Five minute read

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Leading the industry's hydrogen revolution

GeoPura hydrogen generator and renewable energy solutions at Connect Roads M77 / Glasgow South Orbital contact

Imagine construction sites powered by the most abundant element in the universe - hydrogen. A future where every piece of equipment, from handheld tools to cranes, is powered by zero emission hydrogen fuel, construction sites are free from harmful exhaust fumes, the air is cleaner and noise is reduced.

While this vision of transforming one of the most polluting - yet critical - industries is almost within touching distance, we still face hurdles; including how to increase the supply of hydrogen and ensure its safety – our number one priority.

With the impacts of climate change accelerating and decarbonisation deadlines looming, action is essential.

If you would like to find out more, please read on or connect with me via LinkedIn and contact me via direct messenger.

How can we quickly address issues and deliver hydrogen to construction sites?

1 Transparent categorisation and strategic direction

Balfour Beatty's 'fuel hierarchy' clearly ranks fuels based on their environmental impact, moving to less preferred options only when better alternatives have been explored. The UK needs a similar approach for hydrogen, with a clear system to categorise different hydrogen sources and consistent emissions factors for each different production method. This will help us understand which hydrogen sources are truly sustainable. We must also decide whether to focus on importing large quantities of hydrogen, producing it locally on a smaller scale, or a combination. This decision will be crucial in shaping investment and development in the sector. See page 3 for more information about Balfour Beatty's fuel hierarchy.

2 A hydrogen fuel levy

The supply of green hydrogen - produced from renewable sources - is inconsistent. For hydrogen producers to meet growing demand and remain viable, supply must increase in line with industry needs. The unreliable availability of hydrogen gas is also an obstacle to the widespread adoption of hydrogen vehicle retrofits, which are crucial for cutting our reliance on diesel. Our suggestion is a commercial enabler, such as a hydrogen fuel levy, to make hydrogen economically viable and a practical alternative to diesel. This could include providing subsidies or incentives to reduce costs and promote infrastructure development, similar to the UK's Carbon Price Support under the Climate Change Levy, which effectively reduced carbon emissions by raising the cost of fossil fuels. We also need a clear roadmap for investing in hydrogen infrastructure, outlining incentives for building more hydrogen refuelling stations to help decarbonise heavy goods vehicle fleets. See page 4 for our case study on how Balfour Beatty is Accelerating adoption on the M77 / Glasgow South Orbital contract.

3 Safety guidance

Due to hydrogen's high flammability and tendency to leak, having thorough safety standards in place is crucial to prevent accidents and keep workers safe. This guidance should address safe storage, handling procedures, and emergency protocols specifically for hydrogen. Well-defined regulations will not only ensure that safety measures are followed but also build confidence in hydrogen's use, paving the way for its wider adoption in the industry. We have used the experience from our hydrogen trials to develop our own technical procedure on hydrogen deployment, which we have shared with the Health and Safety Executive (HSE), with the aim of contributing to the development of industry-wide standards. See page 5 for our case study on Pioneering safe hydrogen deployment.

We're committed to leading the way in adopting hydrogen technology. Our focus is on using hydrogen on our sites, showcasing its benefits, and driving innovation across our supply chain: but overcoming the challenges will take a united effort from everyone in the hydrogen ecosystem - government, manufacturers, and all other stakeholders - to turn the vision into reality.

Case Study

Balfour Beatty's fuel hierarchy

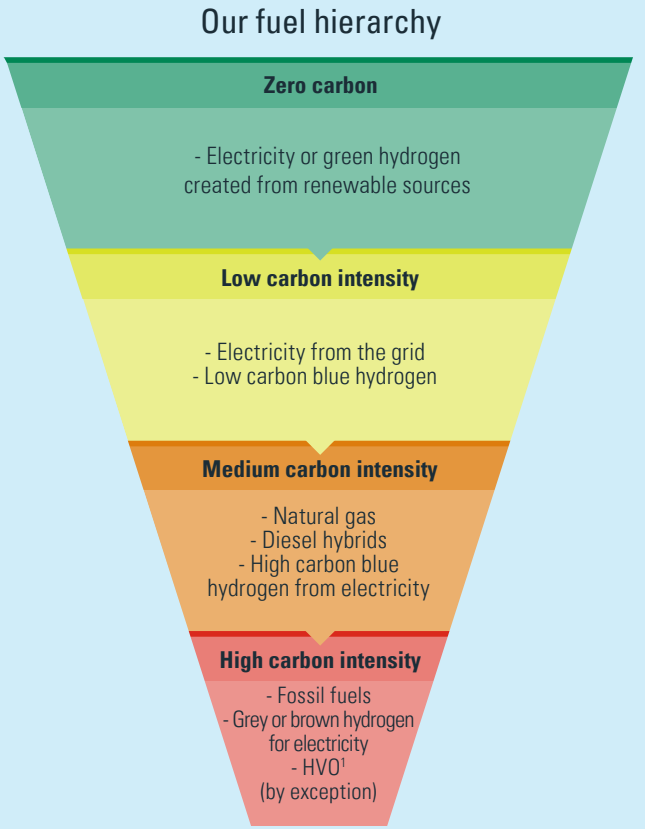
At Balfour Beatty, our commitment to sustainability and innovation is embedded in the way we choose and use fuel across our operations. Central to this commitment are our fuel hierarchy principles, which guide us in selecting the most appropriate and sustainable energy sources for our plant, equipment, vehicles and buildings.

