



# Navigating the seas of hydrogen risk: key factors to consider

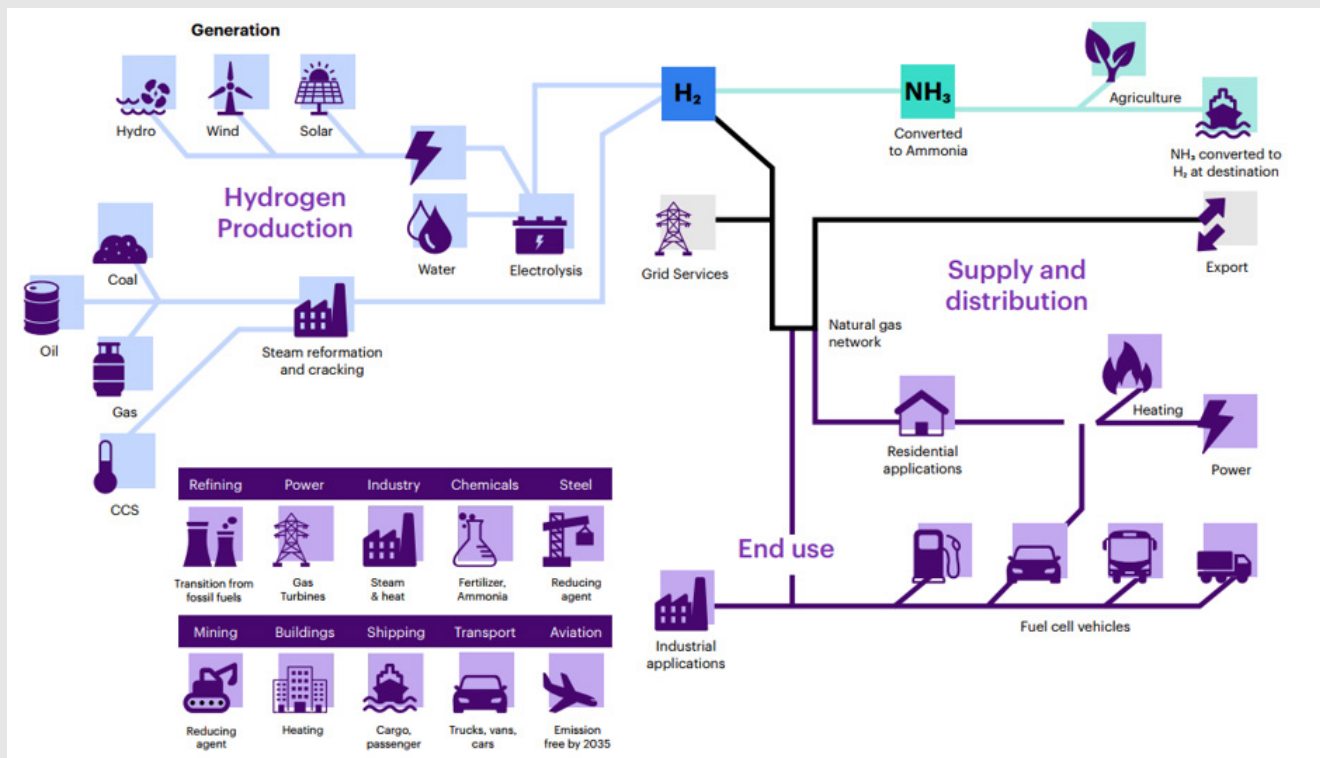
## Introduction: the supply & demand imbalance

Sanctions against Russia have created a restriction in the supply of natural gas to Europe without any abatement in demand; this is being seen by many as a catalyst for innovation and investment into renewable energy solutions. With a strong global focus on hydrogen, could this make a meaningful contribution to balancing the supply & demand issues experienced?

We are all acutely aware from COP27 that any change in the energy system doesn't happen overnight, and that transitioning the energy infrastructure takes time. We must then question what level of delivery is realistic in the short, medium and long term to strengthen the energy security of supply for impacted nations, in a stable, equitable, consumer or government-led energy transition.

