scaling up amidst emerging challenges

The hydrogen sector is poised for significant expansion, with projections indicating the completion of 1,064 hydrogen projects by 2040¹. This represents a substantial 40% growth in the number of projected projects over the last 12 months¹, signalling extensive demand in the industry. Despite this promising outlook, the sector faces a range of challenges; only 6% of projects greater than 10 megawatts have reached the Final Investment Decision (FID) stage¹.

A contributing factor is the slower-than-expected response from the supply chain to provide cost effective solutions and ease access to finance, which has resulted in fewer projects advancing to the construction phase. There is a clear and pressing need for education, innovation, and stability to realize the full potential of the hydrogen market.

Against this backdrop, assurance access to the right technical expertise and a quality-focused approach provides a solution to a range of key market challenges relating to technical innovation, the supply chain, compliance with regulations and standards, social license to operate, and availability of technical expertise and competency.

1. Technical and supply chain challenges

The drive to scale hydrogen production in alignment with global energy demands - and within feasible cost parameters - requires substantial innovation. This expansion phase must carefully account for the risks inherent in diversified supply chains and the operational challenges associated with establishing plants in some unconventional locations. These factors contribute to a landscape marked by significant technical complexity and skills shortages. LRQA's technical experts have an extensive knowledge of current best practices around the use of technology and supply chain risk management globally - ensuring that your project advances safely, efficiently, and reliably.



2. Compliance with regulations and standards

The hydrogen industry is rapidly evolving, working to set clear rules and standards covering production to end-use. Currently, the absence of comprehensive standards and regulations leaves businesses navigating an uncertain landscape. This not only fuels uncertainty but also hinders the establishment of recognized, international best practices - often leading to project delays and increased costs. LRQA can provide the expertise and support required to navigate these regulatory waters. We guide you through the current regulations and prepare you for future developments, ensuring your projects proceed smoothly and efficiently.



3. Social license to operate

Public impact and perception play pivotal roles in the viability of hydrogen projects. Historical incidents and local resistance to industrial expansion near residential areas have created scepticism, which can impact project advancement. To overcome these social obstacles, it's crucial to build community trust and transparently demonstrate the benefits and safety of hydrogen initiatives. LRQA can support your efforts to build stakeholder engagement by ensuring your projects comply with internationally recognized standards and best practices, and by independently verifying your carbon footprint and emissions, ensuring the true purpose of the energy transition project and impact on a greener future can be shown and trusted.



4. Addressing the competency gap

The rapid growth of the hydrogen sector requires a workforce skilled in the nuances of hydrogen production, storage and usage. Several global institutions and universities are rolling out hydrogen-specific training courses, highlighting the need to upskill existing professionals and attract new talent, and various businesses are working to seamlessly implement best practices from other industries. While these are important steps, more will be needed to truly address the skills gap. Surges in the oil and gas and mining sectors are intensifying the competition for skilled professionals, and as the sector grows and introduces new global and regional standards, professionals will need comprehensive training around areas such as process safety risks and regulatory compliance.



LRQA's extensive range of hydrogen services has been designed to help you navigate the many complexities of the hydrogen sector through a tailored approach that targets support in the areas that matter most to your projects and organization.

How we can support your projects

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Every hydrogen project carries its own unique risks and challenges, making it essential to identify the necessary technical expertise early in the process.

