

H₂

GREEN

RENEWABLE

Thermo Fisher Scientific and CPH2 team up to give renewable hydrogen production the green light

Most developed nations have announced clean energy strategies to reduce their CO₂ emissions, aiming to reach 'net zero' within the next few decades.

The use of fossil fuels must soon become a thing of the past if this goal is to be realized, with alternative energy sources making up for the inevitable shortfall. Clearly, the absence of traditional fuels will leave big shoes to fill, and whichever energy source comes out on top must be underpinned by the infrastructure to produce and transport the large quantities of fuel needed to sustain society's ever-increasing reliance on electrified technologies. Hydrogen is a promising alternative to oil and gas, and with the European Commission featuring it heavily in Europe's roadmap to decarbonization,¹ hydrogen-based technologies are poised to undergo rapid development in the coming decade.

Greener hydrogen

Hydrogen has great potential as a green energy source; however, its environmental friendliness depends entirely on the amount of carbon released during its generation. The vast majority of global hydrogen production is so-called 'brown hydrogen' generated during fossil fuel processing – among other operations – which releases large quantities of carbon into the atmosphere. While these harmful emissions can be reduced via carbon capture to produce 'blue' hydrogen, the most environmentally friendly technique involves using renewable energy sources to power electrolysis, decomposing water into its constituent parts of oxygen and 'green' hydrogen.

A partnership with electric chemistry

Currently, only around two percent of the world's hydrogen production can be classed as green, but Clean Power Hydrogen (CPH2)—a key industry player based in the UK—is looking to change this with its novel membrane-free electrolysis and cryogenic separation processes. The company manufactures high-spec ISO units—self-contained oxygen and hydrogen production systems—and is currently scaling up the technology to increase its output and efficiency.

An important segment of CPH2's market is hydrogen fuel cell manufacturers – who are tightly bound by ISO purity specifications²—making it imperative to accurately measure and declare impurity levels. The company's lead scientist, Bridie Haxby explained: "The gas analyzers we were using are only accurate to within ±2 %, which is insufficient for some of our customers' most stringent applications. After explaining our issues to several suppliers, Thermo Fisher Scientific was the only company to offer its assistance, generously loaning us a mass spectrometer to help us gain a true measure of product purity."



The Prima candidate

The Thermo Scientific™ Prima PRO Process Mass Spectrometer replaced CPH2's multitude of incumbent gas analyzers, drastically reducing the complexity of its analytical setup. This system allowed simultaneous measurement of multiple gas species at several locations in the process, all within a single unit. The high precision of the MS instrument—thanks to its magnetic sector technology—allowed CPH2 to confirm the purity of the hydrogen and oxygen streams to within $\pm 0.1\%$. Bridie explained: "We were always confident that our process was capable of producing hydrogen with 99.99% purity, but it took the accuracy of the Prima PRO to confirm this and give us the data needed to increase the efficacy and efficiency of our technologies. It will allow us to perform factory acceptance testing on every ISO unit leaving the factory, providing customers with certificates stating the exact level of impurities in the product stream. It has also given us the ability to estimate production plant efficiencies, providing customers with an accurate prediction of the power consumption per kg of hydrogen produced."



Prima PRO Process
Mass Spectrometer

Endorsing eco-electrolysis

The CPH2 team was so impressed by the Prima PRO that they decided to purchase a unit of their own, which is now in use in both R&D and factory acceptance applications. Thermo Fisher Scientific is proud to partner with CPH2 in the pursuit of green hydrogen, and the precision of the Prima PRO Mass Spectrometer is helping to take electrolysis and cryogenic separation to the next level, providing end-users with the ground-breaking technologies required to give renewable hydrogen production the green light.

References

1. European Commission, *A hydrogen strategy for a climate-neutral Europe*, ([EUR-Lex – 52020DC0301 – EN – EUR-Lex \(europa.eu\)](#))
2. International Organization for Standardization, *ISO 13687:2019 Hydrogen fuel cell quality – product specification*, [ISO – ISO 14687:2019 – Hydrogen fuel quality – Product specification](#)

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