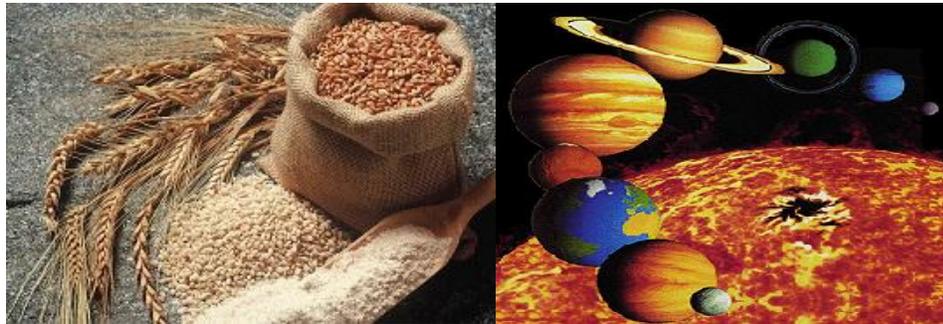


CONTRIBUTION OF INDUSTRIAL MINERALS TO SOUTH AFRICA'S ECONOMIC GROWTH

The quest to increase food security, accelerate infrastructural development and chemical expansion

DIRECTORATE: MINERAL ECONOMICS



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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GROWTH**

DIRECTORATE: MINERAL ECONOMICS

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ABSTRACT

Industrial Minerals are recognised as geological materials which are mined for their commercial value and are used in their natural state or after beneficiation either as raw materials or as additives in a wide range of applications. The bulk nature of these minerals means their exploitation must be close to markets. The biggest strength of industrial minerals is that their consumption correlates strongly with GDP growth per capita in various sectors like construction and agriculture. Their consumption is the most reliable indicator of structural transformation. Their ability to be used in various applications differentiates them from other minerals and makes their consumption an indicator of structural transformation. This report focuses on industrial minerals playing a developmental role in infrastructure, agriculture and chemical applications. Studies have shown that there exists a strong correlation between investment in infrastructure and economic development. Like most developing nations, the South African government recognises the need for infrastructure improvements to deliver on sustainable economic growth and poverty eradication, hence its commitment to invest in building new and upgrading existing infrastructure. Infrastructure lies at the heart of government's stimulatory fiscal package and is a pivotal component for growth and development. The report also looks at programmes that have been developed to encourage collaborations between the mining and the agriculture sector in a bid to address the issues related to food security. The implementation of these programmes includes promoting the use of fertilisers to improve crop yield. Furthermore, the report reviews the contribution of fluorochemicals to the economic growth in the Republic of South Africa. This is achieved by outlining the assembly of the fluorochemicals sector, its production, consumption, economic benefits and downstream industries which it supports. Fluorochemicals play a major role in the economy as they are largely used for consumer and industrial consumption.

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INTRODUCTION

Industrial minerals comprise of a highly diverse group of vitally important minerals and rocks that are exploited for their non-metallurgical value. These are used in various applications, lime and limestone as well as phosphates in agriculture and fertiliser industries, sands, limestone and dimension stone in construction, fluorspar, and kaolin in pharmaceuticals and chemicals, andalusite, lime and silica sands in the metallurgical sector; kaolin and feldspar in the paint and pigment sectors.

Industrial minerals are generally high volume, low value commodities compared with other minerals, making their economic exploitation highly dependent on transport costs and distance to the market. Because of their low value, some companies mining these minerals have a high degree of vertical integration, in that they mine raw materials and beneficiate them to the stage of final product.

Many industrial minerals have a large value-added potential because the same mineral can often be used in different applications. Key to this sector, is the performance of the mineral consuming market which drives the demand for industrial minerals. This is often led by the economic performance, population growth and development.

CHAPTER 1: INFRASTRUCTURE DEVELOPMENT

The South African construction industry is categorised by civil infrastructure, such as roads, bridges, ports and dams, as well as the residential and non-residential building sectors. Infrastructure development in the country is at the epicenter of economic growth. Although all the different infrastructure segments are interlinked and all have an important role in the economy, civil and building infrastructure play a pivotal role in the country's economic growth and development mainly due to their multiplier effect.

Infrastructure is the heart beat of government's stimulatory fiscal package and is a crucial part for growth and development. South Africa's growth in transport infrastructure is at about 18 percent. This growth has a positive impact on labour absorption rate of both skilled and unskilled labour, thus positively contributing towards elimination of poverty and inequality gap. In the next three years, South Africa plans on spending R947.2 billion on infrastructure developments by 2020.

In the country like South Africa with vast mineral wealth and some of which occur in the most remote places, the development of quality transport infrastructure will increase the country's competitiveness on the global markets. Transport infrastructure is therefore regarded as a crucial engine for economic growth and social development. The other key driver of advancing economic development in the construction industry is the building sector. Government has taken upon itself to ensure that there is adequate access to human settlement and basic services to its citizenry by 2019, in an attempt to address inequality and the legacy of social injustices of the past.