We are now challenged with not only increasing, but also changing, the technologies used for delivering grid electrification. We are confident that hydrogen is poised to play an increasingly important role in the energy demand for heavy industrial applications such as steel, cement, aviation, and shipping, which are inherently more challenging to decarbonise, due to the large quantity of fast-deployable energy which is required in these industries. While renewable energy will have its part to play being integrated into the new Green hydrogen infrastructure, there are limited technologies which can be deployed to directly replace traditional hydrogen carbons. The hydrogen ecosystem, and the diverse applications, is shown in Figure 1 overleaf.

Figure 1: The hydrogen ecosystem



Source: WTW

## Fuelling the future

At COP27 Jonas Moberg, CEO of the Green Hydrogen Organisation commented that “Green hydrogen is one of the bright spots of this COP”<sup>1</sup>. Organisations and nations are racing to develop Green hydrogen strategies attracting strong interest from the international investment community, for example:

- Oil company Cepsa is to invest €3bn in 2GW Green hydrogen project in southern Spain<sup>2</sup>
- Michael Matheson has unveiled a £25 billion hydrogen plan for Scotland<sup>3</sup>
- India plans to introduce Green hydrogen mandates for heavy industry after passing enabling legislation<sup>4</sup>
- Scatec and partners are to develop a large-scale green ammonia facility in Egypt<sup>5</sup>

On the technology front, Alex Lua’s article elsewhere in this Review explores cutting-edge Japanese technologies for the transportation of hydrogen and what this means to this industry. Beyond the well-established and proven

electrolysis technology, the hydrogen industry is investing heavily and looking at how this technology can be integrated to replace generation sources, especially for carbon intensive industries.

Individual governments are now considering their own domestic strategies and actively planning and delivering national hydrogen technology hubs to focus the research, development, innovation, transportation, and commerciality of a hydrogen-enabled future. There appears to be no end to the ambition for hydrogen, with many projects being planned or in development, connecting renewable energy generation both onshore and offshore. Some concepts, including hydrogen production offshore, utilise seawater electrolysis which could create a new frontier for affordable green hydrogen<sup>6</sup>.

With changes and new technology applications comes risk; the insurance industry will have a critical role to play to supporting the Green hydrogen sector to navigate the seas of hydrogen risk.

<sup>1</sup> <https://www.energymonitor.ai/tech/hydrogen/cop27-green-hydrogen-is-one-of-the-bright-spots-of-this-cop-jonas-moberg-ceo-of-gh2/>

<sup>2</sup> <https://www.hydrogeninsight.com/production/oil-company-cepsa-to-invest-3bn-in-2gw-green-hydrogen-project-in-southern-spain/2-1-1364762>

<sup>3</sup> <https://www.heraldscotland.com/politics/23191997.michael-matheson-unveils-25-billion-hydrogen-plan-scotland/>

<sup>4</sup> <https://www.hydrogeninsight.com/policy/india-plans-to-introduce-green-hydrogen-mandates-for-heavy-industry-after-passing-enabling-legislation/2-1-1373860>

<sup>5</sup> <https://scatec.com/2022/03/10/scatec-partners-with-the-sczone-the-sovereign-fund-of-egypt-the-ministry-of-electricity-and-renewable-energy-to-develop-a-large-scale-green-ammonia-facility-in-egypt>

<sup>6</sup> <https://www.azocleantech.com/article.aspx?ArticleID=1607>

Figure 2: key hydrogen risk factors

#### Chemical Properties Risk

- Hydrogen Embrittlement
- Propensity to leak
- Ignition / Wide Flammability Range
- Ignition Energy

#### Organisational Risk

- Positive Material Identification
- Maintenance / Inspection Procedures
- Operating Procedures
- Personnel Competence