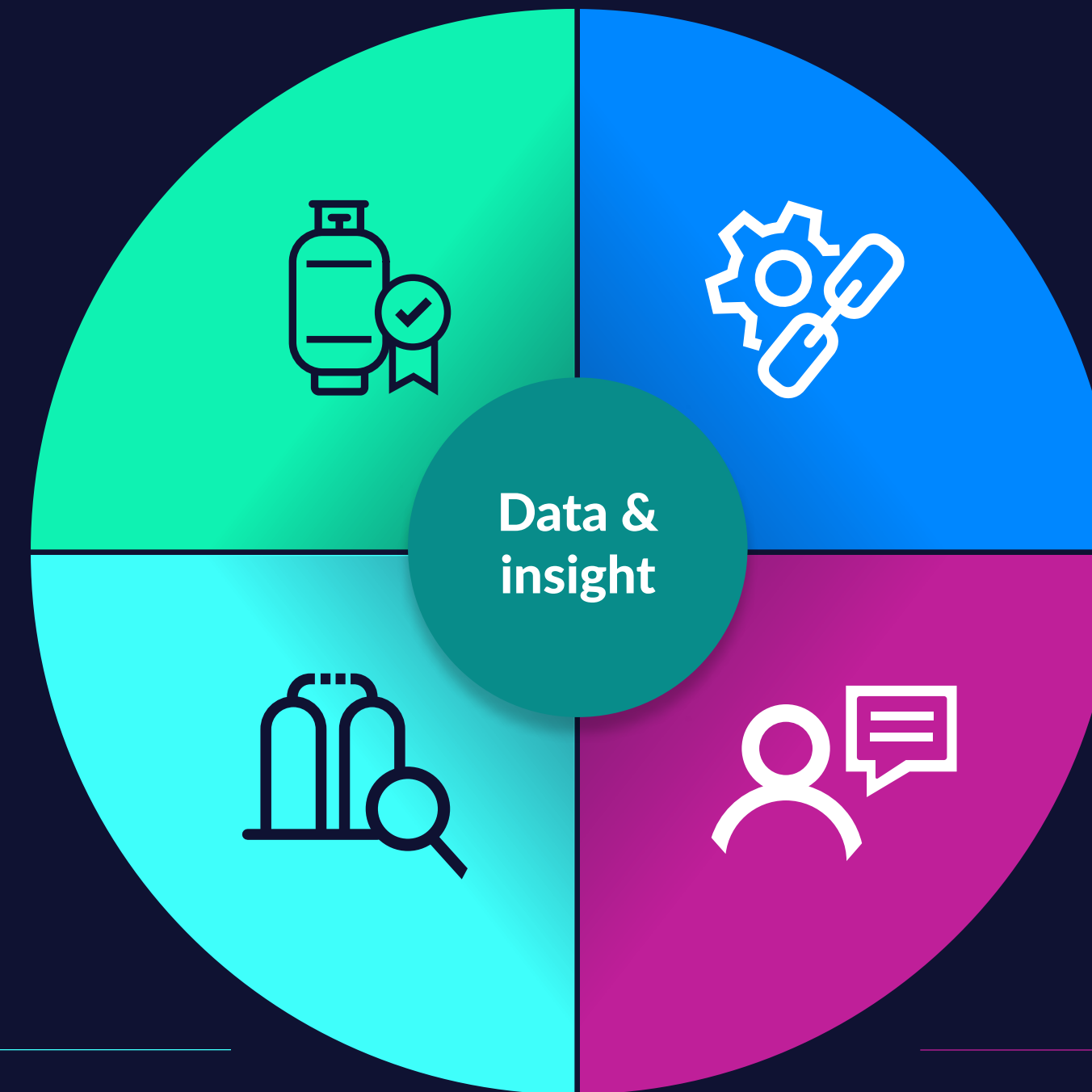
That's why our team of experts collaborates closely with you to understand the full scope of your plans. Based on your requirements we can build a tailored assurance program that ensures your equipment, products, activities, and supply chain operate in line with legal requirements, global standards, and industry best practices.

Product inspection & certification

Ensure that the hydrogen you produce complies with standards, regulations, GHG reporting requirements, and recognized best practices before entering the market.

Equipment inspection & certification

Ensure your equipment adheres to all relevant regulations and international standards, regardless of your export or usage location.



Project & supply chain assurance

Maintain the integrity of your hydrogen supply chain through site inspections and vendor assessments that ensure quality and safety throughout your projects.

Technical advisory

Maximize the success of your hydrogen projects with specialized insight, regulatory advice, training and support at every stage.



Key services

Our team will work closely with you to design a bespoke assurance program tailored to your specific needs. Below, you'll find a selection of LRQA services that have supported hydrogen projects and developers globally. If you do not find what you're looking for, please get in touch to discuss your requirements with one of our specialists.