In ensuring that all key infrastructure projects are well coordinated, Government has formed the Presidential Infrastructure Coordinating Commission (PICC), which is aimed to expedite unlocking the country's infrastructure constraints. The program will also assist in providing employment opportunities to women and the youth, and supporting broad-based black economic empowerment.

The development of transport and civil (construction) infrastructure will play an important role in the countries trade relations. Approximately 96 percent of the country's exports are conveyed by sea and later transported to various locations using road transport, hence government's emphasis on developing infrastructure to support foreign direct investment (FDI).

In South Africa limestone is mainly used in the construction industry, for the production of cement. The increased roll out of government projects will indirectly have a positive impact on the demand for cement, thus increasing the demand for limestone. Although South Africa's cement industry has come under pressure, owing to cheap cement imports, subdued growth and low business confidence, the industry is expected to recover margins in the long run. South Africa's market share is increasing, with local industries venturing to other emerging markets. Growth in the cement industry will sustain the forecasted increasing infrastructural development.

1.1. SOUTH AFRICA'S INFRASTRUCTURAL DEVELOPMENT

Infrastructure development lies at the center of the South African government stimulatory fiscal package to drive growth over the next three years. It is a critical enabler for attracting investment and future economic competitiveness. Infrastructure development is the key driver not only to economic growth, but also to poverty alleviation, job creation and skills development. Parliament approved the Infrastructure Development Act in June 2014 to accelerate the decision making process on infrastructure projects, which will facilitate increase in the country's fixed capital expenditure. Despite muted growth in the medium term, South Africa's long term economic outlook is positive, on the back of infrastructural development projects, which will warrant security of supply of raw minerals such as limestone for cement manufacturing.

The National Development Plan (NDP), which is the country's growth and development framework, aims to eliminate poverty and reduce inequality by 2030. It seeks to address poverty by broadening the base of employment and addressing infrastructural deficiencies to unlock the country's economic potential. The construction industry, in this case the building and civil infrastructure, has been identified as a strong economic growth stimulants and government has put measures in place to ensure that the industry flourishes.

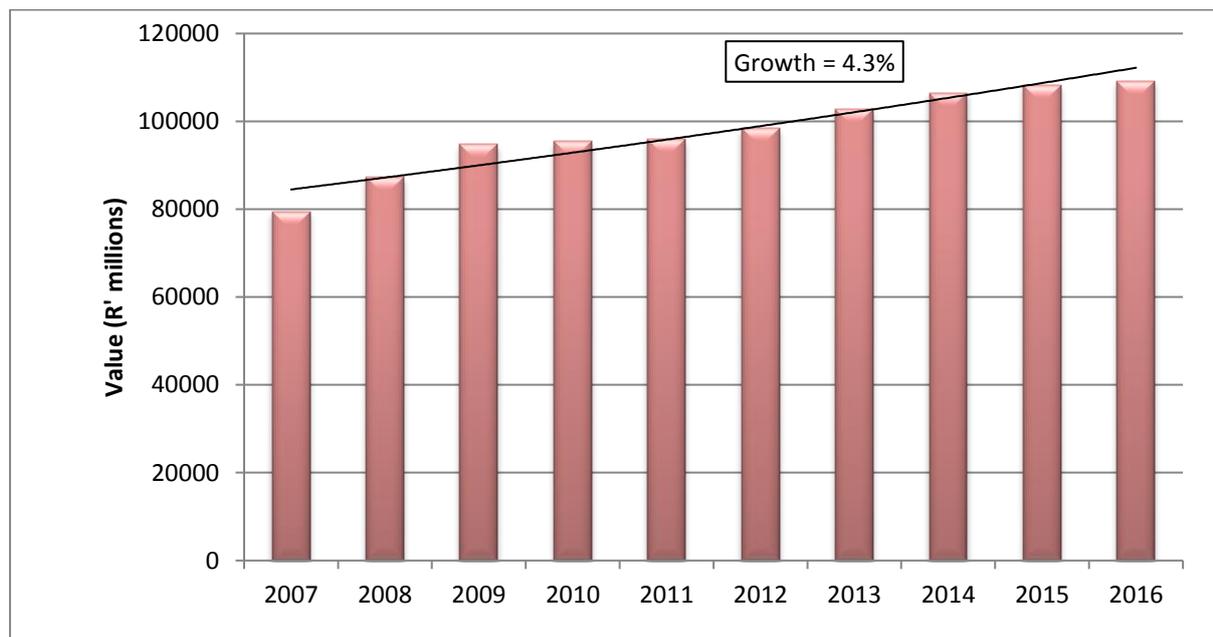
South Africa's road infrastructure is the largest public asset valued at R1.7 trillion. Preserving and maintaining it will ensure that there is consistent demand for raw materials and labour absorption. Government has embarked on labour intensive methods in developing and maintaining public infrastructure, which bodes well with initiatives to reduce unemployment and skills development.

Another major boost to the construction industry will also be driven by human settlement projects as one of the focus areas by government in the mid-term, since decent housing has been identified as a key factor in the fight against poverty and social exclusion. Government has allocated R195.8 billion to human settlement and municipal infrastructure projects, which will positively impact the construction industry and raise demand for cement and limestone.

