
Speedy Hire
HYDROGEN
SOLUTIONS
HARNESSING THE
FUEL OF TOMORROW
In partnership with
AFC Energy

CONTENTS

FOREWORD

As annual temperature records tumble and extreme weather events become more common, the need to embrace a greener, more sustainable future has never been clearer. And for many, this future lies in hydrogen.

Hailed as the fuel of tomorrow for its longevity and versatility, in this short report, we'll examine hydrogen's place in the UK energy landscape and especially within the construction sector. Looking at current adoption levels and forthcoming plans and policies, we'll explore its potential and consider some of the main challenges that lie ahead.

Today's slow hydrogen adoption is often blamed on several factors: high costs, low availability and a distinct lack of infrastructure. Addressing these obstacles is the first step to overcoming them and preparing for a hydrogen-rich future.

The construction industry is a crucial contributor to the UK economy, but currently, the vast majority of energy being used on-site is generated by diesel. The built environment and construction sectors account for almost 40% of global carbon emissions. This makes decarbonisation of the sector essential if it is to successfully contribute to the UK's net zero target.

This net zero transformation presents a significant opportunity for the sector, and a chance for those businesses working within it to make a bold statement. Those innovative thinkers willing to take the first steps have the potential to reap not just environmental but also commercial benefits as they lead the charge towards sustainability.

We're proud to be amongst these pioneers, making the fundamental changes needed and bringing the issue of energy and hydrogen in construction to the forefront.

Only by initiating these conversations can we bring about discussions, debate and ultimately, the changes required.

Adopting greater hydrogen use doesn't have to cost the earth. But ignoring the issue most certainly will.

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Hydrogen is the most abundant element on earth.

It is the simplest in the periodic table and is firmly in the spotlight as an energy alternative in the UK and beyond.

It's set to play a significant role in the future energy mix and specifically net zero goals: more than 40 countries have now published hydrogen strategies and it's estimated that hydrogen could account for up to 22% of final global energy demand in 2050[1].

[1] *https://hydrogencouncil.com/wp-content/uploads/2021/11/Hydrogen-for-Net-Zero.pdf*

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CHAPTER 1
HYDROGEN USE TODAY

GROWING CONFIDENCE IN HYDROGEN

In the UK, current hydrogen production stands at about 700,000 tonnes (29 TWh), but the vast majority – about 99% – of this is grey hydrogen. (In comparison, the current production levels in the US stand at approximately ten million tonnes per annum, around 95% of which is grey.) However, the government has ambitious plans to not only increase production in the UK, but make it greener too.

The UK's 2021 Hydrogen Strategy set a target of developing the capacity to produce 5GW of low-carbon hydrogen by 2030, a figure that was doubled to 10GW (or 1.5 million tonnes) just a year later with a commitment that at least half would be green. In December 2023, the government further confirmed its confidence in hydrogen by announcing a large-scale project to create 11 green hydrogen-production hubs, the largest number of commercial-scale green hydrogen production projects at once anywhere in Europe. Globally, analysts predict over 30GW of green hydrogen production in 2025, rising to 114GW by 2030[2].

This distinction between grey and green hydrogen is important because it's green and blue hydrogen that has the potential to reduce emissions and decarbonise sectors such as construction, fast.

What is green hydrogen?

Green hydrogen refers to hydrogen produced through a process known as electrolysis. It involves splitting water molecules (H_2O) into hydrogen (H_2) and oxygen (O_2) using electricity generated from renewable sources like wind, solar, or hydropower.

At the other end of the spectrum is grey or black hydrogen, which is generated from natural gas via steam reformation, relying on fossil fuels (natural gas) as a feedstock.

[2] *https://www.advisian.com/-/media/files/global-perspectives/green-hydrogen-today-tomorrow-and-2030/green-hydrogen-today-tomorrow-and-2030.ashx*

THE COLOURS OF HYDROGEN

GREEN HYDROGEN

This is the most sustainable method as it involves no carbon dioxide emissions at all. It uses the electrolysis of water powered by renewable energy, such as wind or solar.

