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BENEFITS OF BENEFICIATION

A process rich in opportunities for SA

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THE tragic events at Marikana have cast a spectre of gloom over South Africa's mining industry and the platinum sector in particular. Amidst the bitter fall-out and recriminations, a critical debate about the role that mineral beneficiation can play in changing the neo-colonial structure of the South African economy has slid down the priority list.

South Africa is blessed with bountiful mineral resources, including 88 percent of the world's platinum resources and 77 percent of global manganese reserves. These resources are reflected in a total mineral wealth valued in the region of $2.5 trillion (R22 trillion), marking South Africa as the world's wealthiest mining jurisdiction.

Despite this huge resource endowment, for some time the level of mineral beneficiation undertaken in South Africa has remained low, with activities in the mining sector instead dominated by primary production and exports of raw or partially processed minerals. The beneficiation activities that have been carried out have tended to be concentrated in the capital- and energy-intensive sectors of the mineral value chain. At the same time, South Africa imports a variety of finished products from countries in the developed world and emerging market giants such as China.

This has prompted the national government to bemoan the comparative lack of mineral-processing activity within South Africa as a significant opportunity loss in export revenue and employment-creation opportunities. The available statistics lend credence to this view.

In 2008, despite the fact that the gross revenue from sales of all minerals in South Africa netted the country nearly R300 billion, just R86bn was generated through the processing of base and precious metals and other minerals within the country. The latter equates to just 11 percent of the total volume of minerals produced in South Africa.

Nevertheless, opinion remains divided as to how, and to what extent, South Africa should pursue a beneficiation agenda in the mining sector. For its part, the national government has trumpeted the merits of beneficiation as a key element of its resource nationalism plan. Minister of Mineral Resources Susan Shabangu has touted beneficiation as "the vehicle through which South Africa's resource-based comparative advantage can be transformed into a national competitive advantage". For its part, the Industrial Development Corporation holds the view that undertaking greater levels of downstream beneficiation can foster the development of backward, forward and even horizontal industrial linkages, thereby creating employment, facilitating skills development and technological innovation, and boosting industrial growth.

However, some sceptics have questioned the theoretical and practical grounds underpinning the national government's decision to rigorously pursue the mineral beneficiation agenda. In essence, these critics have questioned the assumption that resource-rich countries such as South Africa automatically possess the competitive advantages required to process minerals competitively into finished products, or even intermediate goods.

Even some within the Chamber of Mines of South Africa have expressed reservations about the emphasis placed on the local beneficiation of minerals. There is also a great deal of debate concerning the roles of the mining and manufacturing sectors in South Africa in terms of downstream mineral beneficiation. The prevailing view, touted by the Chamber of Mines, is that the manufacturing sector is better-equipped to carry out downstream value-added processing of semi-processed minerals.

These competing viewpoints aside, South Africa does possess some strengths that favour undertaking local beneficiation of minerals. These include: a natural monopoly on certain mineral reserves; competitive advantages in some mining and smelting activities; experience in the beneficiation of certain minerals at the firm level; and a range of research and development programmes focused on the mining sector. Furthermore, the country has already developed some capacity for value-added processing through the creation of facilities for mineral processing and manufacturing.

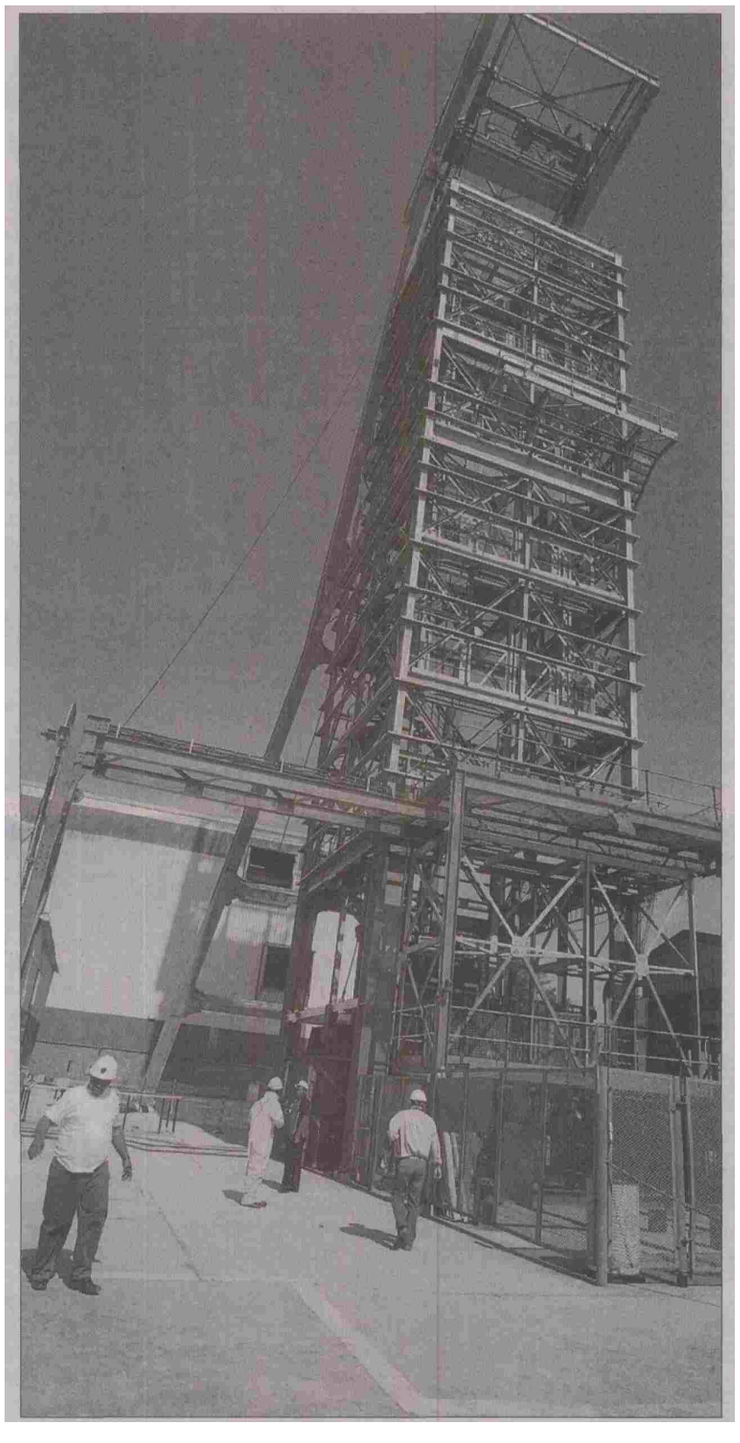
In the case of platinum, South Africa boasts an abundant endowment of platinum group metals (PGMs), the benefits of which can be further leveraged given the rapidly expanding global demand for cleaner power and technology. South Africa also boasts well-established downstream industries – such as the automotive industry – that can support the local beneficiation of PGMs.