1.2. MARKET ANALYSIS

Growth in real value added by the construction industry in South Africa for the period 2007 – 2016 recorded 4.3 percent (Fig 1). The real value added by the construction sector for 2016 improved by 0.72 percent to R109.1 billion compared with R108.4 billion in 2015. The real value added by the construction industry improved slightly in the final quarter of 2016 as activity ticked up in basically the non-residential building, civil construction sector and residential building activities.

FIGURE 1: REAL VALUE ADDED BY THE CONSTRUCTION INDUSTRY TO GDP, 2007 – 2016



Source: South African Reserve Bank

The FNB/BER Building Confidence Index recovered some ground, ascending by 2 points to 40 in the last quarter of 2016. Despite the fact that certainty stayed below 50, the fundamental activity indicators especially that of residential contractors and hardware suppliers, propose that development in the sector recovered some force. Conversely, the slowdown in non-residential building activity increased amid the quarter.

In a bid to stimulate economic growth, government has developed a National Infrastructure Plan to better coordinate and monitor activity in the construction industry. Government's commitment towards infrastructural development will cover all priority areas in rail, road and ports, dams, irrigation, sanitation as well as energy. This will have a positive signal for future growth in the industry and the broader economy.

1.2.1. Supply and demand dynamics for raw materials

Raw materials, such as limestone, are essential in the manufacturing of intermediate products like cement to deliver on South Africa's infrastructure programmes. World resources of limestone and dolomite are adequate, thus most countries are able to meet their own input requirements. Limestone is a low-value bulk product hence, most consumption is found in domestic markets especially in the construction sector. In 2016, production of limestone increased by 1.2 percent compared to the previous year. Local sales quantity increased by 4.4 percent to 21 Mt due to a dumping duty imposed to Portland cement, resulting to a revenue increase of 5.9 percent to R3.0 billion (**Error! Reference source not found.**).

TABLE 1: SOUTH AFRICA'S PRODUCTION AND LOCAL SALES OF LIMESTONE AND DOLOMITE FOR NON-AGGREGATE USE, 2007 - 2016

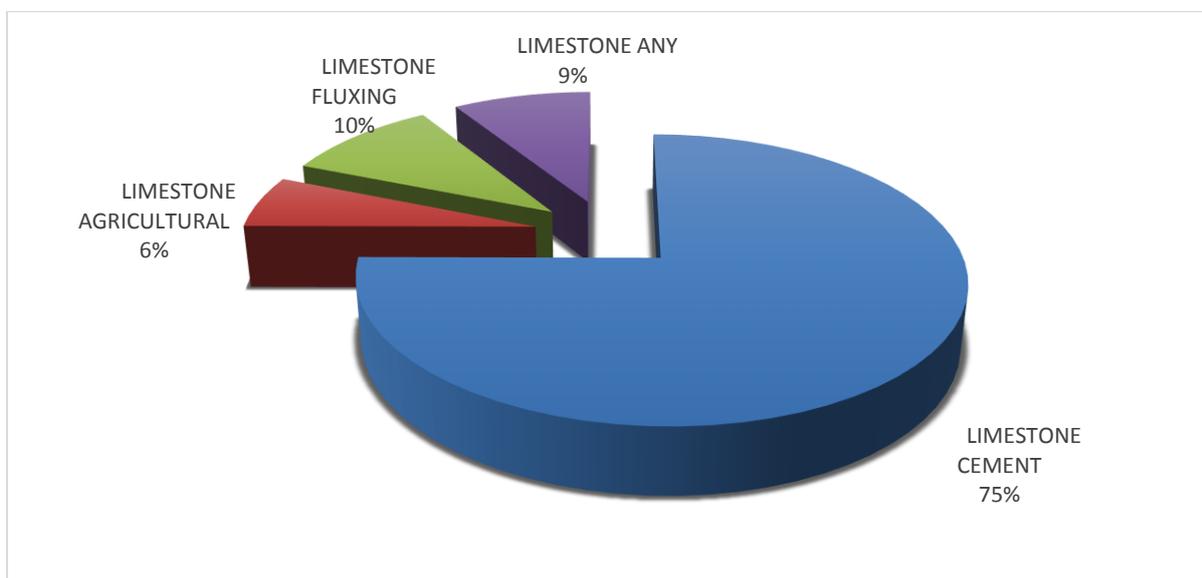
Year	Production	Local sales		Export sales		Total sales	
	Mass kt	Mass kt	Value R'000	Mass kt	Value R'000	Mass kt	Value R'000
2007	23 941	20 493	1 698 294	15	11 510	20 507	1 709 804
2008	23 495	19 781	1 899 279	12	11 234	19 793	1 910 512
2009	22 698	20 001	2 099 165	11	11 263	20 012	2 110 428
2010	22 480	19 226	2 271 133	10	13 325	19 236	2 284 458
2011	21 630	18 507	2 591 727	11	14 337	18 518	2 606 065
2012	21 637	18 479	2 517 772	13	13 190	18 492	2 530 962
2013	21 833	20 097	2 804 944	59	20 539	20 155	2 825 483
2014	21 841	19 042	2 747 857	45	16 795	19 087	2 764 653
2015	22 905	20 406	2 902 761	11	10 605	20 417	2 913 366
2016	23 174	21 295	3 073 142	5	7 883	21 301	3 081 025

Source: DMR, Directorate Mineral Economics

Export sales volume dropped by 54.5 percent to 5 kt triggering a drop in sales value of 25.7 percent to R7.9 million. Export sales volume fell amid weaker international demand for domestically produced limestone.

