

Adelan: Fuelling the transport solutions of the future

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While no single energy source, fuel or technology is expected to solve every environmental challenge, hydrogen and fuel cells are emerging as critical elements of the UK's energy transition - the journey towards a clean, low-carbon UK energy system.

One company leading the hydrogen revolution is West Midlands-based [Adelan](#), which has been developing hydrogen technology for over 30 years. The firm develops low-carbon generator products based on its unique fuel cell system, as well as green hydrogen generators. Adelan is building strategic partnerships with customers looking to decarbonise their products and businesses.

Adelan is led by Dr Michaela Kendall, the UK Hydrogen Champion who plays a key role in building national fuel cell strategies. Over a 30-year career, Dr Kendall has secured more than \$40 million in funding, working with powerful strategic policy and technical networks vital to low-carbon businesses that can deliver energy transition, including the US EPA, the UN, the EU and national governments.

Leading a hydrogen technology-based energy revolution

Adelan is currently leading on UK fuel cell policy with national and regional players in the Midlands. Through the Clean Futures Accelerator programme, the firm is demonstrating and integrating its hydrogen-ready fuel cell technology on different transport applications at the Black Country Innovative Manufacturing Organisation's (BCIMO) Very Light Rail National Innovation Centre in Dudley, West Midlands.

The firm is seeking collaborative partners in the transport industry to address the energy challenges facing the sector and to scale up practical solutions. The technology provides stationary and propulsive power, and is especially useful off-grid.

Adelan's technology, a hydrogen-ready Solid Oxide Fuel Cell (SOFC), is a highly energy-efficient power generation system that generates energy by chemically reacting fuel and oxygen, and supplies both heat and electricity. However, unlike many fuel cell technologies, Adelan's fully patented and scalable technology gives the fuel cell the ability to run on a range of commonly available low molecular weight hydrocarbon fuels too like propane, propane/butane mix, LNG and natural gas – as well as industrial hydrogen, the less pure form that is already produced around the UK.

It's widely acknowledged that scaling up hydrogen infrastructure will require significant time and substantial investment and this multi-fuel capability allows operators to gain all the advantages that fuel cell technologies offer while the hydrogen sector scales. It saves money too, because it uses less fuel.

With the Adelan system able to run on hydrogen and other fuels, this unprecedented operational flexibility delivers substantial ease of use benefits whilst retaining a small, compact and lightweight footprint.

Turning challenges into opportunities

While some have lamented the UK's net zero climate targets and their implications for businesses, there are also unique opportunities for innovation and enterprise, as Dr Kendall explained: "I've heard people say in meetings that climate change regulations are going to be the death of industry in the Midlands and that may be a view that some people have locally. However, I see it as the complete opposite. I think hydrogen technology is a huge opportunity for the Midlands because we have this incredible manufacturing ecosystem, knowledge base and then an innovative manufacturing space with connections between universities, new engineering companies, manufacturers and more. So, for me, it's the ideal place to take advantage of this opportunity and build national capabilities."

She added: "The UK has got to move on, not just for the industrial benefits, but also because we need these technologies to solve climate change. We're seeing in the investment world that investors have already turned a corner and are divesting away from fossil fuels and combustion technologies and are actively funding in the clean tech space, so things like carbon-reducing technology, fuel and energy efficiency are becoming more considered."

Adelan already holds annual hydrogen pitch events for investors in London, and Chairs the Midlands Hydrogen and Fuel Cells Network (MHFCN). Through the Clean Futures Accelerator programme, led by Connected Places Catapult and BCIMO, Adelan is seeking collaborative partners in the transport sectors to

introduce the concept of SOFCs and to scale up the deployment of the technology as a viable clean energy solution.

As Dr Kendall outlined: “We need to be building up capacity in the Midlands and we’re looking for deployers of these solutions, because ultimately that’s what will anchor the value of this technology in the UK.”

Trialling Solid Oxide Fuel Technology on rail freight- A case study

Last year, Adelan demonstrated the decarbonisation potential of SOFC for the rail industry, by using its SOFC technology to run a locomotive on near net zero carbon emission Bio Liquefied Petroleum Gas (Bio-LPG) to generate power for auxiliary loads.

Colas Rail UK partnered with Adelan and engineering firm G-Volution to work on a project to install an SOFC into a Class 37 locomotive to power the auxiliary systems. The proof of concept was successfully showcased at Colas Rail UK’s Rugby Depot in September 2023, with over 40 delegates witnessing a demonstration of the SOFC innovation providing power for the exterior and interior lighting of the locomotive.

Route simulations by the University of Birmingham using a 35kW SOFC showed that for a typical Class 37 operation using two locomotives this approach would save on average 50 tonnes (12 per cent) of CO₂e per annum and combined with an average 8 per cent reduction in fuel costs.

Other benefits brought by this approach are improved air quality (zero particulate matter and nitrogen oxides are produced by the SOFC) and a significant reduction in noise and engine idling.

Highlighting the trial’s success, Paul Conway, Colas Rail UK’s Head of Engineering and Compliance said: “Innovation with a focus on decarbonisation is essential given the challenge to reduce dependency on fossil fuel. This trial has proven that a lower carbon option is available for auxiliary power generation. It’s still early days for this technology but it’s an excellent start and something that Colas Rail Services have been proud to be a part of”.

Identifying scalable applications in rail

Investments in clean technology are on the rise, but many organisations are still unclear about the application and practical use of fuel cells. Dr Kendall explained how Adelan can support the transport sector through strategic partnerships to realise the possibilities: “We know that there are a few promising technologies, but the technologies that grab the headlines are factory electric vehicles and hydrogen (fuel cell) electric vehicles. What companies operating in the rail industry need to understand is that because these technologies are new, they will need to work with proof-of-concept products. They’ll need to trial these products, and, in some cases, they won’t be able to predict where the technology goes.”

Dr Kendall continued: “There are some off-the-shelf products that Adelan can provide support and due diligence on, and we can showcase the quick wins where, for example, other countries are using hydrogen fuel or technologies in rail applications. What we’re looking for is a scalable application of the technology

we produce today. Hydrogen-based solutions are normally quite specific, so for example, there might be a certain size of fuel cell, then you have to tailor the technology, or it might be an off-the-shelf product. We can advise on that specifically.”

She concluded: “With almost 30 years of trading we’re the longest-standing fuel cell business in the UK and that creates a lot of trust with our customers and suppliers. We can have open conversations and suggest hydrogen-based solutions to help them solve their problems, whether that’s using our fuel-cell technology or someone else’s within the hydrogen network.”

Adelan runs the [Midlands Hydrogen and Fuel Cell Network](#), which coordinates the UK’s hydrogen supply chain ecosystem. The MHFCN was set up in 2017 to represent the Midlands’ pioneering fuel cell and hydrogen activities. Adelan chairs the Network and the Network Business Forum, co-organising the UK’s largest hydrogen conference which takes place annually in Birmingham for 30 years. They coordinate with other regional hydrogen clusters to form a national network that speaks to government with one voice.

For more information visit adelan.co.uk/ and find MHFCN on Linked in.