#### People Risk

- Lack of Specialist Availability
- Low Hazard Awareness
- Invisible Flame

#### Technology Risk

- Selection
- Proto-typical Technology
- Scale-up

#### Operating Environment Risk

- New Production Operations
- Transportation
- End-User Handling / Exposure

**“It’s New, but not really that new”**

Source: WTW

### Key factors in the hydrogen risk landscape

The process of hydrogen production will undoubtedly involve the concentration of hazardous and reactive chemicals, large electrical installations, rotating equipment, and the production/storage of flammable gasses. The corresponding loss drivers are likely to be fire, explosion, large electrical equipment faults arising from transformers and AC/DC convertors, power interruptions and rotating equipment failures from turbines, compressors and pumps. Generally, the overall risks for hydrogen operations are more sensitive to the operating environment than conventional fuels but many traditional risks remain, with heightened sensitivity due to the novel nature as deployment grows nature.

### Hydrogen risk evolution

These key risk factors are further exacerbated as the industry grows from current use states into the future operating environment, as evidenced by Figure 3 overleaf.

### Insurers and hydrogen

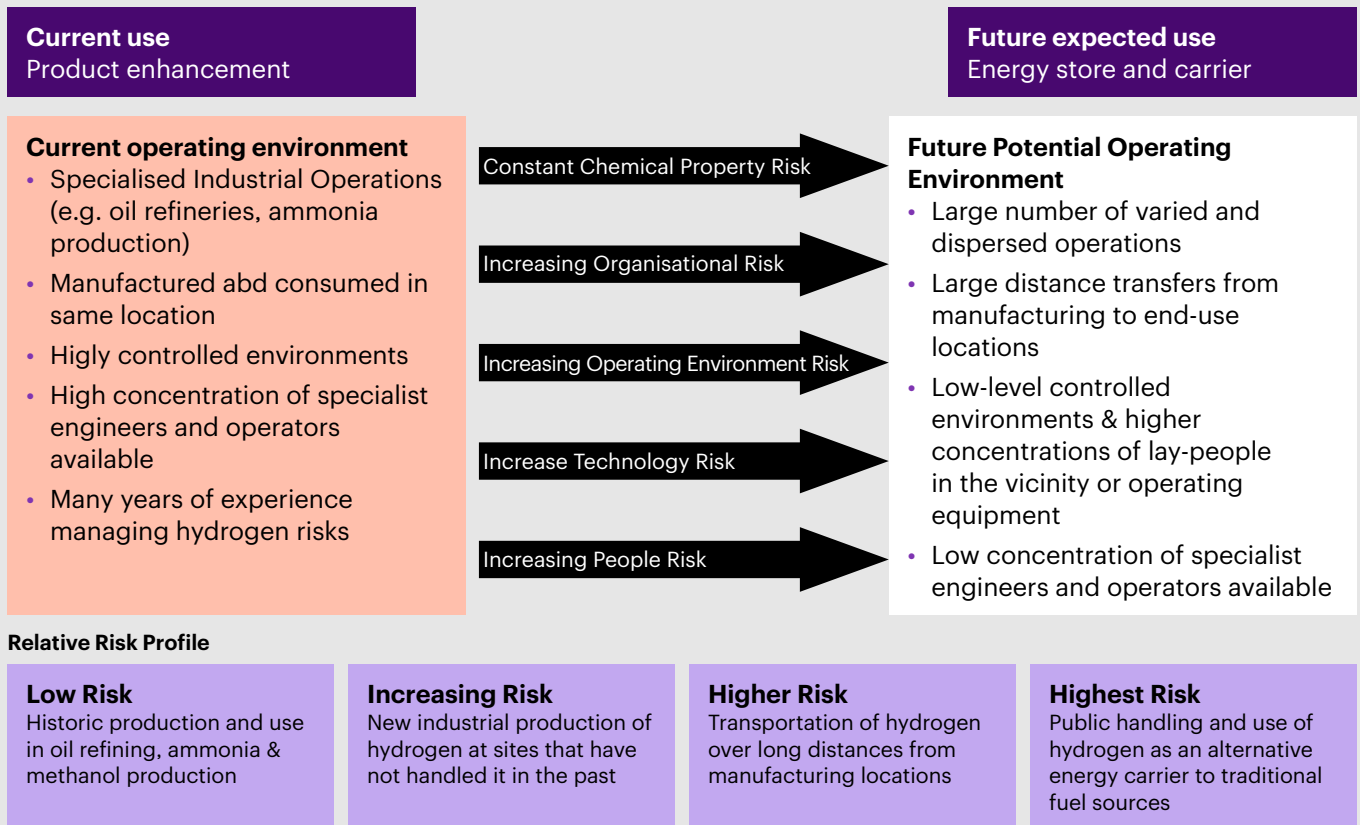
Green hydrogen has become a hot topic in the insurance market over the past twelve months as insurers race to understand the technical risks issues and align their insurance capital to support risk transfer in the sector. One of the challenges they have faced is how the risk fits in their underwriting portfolio. Energy & Power insurers tend to be product and class-driven, often split into Upstream, Downstream and Renewables. Is hydrogen as a class best suited to the Upstream, or Downstream sectors, both of which have a strong understanding or different parts of the technologies, assets and processes?

