

Positioning for
mineral beneficiation
Opportunity knocks





Foreword

Mineral beneficiation is a priority for governments of resource rich countries that would like to leverage the potential of mineral beneficiation to create local employment and drive economic growth. Many governments are developing strategies for domestic mineral beneficiation.

South African President Jacob Zuma, has said that mineral beneficiation is a priority for his government and will finalise and adopt a beneficiation strategy as its official policy. In June 2011, government released a strategy that identified a number of instruments such as policies, legislation and incentives that can be put in place to enable beneficiation.

A mining company will typically be in one of the following assessment phases with respect to beneficiation:

- Strategic Assessment: an analysis of the strategic considerations as well as risks and opportunities for mineral beneficiation, particularly focusing on the business case and taking into consideration government incentives and social imperatives like job creation;
- Feasibility Assessment: the beneficiation opportunities have been identified and feasibility studies need to be undertaken to determine the viability of such initiatives; or
- Implementation: the feasibility of an initiative has been determined and an implementation plan and schedule needs to be developed.

This paper is the first in a series about beneficiation and will be updated as legislation and incentives come into effect, which assesses the merits of beneficiation.



What is driving the beneficiation trend and could it be a solution to increase South Africa's growth rate?

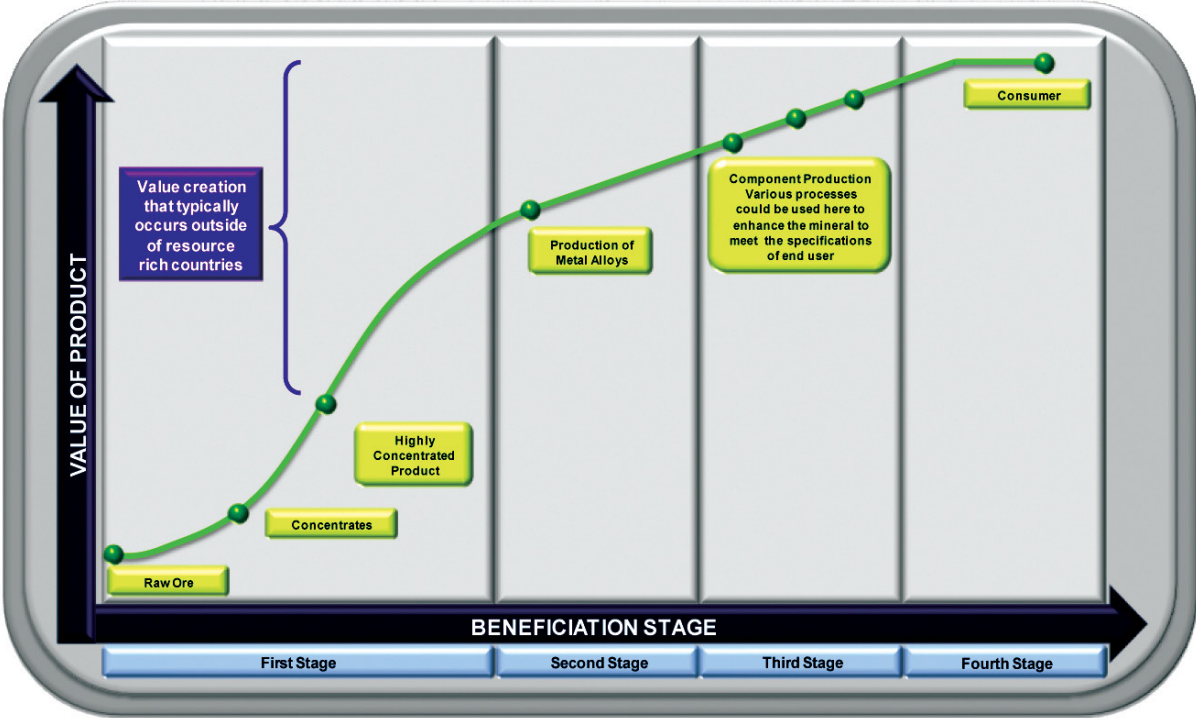
In the state of the nation address, President Jacob Zuma said: *"One of government's priorities this year is also to finalise and adopt the beneficiation strategy as the official policy of government, so that we can start reaping the full benefits of our commodities."*

Beneficiation is largely attributed to the rise in resource nationalism, which is underpinned by higher commodity prices. Resource nationalism refers to government efforts to assert greater control over natural resources located on their territory.

