Plug Power has designed a hydrogen fuel cell system for large-scale backup power applications using its 125kW ProGen fuel cell unit. Source: Plug Power

BACK-UP POWER

Use of platinum-based fuel cells in stationary applications continues to expand

There is a growing market for hydrogen-fuelled, proton exchange membrane (PEM) fuel cells that rely on platinum catalysts in the transportation sector, especially zero-emissions powertrains in heavy-duty and fleet commercial vehicles.

Other industries looking at ways of decarbonising their operations are also recognising the benefits of PEM fuel cells. Microsoft – which has committed to being carbon negative by 2030 – is exploring the potential of using hydrogen fuel cells for back-up power generation at its data centres. Last year, in a world first, it successfully trialled the use of hydrogen fuel cells in powering a row of data centre servers for 48 consecutive hours.

The trial is seen as a precursor to the wider deployment of hydrogen fuel cells for standby power, replacing diesel generators as a way of overcoming the intermittent nature of electricity from renewable energy, or for use in parts of the world where the electricity grid is unreliable. There is even potential for Microsoft to go a step further by developing ancillary electrolyser capacity for hydrogen storage, integrating its own generation capabilities with the wider hydrogen ecosystem.

Reliable standby power is crucial to technology and telecommunications businesses where continuous connectivity is paramount. Historically, PEM fuel cells used to provide back-up power were fuelled using liquid methanol. When powered by green hydrogen, they can assist with climate change goals, with water and heat being the fuel cell's only by-products.

PEM fuel cells offer other advantages; they are more effective than batteries for back-up power because they last longer and are more predictable. Fuel cells can provide reliable back-up power for ten years or more with undiminished power quality and quantity, requiring little on-site maintenance. Able to withstand a wide range of temperatures and easily scalable they are well-suited for deployment in remote or unmanned locations, for example at the site of a mobile phone tower.

Hydrogen-fuelled stationary PEM fuel cell systems provide reliable, clean and quiet backup power for critical infrastructure. Source: Ballard

There is also scope for PEM fuel cells to provide stationary power for construction projects. In the UK, a pioneering initiative has seen the installation of a hydrogen fuel cell to provide off-grid power at National Grid's 'Viking Link' interconnector project in Lincolnshire. Off-grid power is needed until this site has a grid connection, with the fuel cell system providing enough heat and power for the construction village during that time, removing the need for diesel generators.

With regard to the deployment of stationary fuel cells to provide domestic power supply, solid oxide fuel cells tend to be the preferred technology. However, South Korea is leading the way in the development of large, modular hydrogen fuel cell power plants. Here, the energy solutions company Hanwha Energy has completed its $212m hydrogen fuel cell power plant, located at the Daesan Industrial Complex in Seosan.

Growth in 2021

According to Johnson Matthey, platinum-based stationary power applications will see some growth in demand in 2021 – longer term they have the potential to further support the build-out of an integrated hydrogen eco-system. As the number of applications for hydrogen grows, in heavy industry and in transportation, it supports the growth of green hydrogen electrolyser capacity and the wider adoption of fuel cell electric vehicles.

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