FUELLING THE FUTURE

Green hydrogen, often produced using platinum-based electrolysers, is instrumental to the production of sustainable aviation fuels

Pre-pandemic, in 2019, the annual number of flights globally reached an all-time high of 38.9 million and, in the UK alone, aviation accounts for around 7 per cent of total greenhouse gas emissions. Like other sectors, aviation needs to significantly reduce its reliance on fossil fuels in order to achieve net zero goals, and in the UK it has pledged to cut net carbon emissions to zero by 2050.

Aviation kerosene is the fuel of choice for most aircraft, due to its low freezing point, combustibility – needed to power take-off – and low viscosity, meaning it is less likely to solidify at altitude, clogging up the engine.

According to energy technology group Siemens Energy, sustainable aviation fuels (SAFs) based on renewable energies and green hydrogen are the key to sustainable flying. This is why it has joined with the energy supplier Uniper, the aircraft manufacturer Airbus and the chemical and energy company Sasol ecoFT to launch the ‘Green Fuels Hamburg’ project, investigating the feasibility of a commercial project to produce sustainable SAFs in Germany.

Between them, the four project partners cover the entire value-chain for the production of CO_2-neutral kerosene, a SAF that is also called ‘power-to-liquid’ or ‘PtL’ kerosene for short. PtL is a synthetically-produced liquid hydrocarbon that is made in three key stages.

Firstly, renewable energy is used to power electrolysers to produce green hydrogen from water. Then, climate-neutral CO_2 – captured via, for example, Direct Air Carbon Capture – is converted into carbon feedstock. Carbon feedstocks are synthesised with green hydrogen to generate liquid hydrocarbons. They are then converted to produce a synthetic equivalent to kerosene.

Capturing and storing CO_2 is central to the production of PtL. Indeed, recapturing the CO_2 released during combustion and combining it with hydrogen closes the loop in that the CO_2 that was initially released is reused to create fuel. For this reason, emissions from PtL production can be reduced by as much as 90 per cent when compared to fossil fuels.

Initiatives like Green Fuels Hamburg are helping to demonstrate how effective green hydrogen value-chains can be established. Picture credit: Siemens Energy

Green Fuels Hamburg aims to make a significant contribution to de-carbonising the aviation sector through integrated green hydrogen and SAF production on an industrial scale, aiming to supply Hamburg with more than 10 tonnes of PtL kerosene a year from 2026 onwards. Hamburg is well placed for this pioneering large-scale project, as the region is close to renewable energy sources and has the necessary customers in industry and aviation. One of the major advantages of PtL is that it can be transported and distributed via the existing network of fossil-fuel infrastructure, including pipelines and filling stations.

Green hydrogen 50-fold increase

Today, PtL is produced at a relatively high cost and on a low scale. This is expected to change as the green hydrogen ecosystem continues to ramp up worldwide. According to Airbus, green hydrogen production capacity could achieve an estimated 50-fold increase in the next six years. This means green hydrogen could be on track to supply up to 25 per cent of the world's energy needs by 2050.

Platinum-based proton exchange membrane (PEM) electrolysers are one of the two leading electrolysis technologies commercially available. While the platinum needed to produce green hydrogen is gradually increasing in line with the expansion of electrolyser capacity, electrolysers use relatively small amounts of platinum and are built to last, meaning infrequent replacement. Cumulatively, over the next 15 years, platinum demand from electrolysers is likely to be between one and two million ounces, dependent on technology development over that period.

More significantly, the development of hydrogen infrastructure supports the wider market penetration of fuel cell electric vehicles (FCEVs). Recent research by the WPIC highlights that supportive hydrogen policies could result in FCEV demand for platinum equalling current automotive demand by 2039, with broad-based commercial adoption of FCEVs bringing this forward to 2033, adding over three million ounces to annual automotive platinum demand in eleven years.

Contacts:
Brendan Clifford, Institutional Distribution, bclifford@platinuminvestment.com
Trevor Raymond, Research, traymond@platinuminvestment.com
Edward Sterck, Research, esterck@platinuminvestment.com
Vicki Barker, Investor Communications, vbarker@platinuminvestment.com