Our fuel hierarchy is outlined in the diagram opposite. We have shared this with our colleagues, customers and supply chain partners; reflecting our collaborative approach to sustainability, our transparency and leadership in promoting sustainable practices across the sector.

At the top of our hierarchy are electricity and green hydrogen derived from renewable sources. These are the fuels we prioritise because they align most closely with our goals of reducing carbon emissions and fostering environmental stewardship.

In 2023, we made significant strides in this area by generating 109 MWh of energy from green hydrogen. To put this into perspective, that's enough energy to power approximately 37 UK households for an entire year. This achievement is not just a milestone for Balfour Beatty; it's a clear indicator of what's possible when we embrace innovative solutions and put our sustainability principles into action.

As we continue to explore and expand our use of sustainable energy sources, our fuel hierarchy will be a crucial tool in our journey towards a more sustainable future.



[1] Based on the 2022 DEFRA average GHG emissions value for HVO fuels, which includes the emissions released during the combustion of fuel. It does not account for the unknown impact of HVO on forest clearance and marshland drainage.

Case Study

Accelerating hydrogen adoption on the M77/Glasgow South Orbital contract

Alongside electricity from renewable sources, green hydrogen offers the lowest carbon solution for fuelling plant, equipment, and vehicles. Although green hydrogen (created from renewable sources) technology is still in its early stages, we are actively collaborating with customers, UK government and our supply chain partners to accelerate its adoption. Through live trials, we aim to establish a robust green hydrogen supply chain and demonstrate that hydrogen can support organisations in decarbonising effectively today. For example, the Scottish Government has provided over £240,000 from its Emerging Energies Technology Fund, with Balfour Beatty match-funding the scheme, to allow Balfour Beatty to retrofit two gritter HGVs and one Impact Protection Vehicle (IPV). This allowed these carbon-intensive vehicles to run on both hydrogen and diesel on our Connect Roads M77/Glasgow South Orbital contract, with a 26% reduction in carbon emissions from the three retrofitted hybrid engines.

The Connect Roads M77/GSO depot in East Renfrewshire also became Scotland's first 'Hydrogen Construction Hub', where Balfour Beatty facilitated quarterly sessions during the first year of the trial to allow customers, supply chain partners and other key stakeholders to hear about the progress and performance of the three retrofitted vehicles and see them in action.

Initiatives like the M77 retrofit are crucial stepping stones in introducing hydrogen to the industry and making it a mainstream solution. However, we couldn't have achieved this without the generous funding from the Scottish Government. The work we have done on this site will inform the budget and costings to validate our 2030 and 2050 carbon reduction targets, as per the ambitions in our UK Carbon Reduction Plan.

Scan the QR code to read our recent blog on Balfour Beatty's fuel decarbonisation effort.

We're fuelling our decarbonisation effort by retrofitting heavy goods vehicles with a hybrid hydrogen system

Case Study

Pioneering safe hydrogen deployment

At Balfour Beatty, achieving Zero Harm will always be our number one priority. Hydrogen gas, classified as a 'Dangerous Substance' under the UK's Control of Major Accident Hazards (COMAH) Regulations 2015, requires meticulous management. However, since hydrogen is a relatively new fuel on construction sites, the industry is still developing the necessary safety protocols.

In our quest for cleaner energy solutions, we have conducted a number of trials with hydrogen-powered equipment, including tower lights, static power generation systems, and heavy goods vehicles modified to run on a hydrogen-diesel mix. From these trials, we have developed a comprehensive set of internal policies and guidelines to address the unique challenges posed by hydrogen gas and ensure its safe deployment. This includes strict compliance with our electrical and mechanical safe systems of work, as well as conducting detailed fire risk assessments specifically tailored to hydrogen's properties. These controls are designed to mitigate the risks of fire or explosions involving hydrogen, whether for powering mobile plant equipment, generators, or refuelling stations. Our procedures cover critical aspects such as site location, storage protocols, workforce training, signage, emergency procedures, and more, all in full compliance with current legislation and industry standards[1].

To support the broader adoption of hydrogen fuel across the sector, we are engaged with the Health and Safety Executive (HSE) and have shared our procedures and insights with them. By doing so, we aim to contribute to the development of industry-wide standards, helping others benefit from our experience and facilitating a quicker, safer transition to hydrogen across the whole sector.

[1] Guidance our procedures are compliant with includes: DSEAR (Dangerous Substances and Explosive Atmospheres Regulations) COMAH (Control of Major Accident Hazards Regulations 2015) BCGA, (British Compressed Gases Association) ADR (Agreement concerning the International Carriage of Dangerous Goods by Road)

Mobilisation of hydrogen fuel cell generator at A63 Castle Street Improvement Scheme

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