At present, the bulk of PGMs are mined in South Africa in raw concentrate or ore form and partially beneficiated within the country through smelting and refining processes in preparation for the export market. The three main markets for beneficiated PGMs are the auto-catalyst, jewellery and industrial chemicals industries, with the jewellery and auto-catalyst industries representing the two largest markets for semi-processed platinum and palladium resources. Within these industries, the majority of the operations for downstream beneficiation of the PGMs are already firmly established outside of the borders of South Africa.

However, there are some promising opportunities to develop capacity for downstream PGM beneficiation within South Africa. Since the early 1990s, the beneficiation of PGMs into auto-catalysts has been undertaken within South Africa in close association with the local automotive industry. South Africa already produces around 13 percent of the world's platinum catalytic converters; but there remains scope to grow domestic production of auto-catalytic converters through the retention of industry incentives and greater levels of innovation. The latter should target the identification and development of other industrial applications associated with the auto-catalyst industry.

In addition, the growing popularity of fuel cell technology as a form of cleaner energy is attracting increasing attention as an area in which to develop capacity for the local beneficiation of PGMs. Platinum is used as a catalyst in fuel cells, which have been identified as a major alternative to internal combustion engines.

Mindful of the burgeoning opportunities presented by fuel cell technology, Hydrogen South Africa targets the utilisation of locally developed and fabricated PGM to supply 25 percent of the total demand in the global fuel cell market by 2020.The development of a local fuel cell value chain presents promising opportunities for both the mining industry and the downstream manufacturing, installation and maintenance industries.



TAKE IT FURTHER: South Africa already produces around 13 percent of the world's platinum catalytic converters; but there remains scope to grow, say the writers.

A number of key stakeholders – including the Chamber of Mines, Anglo Platinum and the national Department of Science and Technology – believe that South Africa has the potential to position itself as the leading producer of fuel cells in the world and, more broadly, as the dominant alternative clean power producer and manufacturer in the global economy.

Already, South Africa has made some important strides in the development of fuel-cell technology. For example, in May 2012 Anglo American Platinum unveiled a platinum fuel cell-powered mine locomotive, the first technology of its type produced anywhere in the world. These developments have fuelled talk that South Africa should move to create a "Platinum Valley" within the country, inspired by the success of the renowned Silicon Valley in the US.

The success of such initiatives will ultimately depend on whether South Africa's policymakers are willing and able to tackle the challenges that currently impede the development of capabilities to undertake downstream beneficiation of PGMs. These include the need to improve telecommunications, transport and electricity infrastructure in the country. The latter is particularly pertinent given the energy-intensive processes involved in the beneficiation of PGMs and the ongoing concerns relating to South Africa's electricity infrastructure and energy supply capacity.

South Africa is also hamstrung by a shortage of engineers and skilled artisans – effective platinum beneficiation requires highly trained and specialised chemical and electrical engineers which are in short supply in the country. Also, the country faces market access constraints stemming from its geographical distance to major markets for PGM products and the presence of a small regional market for these products.

South Africa is also hampered by a number of obstacles to participation in the latter stages of value addition and beneficiation in manufacturing. These include a lack of access to raw materials and inputs for local beneficiation at competitive prices; uncompetitive labour costs and high costs of capital; regulatory red tape that has an adverse impact in terms of delaying much-needed construction and investment projects related to beneficiation; limited vehicles to attract investment into the latter stages of beneficiation; and the presence of trade barriers in key target markets for beneficiated products.

These challenges notwithstanding, there are several actions that the government and other stakeholders in the platinum sector can implement to develop capacity for downstream beneficiation of PGMs in South Africa. These include:

- Ramping up efforts to attract foreign investment into PGM manufacturing sectors.
- Directing funding and investment towards research and development to inform the development and commercialisation of technology for the local beneficiation of platinum to produce fuel cells within South Africa.
- Focusing on developing firm-level competitive advantages for the downstream beneficiation of platinum into fuel cells, autocatalytic converters and jewellery. This can be achieved through the focused introduction of product and process innovations at the firm level.
- Devising a practical plan to develop a "Platinum Valley" in South Africa that would facilitate the clustering of actors involved in downstream platinum beneficiation as well as related and supporting industries.
- Focusing on building capacity in the form of world-class technology and state-of-the-art equipment for the downstream fabrication of niche platinum jewellery within South Africa, with emphasis on fabrication to produce high-quality, high-priced jewellery that can be differentiated from that produced in other countries in global jewellery markets.

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