BLUE HYDROGEN

This is produced from natural gas, via a process called steam reforming producing water and carbon dioxide. For it to be called blue hydrogen, the carbon dioxide produced needs to be trapped and stored, via a process called Carbon Capture and Storage (CCS).

PURPLE OR PINK HYDROGEN

This is hydrogen produced from electrolysis powered by nuclear energy.

GREY OR BLACK HYDROGEN

This is produced from natural gas or methane, via a process powered by fossil fuels. The carbon dioxide made in the process is emitted into the atmosphere.

CHAPTER 2
THE CHALLENGES

We've already established that the construction industry is highly dependent on diesel: according to the Construction Leadership Council[3], there are over 300,000 pieces of Non-Road Mobile Machinery (NRMM) on UK construction sites, consuming about 2.5 million tonnes of diesel a year, as well as thousands of diesel generators. Add in the 2.07 million tonnes of diesel used to transport construction materials to and from site, and it becomes clear that any attempts to transition towards a greener option will come with challenges.

The construction sector's reliance on diesel is just one of the barriers that stands in the way of more widespread hydrogen adoption. Other considerations include availability, cost and public perception. Let's examine these in more detail.

HYDROGEN AVAILABILITY

The government has admitted that meeting its 2030 hydrogen targets will require rapid and significant scale up over coming years. And while ambitious projects and significant investment have been announced, questions are still being asked about our capacity to produce the levels of low-carbon hydrogen needed. The important distinction here is 'low-carbon hydrogen' – that is green or blue hydrogen, which has no, or fewer, emissions.

According to experts, producing 10GW of green hydrogen using renewable power would take around half of the UK's planned offshore wind capacity[4] and the carbon capture and storage technology needed to produce blue hydrogen isn't yet available at the scale required. Nevertheless, the UK Hydrogen and Fuel Cell Association (UK HFCA) is confident that with the right policy support and ongoing commitment, the targets can still be met.

REDUCING DIESEL USAGE

The UK has committed to reaching net zero in stages, reducing emissions by 68% by 2030 and 78% by 2035, before hitting net zero carbon by 2050.

The Building Research Establishment (BRE) - a significant centre of building science in the UK - estimates that the sector currently uses a billion litres of diesel every year. This must be eliminated or at the very least reduced.

The Construction Leadership Council's Zero Diesel Sites Route Map sets out a clear course of action to see the number of diesel-powered construction vehicles and machines fall by 78% by 2035, which includes the adoption of sustainably produced hydrogen alongside biofuels and other cleaner fuels.

Already, more hydrogen-powered equipment is being brought into use and BRE has said it expects that within 10 years all construction plant over 10 tonnes will be powered by hydrogen.

[3] *https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2023/06/Zero-Diesel-Route-Map-June-2023.pdf*
[4] *Why the UK's hydrogen strategy does not add up - New Statesman*

THE CHALLENGES

COST

Lack of infrastructure is frequently cited as a barrier to hydrogen adoption at scale but the use of fuel cells goes some way to overcoming this as the hydrogen for refuelling can be delivered via road, without the need for extensive pipelines. However, high costs remain an issue and, in this regard, we find ourselves in a 'chicken and egg' situation. Currently, relatively low usage means costs are prohibitively high for the small and medium-sized enterprises that make up 99% of businesses in the UK construction industry[5]. Manufacturing and adoption need to increase significantly to bring down these costs – but this will only happen when more contractors commit to hydrogen power and production can be scaled.

The transition therefore must be driven by the bigger players in the market who see hydrogen as part of their long-term sustainability strategy. If this happens, the price of green hydrogen is forecasted to half in the next 10 years.

