

The background of the entire page is a photograph of several large, cylindrical industrial storage tanks. The tanks are made of corrugated metal and have yellow safety railings at the top. They are set against a clear blue sky. The perspective is looking up at the tanks, making them appear tall and imposing.

**Hydrogen**

# Will a net zero future be powered by hydrogen?

LRQA



As the world grapples with the urgency of climate change, the transition to sustainable energy sources is no longer an option but an imperative.

When considering the available solutions – hydrogen stands out, not just for its potential but also for its versatility. Historically used across various different industries, hydrogen is now being viewed through a new lens – as a possible cornerstone of our net-zero future.

However, as with any transformative shift, the journey towards widespread hydrogen adoption comes with both challenges and opportunities. In this series, we delve into the complexities and possibilities of hydrogen and its role in a net-zero future. We'll explore where hydrogen fits in the broader energy landscape, the technological advancements that could drive further adoption and the importance of assurance in ensuring authenticity and sustainability.

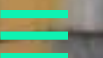


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# The role of hydrogen in a net-zero future

## One part of a broader solution

Hydrogen is poised to play a significant role in achieving a net zero future, but it is just one piece of a larger puzzle. The world has set ambitious targets to curb emissions and combat climate change and while hydrogen offers a promising avenue to help meet these goals, it is essential to recognise it as part of a more extensive solution. The established technology around hydrogen, including its production, storage, and transportation, means it's not just a promising idea but a solution ready for implementation now.

## Comparative advantages

The global transition to cleaner energy requires us to evaluate the potential of hydrogen in the context of available alternatives. The primary challenge lies in achieving net-zero objectives while maintaining the efficiency and economic feasibility of the solutions. The current reality is that addressing climate change might require consumers to accept higher energy costs, even if just in this transition phase.

Nevertheless, hydrogen boasts several distinct advantages over its counterparts. Unlike wind or solar energy, which demand vast land areas and specific environmental conditions, hydrogen operations can be more localised. It has the potential to significantly reduce carbon footprints in industries with high energy consumption, like steel production. Additionally, unlike some renewable sources, hydrogen can be produced in one location and consumed in another, thanks to its transportability using carriers such as ammonia or methanol.

While hydrogen might not singularly power a net-zero future, it will undeniably be a key player. Its technological readiness, adaptability across industries, and transportability make it a leading contender in the renewable energy landscape. However, a comprehensive approach that leverages all available renewable sources will be crucial for a truly sustainable future.

## Advancements in hydrogen production

The production technology for hydrogen has been around for many years, with techniques like electrolysis, SMR, and coal gasification being long-established. However, as the world eyes hydrogen as a potential primary energy source, there's a renewed emphasis on scaling up production while also making it cost-effective. For perspective, while the current global electrolysis manufacturing capacity stands at 14 gigawatts per year in 2023, future targets require a substantial jump to around 70 gigawatts annually. As a result, innovations are focused on enhancing production efficiency. Additionally, novel storage solutions are emerging, with solid storage solutions becoming more prevalent. An exciting development is the extraction of naturally occurring "gold" hydrogen from under the Earth's surface, although widespread commercial-scale operations may still be a decade or more away.





# Barriers to growth

## Financing & infrastructure remain a challenge

Today, the most significant challenge hindering hydrogen development is financing. Traditional financial models centred around oil, gas, and power don't readily apply to hydrogen. Projects in the hydrogen domain must be evaluated not just on financial feasibility but also on their potential climate impact and alignment with environmental, social, and governance (ESG) commitments.

Infrastructure poses another barrier. While setting up large wind or solar farms to power low carbon hydrogen plants, considerations must include upgrade costs for existing pipelines, the strategic location of hydrogen plants in relation to the grid and whether any blending will take place.

Despite these challenges, hydrogen does offer advantages like easier transportability and storage compared to other large-scale renewables. Lastly, a looming competency gap presents a significant challenge. With over a thousand potential projects in the pipeline, the industry needs skilled professionals familiar with hydrogen's unique characteristics and challenges.

## Addressing the competency gap

The rapid growth of the hydrogen sector demands a workforce skilled in the nuances of hydrogen production, storage, and usage. With projections suggesting an investment of up to 6.8 trillion US dollars in the hydrogen industry by 2050, the scale-up of operations is set to be immense. In response to this anticipated boom, several global institutions and universities are rolling out hydrogen-specific training courses, emphasising the need to upskill existing professionals and attract new talent, which highlights that there is a recognition of what is required to address the skills gap.

The industry is also grappling with a simultaneous surge in the oil and gas and mining sectors which is linked to the requirements of new energy. This is intensifying the competition for skilled professionals. Another significant concern is the evident gap between professionals nearing retirement and the number of fresh entrants in the sector, which is an issue that needs to be addressed with a degree of urgency.

As the hydrogen sector expands, it's introducing a new set of global and regional regulations and standards. Professionals making the transition into this realm need comprehensive training on these standards, focusing on areas like process safety risks, key metallurgy risks, and regulatory compliance. Various firms are taking the helm in addressing this competency gap, striving to ensure that best practices from other industries are integrated seamlessly into the hydrogen sector.