Get in touch →



Technical advisory

- **Regulatory research & advisory**
 - Regulation roadmap development
 - Development of guidelines and standards for hydrogen safety and quality
 - Supply chain risk
- **Technology and design evaluation**
 - Technology qualification
 - Gas transmission analysis
 - Gap analysis for standards and design
 - Design appraisal for regulatory compliance
 - Gas Connection Competency assurance and advisory services
 - Approval in principle / Technology qualification
- **Safety studies & risk assessment**
 - QRA, SAFETI, HAZOP, HAZID, SIL verification
- **Owner's engineer advisory**
- **Training**
 - Hydrogen fundamentals (Regulations, Process Safety and Quality)



Equipment inspection & certification

- **Pressure equipment**
 - Pressure Equipment Directive (PED)
 - Transportable Pressure Equipment Directive (TPED)
 - Other local directives and guidelines including: ASME, MOM, AS, DOSH
 - Recertification of pressure equipment
- **Other equipment**
 - Machinery Directive
 - Electrolysers
 - BoP
- **Advisory & compliance reviews:**
 - ISO 22734 – Hydrogen generators using water electrolysis
 - ISO 19880 – Gaseous hydrogen fuelling stations
 - Gas Connection Competency Assurance Certification



Product inspection & certification

- **Certificate of origin**
- **Carbon footprint/GHG verification –**
 - According to GHG protocol
- **Responsible Steel certification**



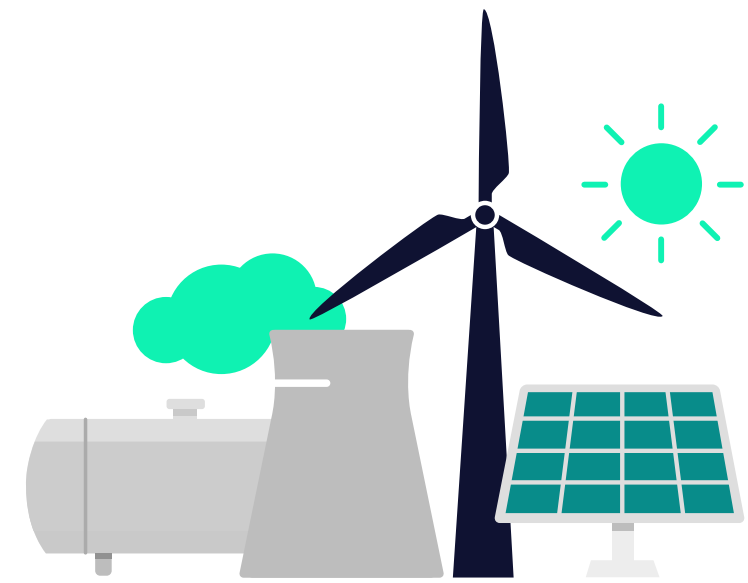
Project & supply chain assurance

- **Independent project verification and validation**
- **Site inspections**
 - Client sites
 - Vendor sites – global supply chain
- **Vendor assessments**
- **Responsible sourcing & Modern slavery auditing**
- **Development of Quality Assurance Plans and**

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Track record in renewables

With over 40 years of experience, we've established an extensive track record in renewables – supporting some of the world's leading energy producers, manufacturers and operators throughout their transition to cleaner forms of energy including hydrogen, nuclear, wind and solar.



Full lifecycle expertise

LRQA offers specialist inspection and assurance services in over 80 countries. Whatever your sector, we can help you anticipate, mitigate and manage risk. Our team of over 1,000 inspectors and specialists use extensive local sector knowledge to help thousands of clients safely and sustainably establish best practices.



Global reach, local expertise

LRQA offers specialist inspection and assurance services in over 80 countries. Whatever your sector, we can help you anticipate, mitigate and manage risk. Our team of over 1,000 inspectors and specialists use extensive local sector knowledge to help thousands of clients safely and sustainably establish best practices.



Actionable insights

Our expert team participates in sustainability committees, shapes industry agendas and stays current on key trends to help you seize opportunities and manage risks. This ensures that the insights and solutions we provide are grounded in real-world experience.

How we make a difference for our clients

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Case study

Emano Kunststofftechnik GmbH & APEX Energy GmbH, Germany

1. Client

Emano Kunststofftechnik GmbH is a German plastic manufacturer with over 60 years experience, specializing in the use of rotational sintering to produce high quality, hollow body vessels.