PUBLIC PERCEPTION

Hydrogen also faces a social challenge. Public disasters have given hydrogen a reputation for being explosive and volatile. Though it is highly flammable, other gases such as gasoline fumes actually pose a greater risk. Hydrogen disperses rapidly in open air, whilst heavier gases hover nearer the ground and become more concentrated. And it's impossible for a hydrogen tank containing only hydrogen to ignite because there is no oxidiser (such as oxygen) present.

FEAR OF CHANGE

Another significant yet less tangible barrier is the fear of change. Machinery and plants have been run off diesel for generations; it's a familiar process with known costs and confirmed reliability. Hydrogen brings a wealth of benefits but a lot of unknowns and any requirement for significant reskilling will be a further obstacle. Therefore, new technologies must deliver an experience that is as similar as possible to what operators are used to in order to make the transition as smooth as possible.

> ***"If these challenges can be overcome, and there is every reason to be optimistic, there is a bright future for green hydrogen as a renewable, clean source of energy."***

[5] *https://www.fmb.org.uk/news-and-campaigns/key-facts-and-figures.html*

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CHAPTER 3
THE HYDROGEN SOLUTION

Whilst there are undoubtedly challenges to overcome, simply continuing as we are is not an option. Without serious action our planet is in danger: reducing emissions has to happen and it has to happen now.

Fossil fuels are by far the largest contributor to global climate change, accounting for over 75% of global greenhouse gas emissions and nearly 90% of all carbon dioxide emissions[6]. The construction sector in the UK alone is responsible for around 50 million tonnes of carbon dioxide emissions[7]. The way forward is clear – if we're to make any significant reduction in emissions, we have to end our reliance on fossil fuels.

Renewable energies are an obvious alternative but their lack of reliability is a significant disadvantage. This leaves hydrogen as the only scalable solution that can meet our energy needs and targets long term.

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THE ADVANTAGES OF HYDROGEN

Clean, versatile and scalable, hydrogen ticks many boxes when it comes to sustainable energy solutions, especially for the construction industry:

- **ZERO EMISSIONS –** the only byproducts when hydrogen reacts in a fuel cell are water and heat, there are no carbon dioxide emissions, other particulates or harmful pollutants released. As well as reducing the carbon footprint on site this also helps to improve the air quality.
- **VERSATILE –** hydrogen-powered machinery and equipment can be easily transported across construction sites without the need for extensive refuelling infrastructure. This flexibility allows for equipment to be used in various locations, optimising efficiency and construction processes.
- **RELIABLE –** unlike other renewable energy sources such as wind and solar, the production of electricity from hydrogen is not weather-dependent. It can also be stored for later use, providing a consistent and reliable energy supply, even in remote locations.
- **QUIET –** equipment powered by hydrogen fuel cells tends to operate more quietly than traditional combustion engines. Not only does this provide a quieter, more comfortable environment for workers, but it reduces the impact of construction on nearby residents.
- **EFFICIENT –** hydrogen's energy content per unit mass surpasses conventional fuels and, when used in fuel cells, it converts chemical energy directly into electricity with an efficiency rating of 60% - compared to only 20-25% of combustion engines.
- **MARKET LEADERSHIP –** adopting hydrogen power positions your company at the forefront sustainable construction practices. This approach can enhance your reputation, increase your competitiveness in tenders, and demonstrate your commitment to environmental stewardship, potentially opening up new business opportunities.

A COMMERCIALLY-SOUND DECISION

Embracing hydrogen makes sound business sense. Sustainability is fast becoming integral to corporate success and investing in hydrogen aligns with environmental, social, and governance (ESG) strategies, demonstrating a commitment to reducing carbon footprints and promoting clean energy.

Companies that are willing to take the lead on this are perceived as bold and innovative in other ways too – an image that resonates with customers, investors and stakeholders.

