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FUEL CELLS ROCK

Recent milestones demonstrate how fuel cells – and platinum – are key to unlocking the potential of the hydrogen economy

When a global rock supergroup turns to platinum-based hydrogen fuel cells to help power a sell-out stadium gig, it is a high-profile reminder of the versatility of a technology which is perhaps best-known for its use in cars and trucks. In a world first, the band U2 used fuel cells in this way at a recent show in Tokyo, where four Toyota Mirai fuel cell electric vehicles (FCEVs) were parked backstage and wired up to provide the performers on stage with power from clean and renewable sources.

A FCEV can produce 100kw of power, enough for U2's back line and over fifty times more than that which is needed to run the average house. This is why platinum-based fuel cells are optimal as a powertrain solution in vehicles, providing as they do the necessary performance demanded by drivers, such as acceleration, while being small and light enough to suit a mobile application.

The generation of electricity from hydrogen fuel cells is itself an established technology which is increasingly being viewed as a viable clean alternative to electricity from fossil fuels. In a platinum-based hydrogen fuel cell, hydrogen and oxygen are combined to generate electricity, with heat and water as the only by-products. Molecules of hydrogen and oxygen react and combine using a proton exchange membrane (PEM) which is coated with a platinum catalyst.

The potential of fuel cells to power both stationary and transport-related applications has been highlighted by other recent developments. For example, a new world record was set at the end of last year for distance travelled by a FCEV on a single tank. A Hyundai Nexo covered 778 km without needing to refuel, further demonstrating the range that FCEVs are capable of, made possible by platinum and all the while producing zero tailpipe emissions.

Meanwhile, the Tokyo 2020 Olympics is gearing up to be the first-ever 'hydrogen Games', with Japan showcasing its technological capabilities in this area. Not only will a fleet of fuel cell buses ferry the athletes around, but the newly-constructed Olympic Village – housing some 10,000 athletes from 200 countries – will run on hydrogen power using stationary fuel cells. After the Games the Olympic Village will be turned into apartment complexes with hydrogen being used as an energy source to generate electricity as well as providing the fuel for buses and cars.

Artist's impression of Toyota's Woven City

Also in Japan, Toyota has this month announced plans to build a prototype 'city' of the future on a 175-acre site at the base of Mount Fuji. Called the Woven City, it will be a fully connected ecosystem powered by hydrogen fuel cells.

Implications for platinum

It is widely accepted that hydrogen technologies are poised to play a major role in accelerating the energy transition away from fossil fuels, with scaling up of infrastructure the crucial next phase.

Collaboration is critical to the success of this phase, and a growing number of strategic alliances and ventures around the world are taking the lead. A key example of the 'joined up thinking' that is helping hydrogen schemes get off the ground more quickly is the Hydrogen Council, a global initiative of CEOs representing energy, transport and industry organisations that advocates the accelerated deployment of hydrogen solutions. The Hydrogen Council has just reached an agreement with the European Investment Bank to work together on financing schemes for hydrogen projects.

Platinum is central to much fuel cell technology, which is essential if the potential of hydrogen to power our homes, cars and even rock concerts is to be realised fully. Many investors recognise the upside potential in longer-term platinum demand growth which could come as the hydrogen economy expands, bringing with it wider adoption of FCEVs.

In the near term, demand for FCEVs is being driven by the heavy-duty market segment (buses and trucks), where supporting infrastructure is available or being developed, especially in port locations and cities. Positive investor sentiment, which was reflected in the record level of platinum exchange traded fund purchases in 2019 of around 1 million ounces (28.3 tonnes), recognises this trend.

Contacts:
Brendan Clifford, Investor Development, bclifford@platinuminvestment.com
Trevor Raymond, Research, traymond@platinuminvestment.com
Vicki Barker, Investor Communications, vbarker@platinuminvestment.com