Around 75 percent of limestone in South Africa is predominantly utilised for cement production (Fig 2) which is a key input material in guaranteeing improvement of economic infrastructure, such as, roads and buildings. Other uses are found in agriculture and metallurgical applications with 6 percent and 10 percent respectively.

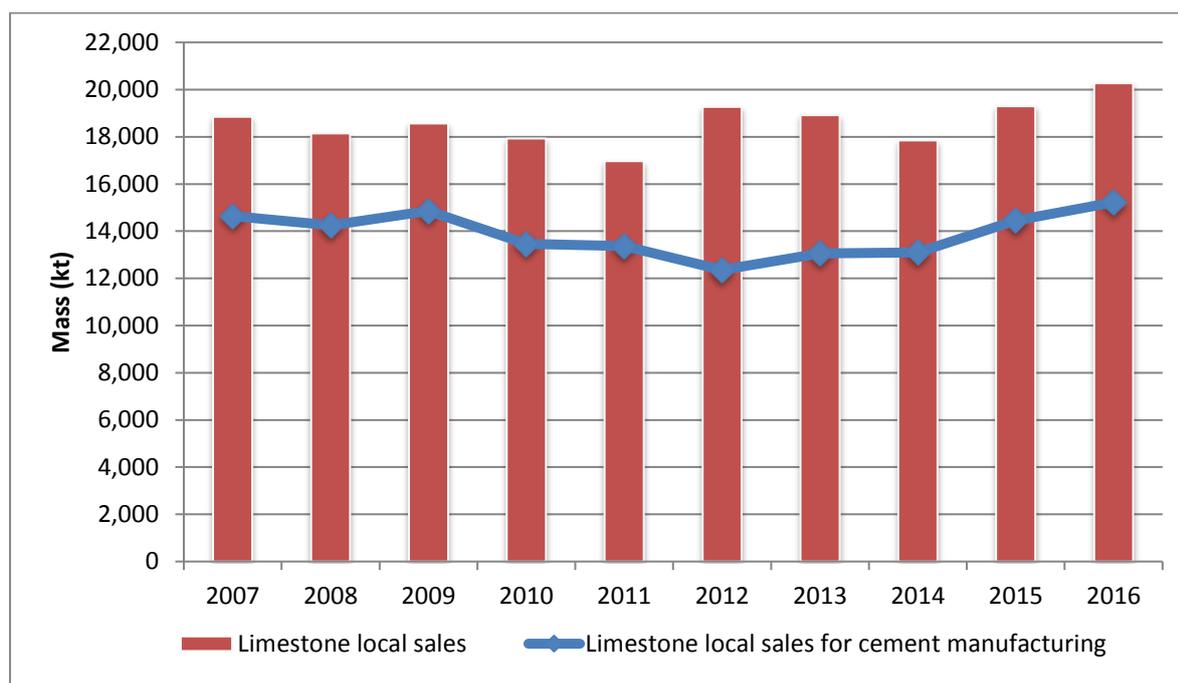
FIGURE 2: DEMAND FOR LIMESTONE BY SECTOR, 2016



Source: DMR, Directorate Mineral Economics

The cement consumption is viewed as a barometer for construction activity which is one of the main drivers of economic growth in the country. South Africa's demand of limestone for cement manufacturing improved by 5.3 percent in 2016 to 15.2Mt from 14.5Mt in 2015 (Fig 3). The improved demand of limestone for cement manufacturing comes as a result of the imposed dumping tariffs on imported cement products from some Asian countries.