2. The Requirement

Ensuring the quality and safety of an innovative green hydrogen storage vessel for Emano's client Apex Energy, to be installed at one of Germany's first hydrogen power plants.

3. The Solution:

An end-to-end certification service across design, product and manufacturing, against international best practice including European Pressure Equipment Directive (PED) and American Society of Mechanical Engineers (ASME) standards.

In June 2020, the German government published its national hydrogen strategy, putting one of the world's most abundant elements at the heart of an ambition to be carbon dioxide neutral by 2050. Hydrogen, already widely used in industrial processes, is increasingly seen as key to meeting climate change goals, solving the problem of how intermittent sources of renewable energy - in particular solar and wind - can more closely match demand.

Using electrolysis powered by renewable sources, water is used to create green hydrogen to be stored for use on demand. Storing hydrogen, however, is inherently more challenging than other fuels. Volumes are bigger, it ignites easily, combusts powerfully and carries risks to the components around it.

If hydrogen's potential as a green energy solution is to be fulfilled, storage and distribution risks must be effectively managed. Here, we examine the impact of LRQA's end-to-end inspection and certification capabilities on one of Germany's most ambitious hydrogen energy projects to date.

Certifying design innovation in green hydrogen storage

As Germany turns towards hydrogen, manufacturing company Emano has collaborated with the Fraunhofer-Institute and the Leibniz-Institute for Catalysis to develop hydrogen storage manufactured from a gas-tight plastic. This innovative design, combining plastics with a carbon fiber shell, offers both weight and price advantages, as well as improved risk performance in terms of fatigue properties.

The first of these tanks, designed for its client Apex Energy, will be installed at a new hydrogen power plant serving a small industrial development at Rostock-Laage, near the Baltic Sea. The plant is among the first of its kind in Germany.

Certifying manufacturing and production

With the capacity to produce up to 300 tons of hydrogen per year directly from water, the Rostock-Laage facility requires 40 of Emano's newly certified hydrogen vessels enabling 200kg of hydrogen storage capacity. With the design and manufacture certified across European and US standards, Emano can target valuable export markets, as well as future applications for the technology, including domestic storage.

Ongoing monitoring and inspection

With its design, manufacturing processes and end-product certified, Emano's innovative green hydrogen storage tanks have successfully been delivered and installed at Rostock-Laage. As part of Germany's requirement for regular inspection of pressure equipment, monitoring of explosion protection and plant safety, Emano's engineering will be subject to ongoing monitoring and inspection to ensure compliance.

Green hydrogen's emergence as a key pillar of Germany's national energy strategy creates a major opportunity for Emano's precision-engineered plastic storage solutions. Like any innovation, however, the challenge is to give our customers confidence that they can invest in innovation without any compromise on safety or quality.

This is where the breadth of LRQA's expertise, integrity and reputation have been invaluable. The result is a better engineering solution that is more cost-effective for our customers – an outcome that can only make it more likely that Germany will be able to make its green hydrogen strategy work and meet its climate change goals.”

Emano turned to LRQA to certify both the design and manufacturing of these safety-critical storage tanks, with LRQA's surveyors required to look beyond European standards. Heino Axnick, Technical Quality Manager at LRQA explains:

“Given hydrogen's potential as a global energy solution, it made sense for Emano to take account of future export markets and new applications when considering safety and quality standards.”

“Our track record in design verification, testing and inspection and as the largest provider of ASME services outside of the US, ensured LRQA was well placed to support certification not just to PED Module B and Module F, but also ASME Class I, Section 10, which specifically focuses on fiber reinforced pressure vessels.”



YOUR FUTURE. OUR FOCUS.

About LRQA:

LRQA is a leading global assurance partner, bringing together decades of unrivalled expertise in assessment, advisory, inspection and cybersecurity services – underpinned by data-driven insights – to help its clients navigate a new era of risk.

Operating in more than 160 countries with a team of more than 6,000 people, LRQA’s award-winning compliance, supply chain, cybersecurity and ESG specialists help more than 61,000 clients across almost every sector to anticipate, mitigate and manage risk wherever they operate.

Get in touch

Visit www.lrqa.com/us for more information, email info-usa@lrqa.com or call **866 971 5772**



LRQA
2101 Citywest Blvd., Suite 100
Houston, TX 77042
United States

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