

COST IMPLICATIONS OF MODERN MINING METHODS ON WATER AND ENERGY CONSUMPTION: A SOUTH AFRICAN PLATINUM CASE STUDY

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ABSTRACT

South Africa has an exceptional mineral wealth that enabled its industrial and economic development in the 19th and 20th centuries; and that continues to play a major role in its future development goals. South Africa has the largest platinum reserves in the world, and its platinum mining sector is a major contributor to its mineral exports. However, the country's platinum industry however, faces many challenges that threaten its growth and sustainability, two of which are access to water and energy.

Water and energy are critical inputs to platinum mining and a continuous uninterrupted supply of these resources is required. South Africa however, faces increasing water and energy risks in the forms of continued droughts, electricity supply shortfalls, above-inflation electricity price increases and competition for electricity and water resources from other industries, governments and communities. To ensure its growth and sustainability, the platinum mining industry is transitioning from conventional mining to more modern mining methods that include improved technologies and processes in conventional mines, mechanisation and continuous mining operations. This study aimed to determine the consumption and cost implications with respect to energy and water associated with the implementation of modernisation in the narrow reef platinum mining industry.

A platinum case study was undertaken, using information from published literature and where possible actual mine data between 2013 and 2017 to determine whether modernised conventional mining and the implementation of mechanisation will improve water and energy efficiencies. The study found that that mechanised mining were 47% more energy efficiency and 87% more water efficient (for potable water) compared to conventional operations, that resulting in significant cost savings. Furthermore, the study forecasted total energy and water demands up to 2043 that illustrated that the modernisation of the platinum industry will result in significant consumption and cost savings from energy and water perspective.