In 2010, South Africa as a resource economy was estimated to possess approximately US\$2.5 trillion in non-energy in situ mineral wealth, making it one of the wealthiest mining jurisdictions in the world. Despite this, South Africa continues to export most of its minerals as ores or semi-processed minerals rather than high value intermediate to finished products.

Mineral beneficiation has been identified as one of six key sectors in Government's New Growth Path (NGP) strategy for creating five million new jobs by 2020

Mineral beneficiation: Where value is created



Stages of mineral beneficiation



The value extraction of the ore and mineral can be broken down into four generic stages. A large portion of the value extraction process has traditionally taken place outside of resource rich countries. The majority of the value that is extracted occurs once the ore has been developed into a highly concentrated product and sold to the consumer. This part of the process is mineral beneficiation. The four stages are:

- **First:** This involves the actual extraction of the ore, the concentration of the particular mineral into concentrates and the further beneficiation of the mineral into a saleable product typically defined by industry standards - examples include gold doré (22+ carats) and platinum bars (99,99% Pt).
- **Second:** The mineral is enhanced by the addition of other metals to create a metal alloy. This is usually also done to meet defined industry standards.
- **Third:** This involves including the mineral in the production process for a saleable product - examples include the production of vehicle exhaust systems and jewellery design and manufacturing. There may be more than one value enhancing step in this stage.
- **Fourth:** This involves the sale of the product to the consumer for a margin.

Challenges and benefits of beneficiation

The challenges that South Africa faces in beneficiating its minerals are relatively substantial and are not challenges unknown to the industry and its government. The aim of the beneficiation strategy aims to provide a framework to convert the country's comparative advantage it has inherited in the form of its mineral wealth, into a national competitive advantage. In order to attain this competitive advantage, the challenges and benefits need to be considered.

Macroeconomic challenges		
Issue	Government solutions	Private sector solutions
Access to raw material for local beneficiation	<ul style="list-style-type: none"> Leverage the state's custodianship of minerals to facilitate downstream beneficiation Amendments to the Mineral and Petroleum Resources Development Act to strengthen beneficiation provisions Strengthen existing legislation to promote reliable and competitive access to raw materials Address import-parity pricing 	<ul style="list-style-type: none"> Take advantage of the mineral value proposition to expand local demand for mineral ores Comply with legislation
Lack of infrastructure	<ul style="list-style-type: none"> Identify infrastructure needs for next 20 years Ensure critical infrastructure programme correctly identifies requirements for beneficiation Leverage on the NGP and infrastructural supports 	<ul style="list-style-type: none"> Align production plans with national programmes Embrace energy efficiency Explore co-generation prospects

Macroeconomic challenges		
Issue	Government solutions	Private sector solutions
Research and development	<ul style="list-style-type: none"> Align beneficiation research and developments requirements to the national ten year plan for science and technology 	<ul style="list-style-type: none"> Support and develop competitive technologies
Skills sought for expediting local beneficiation	<ul style="list-style-type: none"> Align the beneficiation skills pipeline to the National Skills Development Strategy and the Sector Skills Plans Promote skills development and partner with the relevant Sector Education and Training Authorities 	<ul style="list-style-type: none"> Investment in human capital development Enhance the National Skills Development Strategy
Access to international markets for beneficiated products	<ul style="list-style-type: none"> Ensure future trade agreements adequately support the beneficiation intent Take advantage of the Comprehensive Strategic Partnership with China to support investment in beneficiation in South Africa, and access to markets in China 	<ul style="list-style-type: none"> Leverage on trade agreements

Source: *A beneficiation strategy for the minerals industry of South Africa, June 2011*



Government has identified ten commodities for the Beneficiation Strategy, which have been determined to possess the most potential in maximising the value extraction by means of beneficiation. These minerals are:

