



CHAMBER OF MINES POWERED BY PLATINUM

FACT SHEET 2017

A fuel cell using just 40 ounces of platinum and low-pressure natural gas is powering the Chamber of Mines building in the heart of Johannesburg's central business district.

While the use of stationary fuel cells to power buildings is becoming more common in the USA, Germany, Japan and Korea, this is the first base load commercial low pressure natural gas installation in Africa.

The Chamber's fuel cell, installed in December 2014, was the culmination of a four-year initiative to demonstrate the applicability of fuel cell technology in South Africa. The installation aims to demonstrate the potential for local fabrication and the industrial use of platinum in a significant new market; to provide the partners with local experience in fuel cell plants; to act as an industry leader on fuel cell deployments and influence the development of African fuel cell markets; to create jobs through the implementation and servicing of the technology; to capture and sustain technical and operational fuel cell knowledge to promote beneficiation in South Africa; to unlock South Africa's natural resources through the use of natural gas and platinum; to enable the Chamber to operate during power interruptions and to reduce the Chamber's carbon footprint; to install a solution which offers better cash alternatives to grid costs over a 15-year period; to showcase the Chamber's ability to be a leading player in new technology; and, where possible, make use of the diverse generation abilities of the fuel cell by using surplus heat.

ABOUT FUEL CELLS

WHAT IS A FUEL CELL?

- Highly efficient and ultra clean power generation system based on an electrochemical process – not combustion, thereby reducing harmful emissions. (NO_x, SO_x and CO₂)
- Reliable: power availability in excess of 99% of the time in multiple unit configurations or connected in parallel with the electric grid
- Modular and scalable: can be installed and operated in parallel to meet any size of electrical load requirement – additional units can be added incrementally as a facility requires
- Quiet and durable: quiet enough to install inside or outside a building – normal conversation can be conducted within close proximity of the fuel cell
- Generates electricity and heat from the electrochemical reaction between hydrogen, platinum, oxygen, and in this case, phosphoric acid without energy conversion through fuel combustion



QUICK FACTS

KEY FACTS

- The first commercial fuel cells were used by NASA to generate power for space probes, satellites and capsules
- Southern Africa is home to around 80% of the world's platinum resources so the potential for platinum fuel cells to drive economic development is enormous. The fuel cell industry has the potential to revolutionise the way power is delivered to all areas of our lives - from cars to mobile phones and computers, as well as to our homes and workplaces
- The Chamber's 100-kilowatt fuel cell runs on platinum and natural gas. This produces some 70% of the organisation's electricity

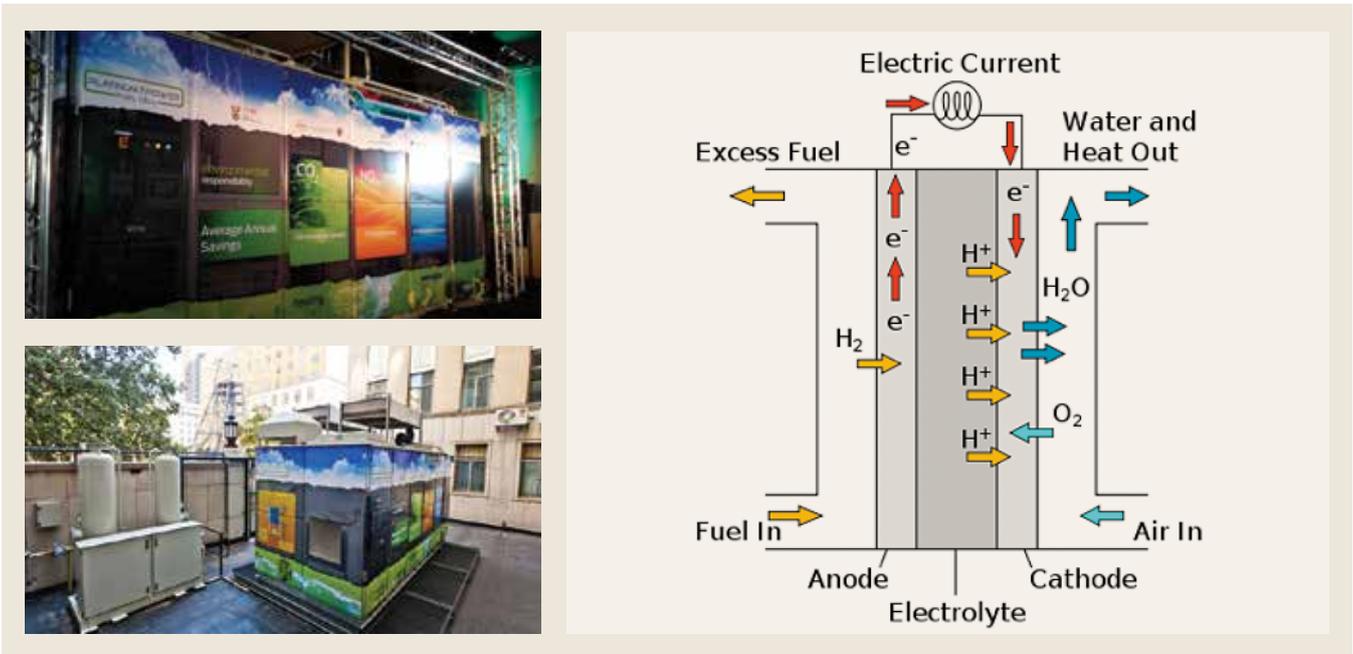
- Has a fire inertisation ability and is used in protecting data centres and high fire risk areas such as tyre storage facilities
- Eco-friendly
- Readily available
- Uses hydrogen or hydrogen-rich fuel (such as natural gas, biogas, methanol) and oxygen
- Can be used for propulsion or auxiliary power in transportation (cars, trucks, buses, trains, ships, submarines and spacecraft)
- Versatile technology (each fuel cell type has unique operational characteristics for a broader range of applications than any other currently available power source – from large power plants to vehicles and residential power for mobile phone chargers and toys)

HOW FUEL CELLS OPERATE

- 1 A fuel cell is an electrochemical device that combines hydrogen and oxygen to produce electricity with water and heat as its by-product.
- 2 A single fuel cell consists of two electrodes – an anode and a cathode – with an electrolyte between them.
- 3 At the anode, hydrogen reacts with a catalyst, creating a positively charged ion or proton and a negatively charged electron.
- 4 The proton then passes through the electrolyte while the electron travels through a circuit, creating a current.
- 5 At the cathode, oxygen reacts with the ion and electron, forming water and useful heat.

When cells are stacked in series, the output increases, ranging anywhere from several watts to multiple megawatts.

South Africa is in a unique position to be able to drive the PGMs market in the right direction by actively promoting and using fuel cells not only to be able to benefit our platinum but in driving industrialisation. To date the uptake of fuel cell technology in the South African and African markets has been disappointing but there are signs that this market is starting to see growth.



A fuel cell powers the Chamber of Mines building.

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