

FUEL CELL: POWERED BY PLATINUM

Fact sheet



MINERALS COUNCIL
SOUTH AFRICA



Minerals Council South Africa

“Unlocking South Africa’s natural resources through the use of natural gas and platinum.”

A fuel cell using just 40 ounces of platinum and low-pressure natural gas is powering the Minerals Council South Africa (Minerals Council) 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 Minerals Council’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 Minerals Council to operate during power interruptions and to reduce the Minerals Council’s carbon footprint; to install a solution that offers better cash alternatives to grid costs over a 15-year period; to showcase the Minerals Council’s ability to be a leading player in new technology; and, where possible, to make use of the diverse generation abilities of the fuel cell by using surplus heat.

ABOUT FUEL CELLS

What is a fuel cell?

- A 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)



QUICK FACTS

1st



The first commercial fuel cells were used by NASA

80%



of the world’s platinum resources are found in Southern Africa

70%

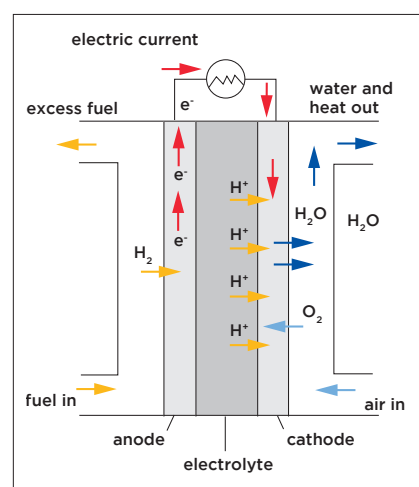


The Minerals Council’s 100kW fuel cell produces some 70% of the organisation’s electricity

- Reliable: power availability in excess of 99% of the time in multiple unit configurations or connected in parallel with the electricity 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
- 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 and 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)

FUEL CELL MARKET IN SOUTH AFRICA

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.



HOW FUEL CELLS OPERATE

01	A fuel cell is an electrochemical device that combines hydrogen and oxygen to produce electricity with water and heat as its by-product
02	A single fuel cell consists of two electrodes – an anode and a cathode – with an electrolyte between them
03	At the anode, hydrogen reacts with a catalyst, creating a positively charged ion or proton and a negatively charged electron
04	The proton then passes through the electrolyte while the electron travels through a circuit, creating a current
05	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.



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