- Chromium
- Coal and Uranium
- Diamonds
- Gold
- Iron-Ore
- Manganese
- Nickel
- Platinum
- Titanium
- Vanadium

The ten commodities have been clustered according to their value chains. The government has identified five value chains that will be the preliminary focus of the new Beneficiation Strategy. There are instances where some of the commodities share value chains, such as Gold and Platinum. The five value chains are:

- Energy commodities (coal, uranium and thorium)
- Iron and steel (iron-ore, chromium and manganese)
- Pigment and titanium production (titanium and vanadium)
- Autocatalytic converters and diesel particulate filters (platinum)
- Jewellery fabrication (diamonds, gold and platinum)

Each value chain requires specific interventions in order to maximise the value extraction of the associated mineral. Each value chain has its own unique beneficiation strategy, in which the technicalities can be further unpacked.



Macroeconomics benefits	
Opportunities	
Potential job creation/ Sustainable employment	<ul style="list-style-type: none"> • Take advantage of governments NGP for employment creation • Creation of sustainable employment through the creation of long term projects • Increased industrialisation will facilitate access to skills, increased expertise and improved technology
Revenue potential	<ul style="list-style-type: none"> • Increase tax revenue for government through business creation • Increased integration benefits • Potential cost cutting
Saving on import/ export costs of beneficiated products	<ul style="list-style-type: none"> • Reduced transportation costs of raw material • Reduce costs and fees associated with import and export • Reduce the delay costs associated with the lack of infrastructure around import/export hubs
Tax benefits	<ul style="list-style-type: none"> • Utilising the tax benefits associated with each commodity as per the mineral beneficiation strategy
Environmental impact	<ul style="list-style-type: none"> • Possibility of reducing the environmental impact through improved technologies and carbon reduction initiatives

Mineral beneficiation will bring a number of benefits to the South African economy and the mining industry. The gross revenue from sales of all minerals in South Africa for FY 2010 amounted to R227 billion. Similarly, just over R86 billion was generated from processing base metals, precious metals and other minerals, representing approximately 11 percent of the total volumes of minerals produced in 2008.



...this not only represents the loss in terms of export revenue but also as an opportunity for employment creation...

The beneficiation of minerals to finished consumer goods not only increases the revenue gained from the exploitation of the mineral resource, but also significantly increases the labour absorptive capacity of the industry. In accordance with government's industrialisation policy and mineral development, beneficiation aims to enhance the value of exports, increase sources of consumption for local content and opportunities for sustainable employment.

The strategy is contributory towards strengthening of the knowledge economy in support of the overall competitiveness of the economy.

Why has value creation traditionally occurred outside of resource rich countries?

The primary reason for mineral beneficiation having occurred outside of resource rich countries has been market access. The period since the Second World War, which ushered in a period of rapid rebuilding in Europe and Japan, as well as urbanisation in the United States, led to significant market demand for finished products in industrialised countries using minerals sourced from resource rich countries.

This end-user demand was spurred by many innovations in developed countries, including the development and widespread use of household appliances and electronics, use of motor vehicles and the development of the large-scale commercial airline industry, to name but a few.

Comparatively lower oil prices, which resulted in lower logistics costs compared to today, also contributed significantly to the beneficiation of minerals outside of resource rich countries. The transportation of large quantities of un-beneficiated ores was relatively cheap.



Have things changed?