FIGURE 3: LIMESTONE DEMAND FOR CEMENT MANUFACTURING, 2005 – 2016



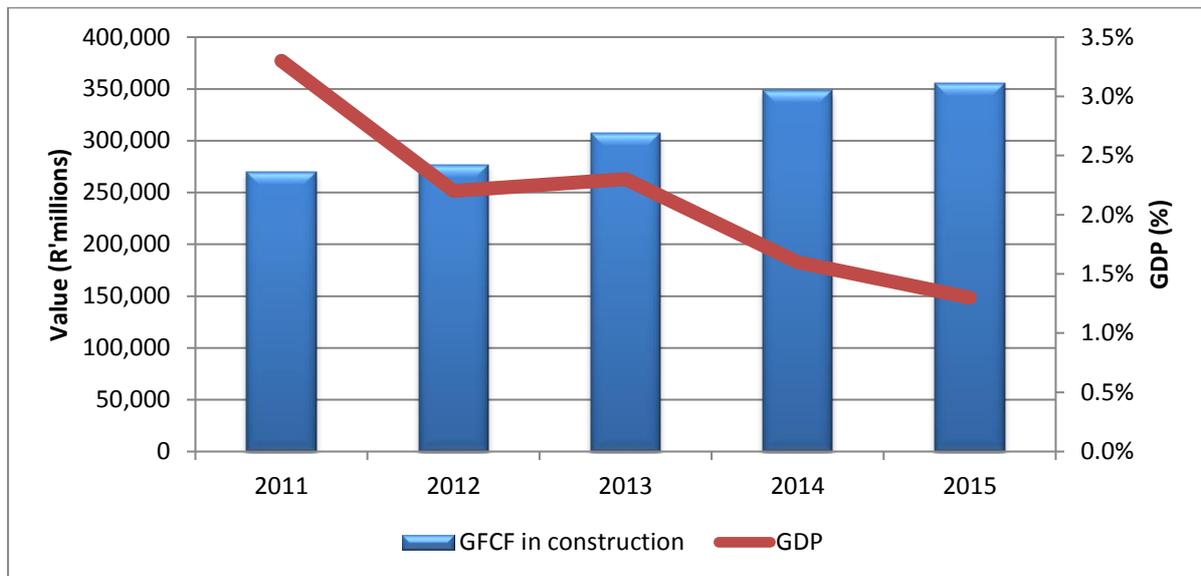
Source: DMR, Directorate Mineral Economics

1.2.2. Correlation between economic growth and infrastructure development

Infrastructure development is one of the instruments of economic development. Much emphasis on this report is based on civil and building infrastructure as main demand drivers for industrial minerals applications. Road infrastructure is a key driver for South Africa's economy because of volumetric consumption between different participants in the economy, (i.e. producers, wholesalers and consumers and also transporting economic active individuals to different work stations). Furthermore, it covers those supporting services that help the development of specifically productive activities like agriculture and manufacturing.

South Africa's real gross domestic product (GDP) grew by 1.3 percent in 2015 down from 1.6 percent experienced in 2014. Nonetheless, during the same period the gross fixed capital formation in the construction sector notably increased by 18.2 percent (Fig 4). Even though GDP slowed down in 2015, the rising trend in infrastructure investment will yield social and economic benefits in the long run, inter alia job creation.

FIGURE 4: RELATIONSHIP BETWEEN GDP GROWTH RATE AND GFCF IN CONSTRUCTION, 2011 – 2015



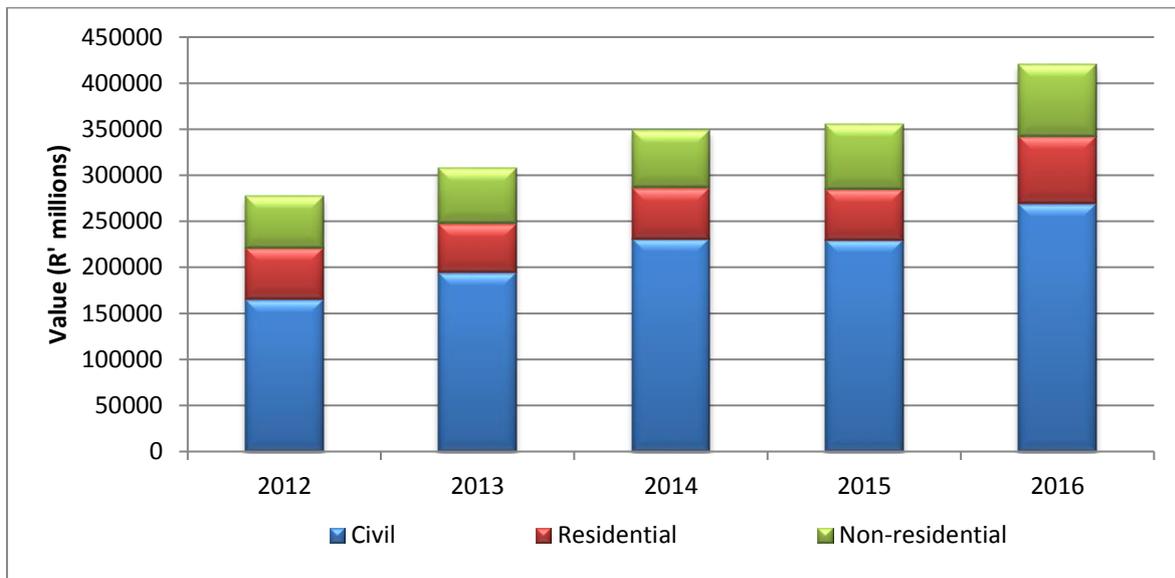
Source: South African Reserve Bank

Large infrastructure projects typically involve huge amounts of spending in construction and potentially maintenance operation. When the economy is depressed, large scale projects act as stimuli for economic growth, increasing production capacity and employment. Therefore increase in expenditure in infrastructure is critical and could be used as a tool to guide industrial policy.

