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A mining feasibility case study analysis of fuel cell technology application to stimulate platinum beneficiation in South Africa

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ABSTRACT

This study entailed determining the feasibility of using a stationary fuel cell to power two different mining operations. These were a deep level gold mine (Mponeng Gold Mine and its plant) and a surface processing operation (Mine Waste Solutions), both belonging to AngloGold Ashanti. The premise of this study was that limited local adoption of fuel cells could possibly act to prompt their local manufacturing and result in increased platinum beneficiation to contribute towards the much needed economic growth and development for South Africa.

For this feasibility analysis, the Molten Carbonate Fuel Cell was used. The study revealed that the use of a large, stationary fuel cell to power the selected operations was not feasible due to high capital and operating costs, both of which are far greater than the current cost of electricity supply. However, it was found that the opportunity for increased platinum beneficiation to support fuel cell technology lies in other applications of fuel cells, such as vehicles and mining machinery. The mining industry, which has increased focus on amplified mechanisation and modernisation, and the bus system, have been identified as malleable conduits through which fuel cell technology can be investigated for application in South Africa.

It has been concluded that the prospects for increased resource-led industrialisation through fuel cell manufacturing are incipient, in that the South African government, academia and industry have laid the foundation on which a manufacturing industry can be developed. Several competencies such as skills, capital investment and research and development will need further and continued attention. These prospects will be greatly advantaged by the sustained and increased support of government departments, and close collaboration between industry, state, academia and original equipment manufacturers.