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# Ensuring authenticity and quality

## Tackling greenwashing through assurance

Greenwashing is an increasingly critical issue when considering sustainable energy sources. For the hydrogen sector, the risk is particularly pronounced because of the varied production methods, each with its own carbon intensity. Whether hydrogen is derived from natural gas, coal, or through electrolysis, the carbon footprint varies, especially when carbon capture and storage are considered. To combat greenwashing, transparency and consistency in reporting the carbon content of hydrogen are essential. Currently, the industry lacks a universally accepted method for assessing the green credentials of hydrogen, which is why many key players are talking about certificates of origin that certify and determine how green the hydrogen actually is.

While progress is taking place - there are still gaps in existing schemes. True success will lie in a global, consistent approach, which considers full lifecycle emissions, from the manufacturing of production equipment to the end-use by consumers, especially in international contexts where hydrogen produced in one country is utilised in another. Advocacy for a globally consistent approach to hydrogen certification is essential and organisations - including LRQA - are lobbying for policies that will establish a standardised approach, ensuring that claims of 'green hydrogen' are substantiated and globally recognised.

## The role of assurance in the supply chain

The hydrogen supply chain is at a critical juncture, facing the need for immense growth to align with net-zero commitments. The market for electrolyzers, a key component in low carbon hydrogen production, is projected to experience an almost sixfold increase to meet a 70-gigawatt

annual production target. Storage solutions, particularly those utilising innovative materials like glass-reinforced plastic (GRP), are also anticipated to see substantial growth, with a potential market expansion to 900 billion pounds by 2027.

However, the growth of the supply chain must not only be rapid but also sustainable and reliable. Delays in financing and project starts have provided a brief period for the supply chain to brace for the expected growth. Quality assurance will be crucial in this phase; it ensures that as companies scale up production, they do not compromise on safety and sustainability standards. By participating in global standards committees and working with manufacturers and end users, LRQA is striving to ensure that quality remains central to the expansion of the hydrogen supply chain, helping to ensure that it can produce equipment in vast quantities without sacrificing the integrity of the industry.

Building upon this foundation, the assurance role extends beyond monitoring to actively shaping supply chain best practices. As new players from diverse industries join the hydrogen market, there is a pivotal shift from retrospective quality control to embedding quality assurance early in the procurement and design process. This proactive stance involves comprehensive vendor assessments to engage with reputable partners, detailed design reviews to pre-empt issues, and robust standard specifications to ensure consistent understanding and implementation. Such pre-emptive quality measures are not merely about adherence but about cultivating trust and establishing a reputation for excellence in the hydrogen supply chain. The shift towards early integration of quality assurance practices marks a strategic move to fortify the industry's growth trajectory, ensuring it is equipped to meet the rising demand without compromising the safety and sustainability that are vital to its long-term success.



# Your partner for hydrogen projects

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 programme that ensures your equipment, products, activities, and supply chain operate in line with legal requirements, global standards, and industry best practices.



## Technical advisory

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



## Equipment inspection & certification

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



## Product inspection & certification

Ensure hydrogen products comply with standards, GHG reporting requirements, and best practices before market entry.

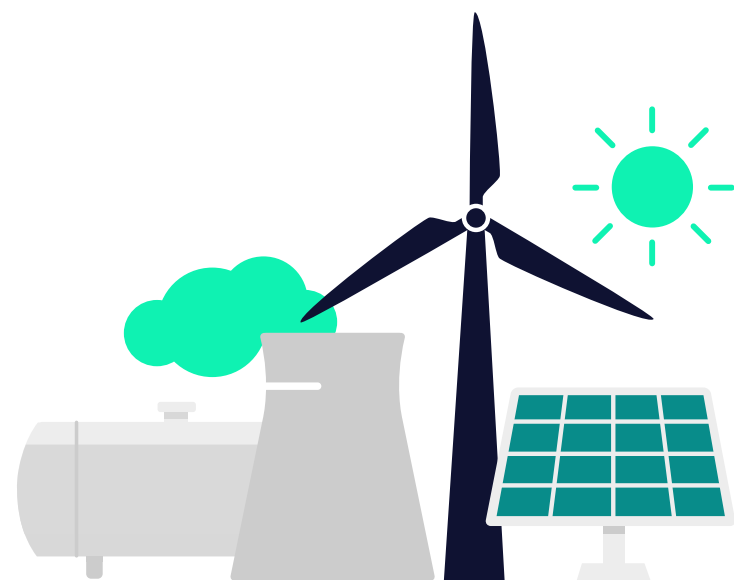


## Project & supply chain assurance

Maintain the integrity of your hydrogen supply chain to guarantee quality and safety throughout your projects.



# Why work with us?



## 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.

# Your energy transition partner

## Over LRQA:

LRQA is een toonaangevende wereldwijde assurance-partner, die tientallen jaren ongeëvenaarde expertise in assessment, advisory, inspectie en cybersecurity services - ondersteund door datagestuurde inzichten - samenbrengt om haar klanten te helpen door een nieuw risicotijdperk te navigeren.

LRQA's bekroonde specialisten op het gebied van compliance, supply chain, cybersecurity en ESG, die actief zijn in meer dan 160 landen met een team van meer dan 6.000 mensen, helpen meer dan 61.000 klanten in bijna elke sector om risico's te anticiperen, te beperken en te beheren, waar ze ook actief zijn.

## Neem contact op

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