1.2.3. Construction sector

Conditions were challenging for the South African construction industry in 2016, owing to the slow recovery in the economy and low national infrastructure spending. The gross fixed capital formation for construction in 2016 was R420 billion presenting a R64 billion increase compared with the previous year (Fig 5). Currently, civil construction contributes the greatest share of the aggregate construction, adding up to 64 percent of aggregate gross fixed capital formation. Civil construction decelerated in 2015, but started displaying signs of recovery in 2016 with a 17.3 percent year on year growth towards the final quarter. Residential building contributed 17 percent to aggregate construction and non-residential building contributed 19 percent toward the end of fourth quarter.

FIGURE 5: GROSS FIXED CAPITAL FORMATION IN CONSTRUCTION BY SECTOR, 2012 -2016



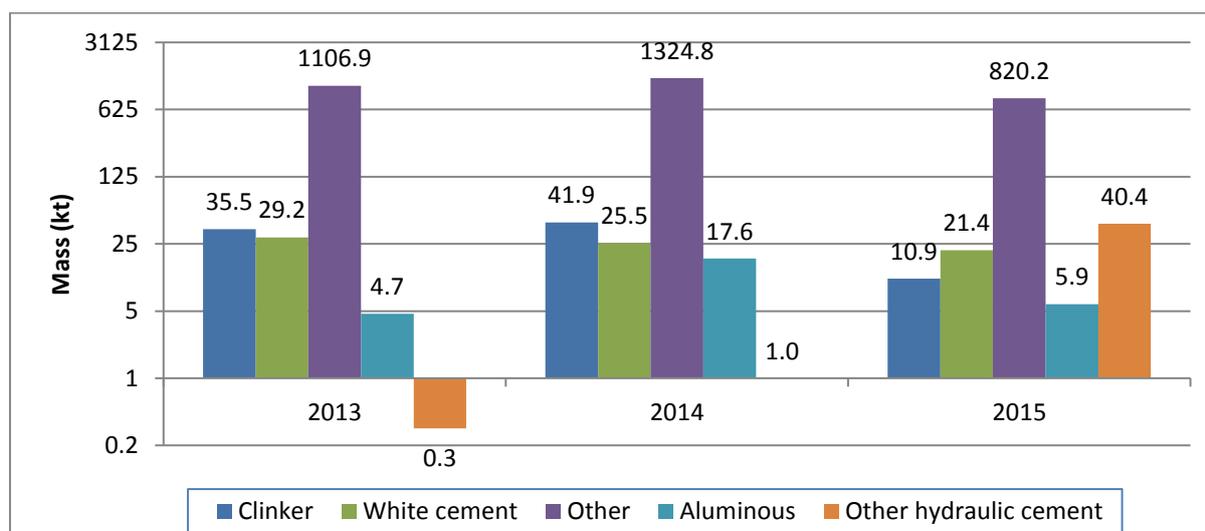
Source: South African Reserve Bank

Current subdued construction activity is expected to be a short-run phenomenon as government expenditure is expected to have a long-run positive effect on the local construction industry. Growth is expected to be sustained by an increase in real gross fixed capital expenditure by government, with the bulk of the capital outlay concentrated on building and civil works.

1.2.4. Imports of cementitious products

South Africa's imports of cement declined by 36.3 percent to 899 kt in 2015 (Fig 6). Imports of cement have essentially declined on a year-on-year basis, on the back of a drop in imports from some Asian countries as a result imposed anti-dumping duties on cement products from these countries. Imports of cement has declined at a rate of 30 percent per annum.