[6] *https://www.un.org/en/climatechange/science/causes-effects-climate-change*
[7] *https://assets.publishing.service.gov.uk/media/631222898fa8f54234c6a508/20220901-Carbon-Net-Zero-Guidance-Note.pdf*

CHAPTER 4
MANAGING THE TRANSITION

Acknowledging and accepting the benefits of hydrogen as a fuel is one thing, encouraging and implementing its use is another, especially in an industry where the consumption of diesel is so embedded.

DRIVEN BY INCENTIVES

A blend of government policy and customer demand will turn the tide on hydrogen.

Several major tenders, like HS2 and Lower Thames Crossing, are specifying reduced carbon solutions and in response, larger contractors are already starting to ask for zero-carbon alternatives to traditional equipment. As net zero deadlines get closer, clients, shareholders and investors will increasingly demand the use of reduced or zero-carbon solutions, meaning companies that don't adapt will be less competitive and find it increasingly difficult to win new work.

In some countries across Europe, bids for public tenders are now weighted by emissions, so the more expensive 'clean' options aren't priced out by cheaper ones with higher emissions. In these cases, not adapting means some companies won't be eligible to bid for major public work.

Policy changes have nudged the process along too: from April 2022, new legislation came into force in the UK designed to incentivise users of polluting fuels, such as diesel, to improve energy efficiency, invest in cleaner alternatives and to use less fuel. The regulations removed the construction industry as a sector entitled to use cheaper red diesel, meaning since then, all construction activities have had to pay full white diesel prices.

THE TECHNOLOGY OF TRANSITION

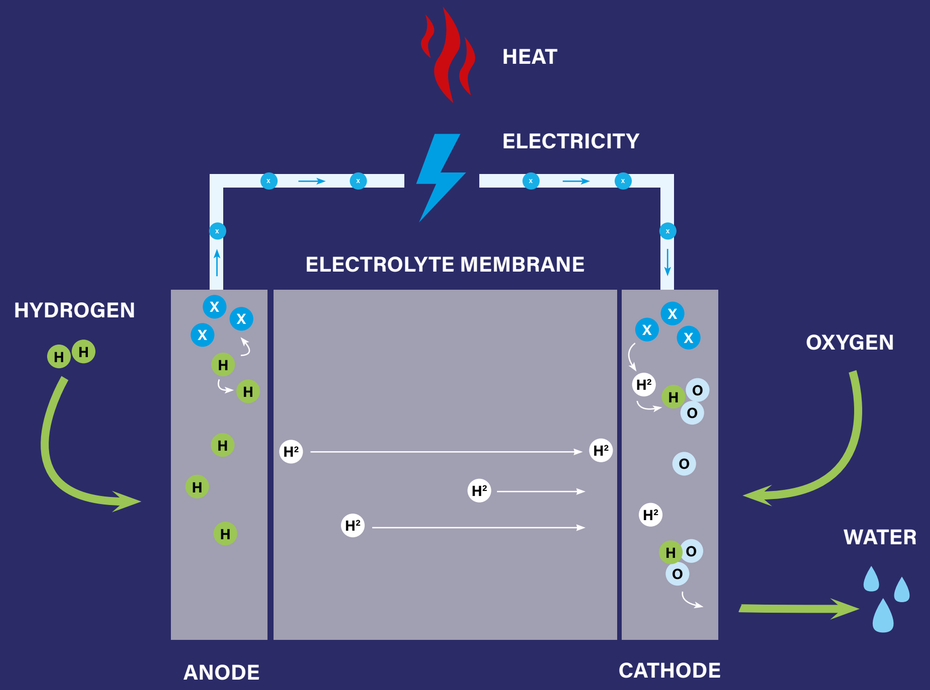
Many believe the transition of construction plant to hydrogen power will be similar to the pattern set by electric cars, with existing equipment first being converted to dual-fuel hydrogen/diesel before fully hydrogen-powered plant is developed. Certainly, there is focus on hydrogen internal combustion engines (ICE): manufacturers such as JCB and the American engine manufacturer Cummins are investing considerable amounts in the development of super-efficient, emission-free engines.