As a clean, low-carbon technology, Renewable Energy insurers will also have good technical understanding of hydrogen risks. They will relish an opportunity to contribute, particularly as they grow accustomed to the increasingly complex green electricity technologies being developed. However, they have a greater focus on Fire and Machinery Breakdown than the Explosion risk with which Upstream underwriters are more familiar and comfortable.

To address this question, WTW conducted a survey of over 25 major global insurers in the market to understand their appetite for underwriting hydrogen across the colour spectrum, identifying the key “seats of authority” to make decisions. This exercise and its subsequent analysis showed that for Green hydrogen there is generally an air of caution, due to the new nature of the technology. Most insurers are willing to review risk submissions to see where and how they could support; it is clearly recognised that many of their clients are going into this area, and they need to play a role to support this development. Several insurers are figuring out where best the risk sits, aligned to with the various technologies harnessed with the hydrogen rainbow, while others have formed dedicated teams to address the sector. It’s not simply a question of Upstream, Downstream or Renewables, but this knowledge and access points are key to unlocking the available insurance capacity.

Certainly, there is a need for greater collaboration, both across the insurance market and the hydrogen industry itself. The closer that insurers and brokers can get to the technology the better, as will lead to the more innovative solutions needed. Effectively matching insurance capacity to project risk, during both the construction and operation phases of the facility, will be key to de-risking a project and driving bankability in the sector.

Figure 3: the evolution of hydrogen risk



Source: WTW

### Developing a hydrogen risk and broking hub

Beyond building an understanding of the insurance market's approach to hydrogen, some risk intermediaries (working with all clients associated with the developing industry) have formed inter-disciplinary teams to provide client-focused risk advisory and insurance transactional solutions for this sector. The goal is to deliver intuitive hydrogen risk solutions in response to the range of regulatory, investor, consumer and operating pressures faced by the industry across the entire lifecycle.

The benefits of this are:

- Holistic project risk support through the development, construction, and operational phases of the project lifecycle
- Expert support for the contractual risk matrix and project debt financing
- Data and analytics underpinning the risk engineering solution
- Specialist sector insurance knowledge helping to achieve the lowest overall cost of risk
- Access to a connected, global network supporting the client's local interactions in all territories for this speciality industry sector

### Helping to become the technology of the future

The race is on to develop the hydrogen ecosystem; while the technology itself is not new, the applications of it are. Projects are exponentially increasing in size and complexity, so maximising the solutions available from the insurance industry are going to be critical for buyers to support the successful delivery and support the goal of a Net Zero society.

Risk intermediaries should be aiming to facilitate efficient and effective risk advice and innovative solutions for this industry, providing global finance with the confidence to invest in these projects which are supported by companies in all parts of the Upstream, Downstream and Renewable Energy sectors. We believe that hydrogen will be one of the answers to balancing the current geopolitical supply & demand imbalance, contributing to future-proofing a secure green electricity production sector, particularly for heavy industries with high load capacity demands.



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