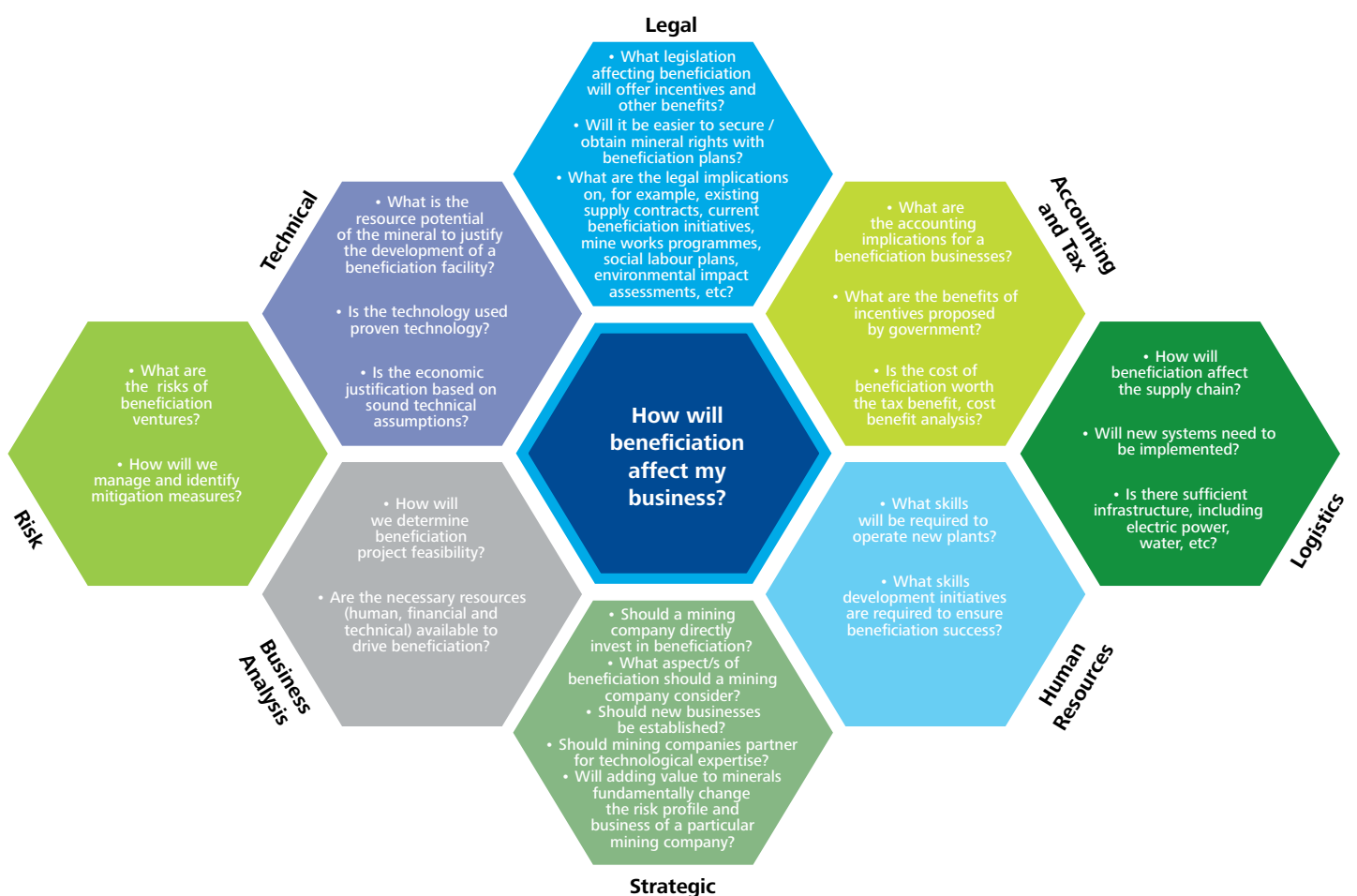
The emergence of new centres of economic growth, most notably in Asia, coupled with higher logistics costs and resource nationalism will change the mineral commodity economy.

The resultant drivers for increased future beneficiation in resource rich countries include:

- Government pressure to beneficiate minerals to create jobs and increase tax revenue
- Increased logistics costs, which will make the transportation of raw materials more costly
- Increased industrialisation of many areas of the world, including resource rich countries, which will serve to enable access to skills, expertise and technology
- Carbon reduction initiatives, the transportation of finished product could potentially lead to lower carbon emissions.

How will the beneficiation strategy affect my business?

There are various aspects that need to be considered when assessing the merits of beneficiation:



Summary

The Mineral Beneficiation Strategy can be leveraged to create jobs and generate local economic growth. However, any investment in beneficiation will require a comprehensive strategic assessment and business case.

Companies will be required to assess beneficiation opportunities and respond to the proposed incentives put forward by government





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