But ICE isn't the only option and global players like Volvo, Hyundai and Caterpillar are also exploring the use of hydrogen fuel cells in commercial vehicles and machinery. These use a chemical process to convert hydrogen and oxygen into electricity, heat and water and work in a similar way to batteries but, while a battery stores energy for future use (and needs regular charging), a fuel cell generates it.

There's a place for both and it's likely they'll be used in tandem, along with battery power, at least in the first stages of the transition.

How do hydrogen fuel cells work?

1. Compressed hydrogen gas is fed into the fuel cell.
2. At the negative side (anode), a catalyst causes hydrogen to split into protons and electrons.
3. The protons move through an electrolyte membrane while the electrons are forced to flow through an external circuit, creating an electric current.
4. At the positive side (cathode), oxygen combines with protons and electrons to form water.



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CHAPTER 5
THE QUESTIONS THAT MATTER

WHY DO WE NEED TO ADOPT HYDROGEN NOW?

The UK has committed to reducing emissions significantly by 2035, and achieving net zero carbon by 2050, necessitating drastic future cuts if high emissions persist. Construction will play a huge role in achieving this. We can't afford to *not* start using hydrogen.

WILL A LACK OF INFRASTRUCTURE HOLD BACK HYDROGEN PLANS?

Global warming mitigation requires promptly reducing cumulative emissions, yet low adoption and inadequate infrastructure form a vicious cycle that forward-thinking companies must break by adopting the technology and demonstrating demand.

HOW ACCESSIBLE IS HYDROGEN TODAY?

Hydrogen is increasingly accessible for various industries, with specialist suppliers like Speedy Hydrogen Solutions offering mobile refuelling solutions that can be delivered directly to project sites, even in remote locations.

The network of fixed hydrogen filling stations is also expanding, particularly in urban areas, making it easier for businesses to integrate hydrogen power into their operations. While costs are currently higher than traditional fuels, they are rapidly decreasing as production scales up and technology improves, making hydrogen a viable and practical energy solution for forward-thinking companies.

SO, WHY ISN'T EVERYONE USING HYDROGEN IF IT'S SUCH A GOOD SOLUTION?

There are barriers to adoption but hydrogen is the only scalable solution that can meet our energy needs and net zero targets long term. Usage will increase over time.

CHAPTER 6
SPEEDY HIRE & AFC ENERGY

With ambitious targets comes the need for meaningful action. Introducing Speedy Hydrogen Solutions, our dedicated hydrogen-powered generator plant hire business.

In collaboration with energy-tech pioneers AFC Energy, Speedy Hydrogen Solutions offers a full-service hire model, coordinating the generator equipment, maintenance, technical support, site preparation, and fueling.

It's the latest step in our strategy to make hire an even more sustainable solution, better for people and the planet.

H-POWER HYDROGEN GENERATORS

AFC Energy shares our values and commitment to sustainable energy and together, we're on a mission to transform the construction industry into a more environmentally responsible sector, one hydrogen-powered generator at a time.

Unlike other products, which run off combustion engines converted to take hydrogen, the H-Power generator is powered by fuel cells and has been specifically developed for the construction and temporary power market. As a replacement for a generator up to 60 kVA, it has several advantages that can help businesses become more efficient and environmentally friendly.

In addition to the Hydrogen Solutions range of generators, we also hold the first hydrogen boom available in fleet, the Niftylift HR15H2E.

SIGNIFICANT INVESTMENT

We've made a multi-million pound investment in AFC Energy's H-Power generators as part of our commitment to encourage the wider adoption of hydrogen generators in construction. As technology advances and market demand grows, we plan to scale up our offer with even more machines.

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GET IN TOUCH

Speedy Hire is the UK and Ireland's leading provider of tools, specialist equipment and services.

Contact us to introduce Hydrogen Power Solutions to your business.

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