FIGURE 6: SOUTH AFRICA'S IMPORTS OF CEMENT PRODUCTS, 2013 – 2015



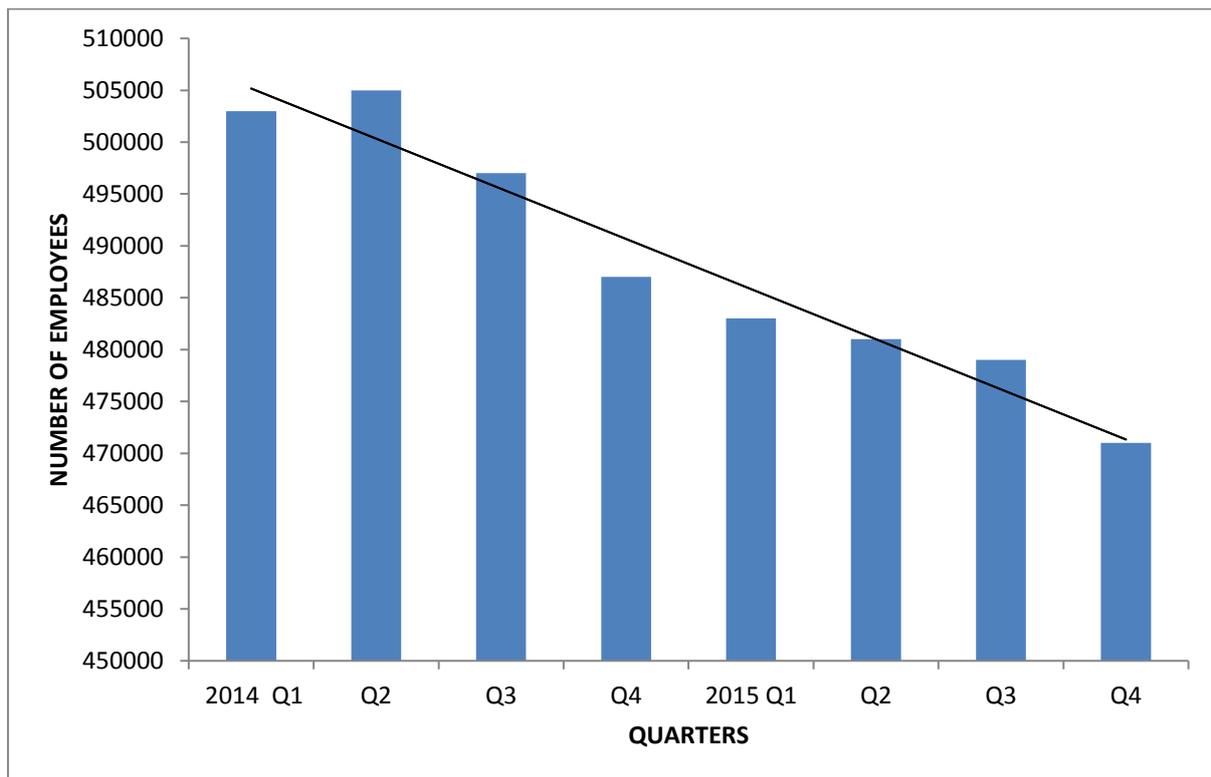
Source: South African Revenue Service, 2015

Pakistan accounted for 83 percent of cement imports into South Africa in 2015 down from 94 percent in 2014, as a result of anti-dumping duties imposed on Portland cement originating from that country. Even though, the import duties have provided some relief to domestic cement manufacturers, local cement producers are still under pressure of squeezed margins. This has seen the domestic cement industry moving towards market consolidation with some producers considering possible options of mergers.

1.3. EMPLOYMENT

Infrastructure development promotes economic growth and labour absorption. According to *Statistics South Africa*, an aggregate of 471 000 people were employed in the construction industry during the fourth quarter of 2015, presenting a 1.6 percent decrease compared with the third quarter of 2015 and a 3.3 percent decline compared with the same quarter of 2014 (Fig 7). Total Gross earnings in construction employment increased by 12.7 percent in the fourth quarter of 2015 compared to the third quarter of the same year and increased by 1.2 percent compared to the fourth quarter of 2014.

FIGURE 7: EMPLOYMENT IN THE CONSTRUCTION INDUSTRY



Source: Statistics South Africa

The construction industry reported an annual decrease of 3.9 percent to 19 000 employees in December 2015 compared with December 2014. There was a quarterly decrease of 1.7 percent to 8 000 employees in December 2015 compared with September 2015. This was mainly due to decreases in employment in the site preparations category.

1.4. KEY DEVELOPMENTS AND PLANNED PROJECTS

According to *National Treasury* the South African government plans to spend R947.2 billion over the next three years on infrastructure projects, which will encourage economic activity and attract investment (Table 2).

TABLE 2: PUBLIC SECTOR INFRASTRUCTURE EXPENDITURE (R' MILLION, CURRENT PRICES), 2014 - 2020.

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	MTEF Total (2017-2019)
Energy	69 600	67 800	65 900	75 000	78 300	81 900	74 300	234 500
Water and Sanitation	25 800	29 500	31 500	37 200	39 300	41 200	44 900	125 400
Transport and logistics	77 800	92 400	81 300	91 400	104 600	105 700	117 400	327 700
Other economic services	13 000	13 000	13 200	16 000	12 600	12 900	13 000	38 500
Administration services	5 000	5 200	6 500	7 900	7 100	7 200	7 500	21 700
Health	10 000	8 700	10 300	11 000	11 200	11 900	12 500	35 600
Education	13 700	15 400	18 000	17 300	17 600	15 800	16 700	50 100
Human settlements	17 000	17 100	18 300	18 300	20 000	21 100	22 300	63 400
Other social services	12 900	13 100	16 300	15 600	16 100	16 600	17 500	50 200
National departments	11 900	13 500	14 500	16 600	16 700	16 000	15 000	47 700
Provincial departments	55 200	56 400	60 600	62 300	64 100	65 100	68 900	198 200
Local government	47 100	53 200	54 700	58 200	56 700	59 100	63 900	179 600
Public entities	15 400	19 200	17 800	22 000	23 900	23 600	24 900	72 300
Public – private partnership	3 900	4 000	4 300	4 800	5 100	5 500	5 900	16 500
State – owned companies	111 200	115 800	109 300	125 800	140 300	145 000	147 500	432 800
Total	244 800	262 200	261 200	289 800	306 700	314 300	326 100	947 200

Source: National Treasury

Alignment of government's programmes in building critical infrastructure has begun to lift constraints to economic growth and productivity. Projects prioritising both national and provincial in the following sectors will ensure sustained activity in the construction industry:

- The Provincial Roads Maintenance Grant is allocated R10.8 billion in 2017/18.

- The South African National Roads Agency Limited (SANRAL) would receive R15.4 billion over the period ahead for strengthening and maintenance of the national road network, which now stands at 21 946 kilometres.
- The Passenger Rail Agency of South Africa continues to implement its modernisation and rolling stock renewal programme. Over the medium term, R16.7 billion is allocated for 70 new train-sets for Metrorail.
- The development and operation of integrated public transport networks, funded through the Public Transport Network Grant would receive R6.2 billion in 2017/18.
- Subsidies for social housing have been rationalised and R600 million over the medium term is reprioritised to the Social Housing Regulatory Authority for investment in rental housing units.

Improved alignment in the delivery of services is central to achieving the objectives set out in the Integrated Urban Development Framework.

1.5. ENVIRONMENTAL IMPACTS

Globally, the built environment is responsible for one-third of carbon emissions. In a bid to remain sustainable the major construction groups have ongoing initiatives to improve their environmental performance by curbing emissions from their operations and reducing their carbon footprint through technology advancements. This trend is supported by green buildings, which uses reduced energy and water consumption. Adoption of environmentally friendly production process is expected to reduce production cost and ultimately lower unit price of cement, and thus increasing the demand for cement.

Another area of opportunity for construction companies to have a broader impact on the environment is through the development of renewable-energy projects. The government has committed to procure up to R200 billion in renewable energy from Independent Power Producers (IPPs). Government aims to procure 14 725 MW capacity of renewable energy from independent power producers, to connected to the grid at different stages. These developments will stimulate activity in the construction industry and contribute positively towards reducing unemployment.

1.6. OUTLOOK

The South African government has made great strides in infrastructure development, achieving the country's long term economic growth objectives. Although construction industry has been relatively depressed, due to the current market conditions, projects are in place to achieve long term economic growth solutions. In a bid to unlock economic growth and reduce unemployment, government has put long term measures in place to eliminate poverty and reduce inequality in the National Development Plan.

The increased spending on infrastructure development will boost cement production and have a ripple effect on the demand for limestone. Investment in infrastructure development is a stimulant for economic growth, thus security for raw materials such as limestone for the manufacturing of cement is pivotal to ensure uninterrupted supply for expansion and development of key infrastructure projects.

The South African National Roads Agency Limited (SANRAL), which is responsible for national road maintenance and upgrading, has been allocated R15.4 billion over the MTEF period for national road improvements, which will stimulate activity in the construction sector and demand for raw materials like limestone and aggregates.

The continued investment in road networks and social infrastructure will maintain a healthy demand for cement, aggregate and limestone in the medium term. Limestone will continue to play a significant role in the manufacturing of cement and ultimately infrastructure development for a very long time as there are no closer substitutes to replace it.

As plans for growth advances, the government will be implementing encouraging initiatives for the future, through the Infrastructure Development plan and Presidential Infrastructure Coordinating Commission (PICC), ensuring that key government projects are aligned and delivered expediently. In order to sustain any kind of meaningful growth in future, the government and the private sector will have to increase investment in infrastructure in the medium term.

CHAPTER 2: FOOD SECURITY AND MINERAL SUPPLY

The agricultural sector of South Africa (SA) contributes about 3 percent to the Gross Domestic Product (GDP). The sector, however has a much greater impact on the economy, as it is linked to many other sectors through buying inputs from the manufacturing sector. This provides raw materials for the manufacturing and purchasing of a host of services. Linkages with other sectors have definitely played an important role in ensuring that the agricultural sector remains one of the key contributors to the country's economy. The mining industry is directly linked to the agriculture sector through its supply of minerals for the production of fertilisers amongst many other linkages with other sectors. About 50 percent of vermiculite is consumed by agriculture. The mining sector is also another key contributor to SA's economy, contributing about 8 percent to the GDP in 2015. However, the contribution of the both mining and the agriculture sector has been declining in the past years but they remain key drivers in ensuring food security for the country's citizens at a time where there is looming food shortage.

Food security is one of the priority areas that have been identified by government to alleviate poverty, as such, it has embarked on programmes that promote access to nutritious food to communities. In addition, the proposed amendments to the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) will allow for some minerals to be declared as key minerals, which are regarded as critical for the country's developmental imperatives. Identified areas include, but are not limited to minerals used in infrastructure development, energy generation, food security and industrialization of the country's economy. For example, phosphate rock plays an important role in fertilizer production, which is key in producing food. Vermiculite on the other hand has a number of uses in agriculture that also contribute to better outputs. A better performing agriculture industry does not only contribute towards ensuring food security within the country but also eliminates total dependence on imported food, which impacts positively on the economy of the country.

Various researches have indicated that the collaboration of the mining sector and agriculture sector can yield great results in terms of contribution towards the economy and securing food for local citizens.

2.1. CONTRIBUTION TOWARDS THE ECONOMY: MINING AND AGRICULTURE SECTORS

2.1.1. Mining Sector

SA's economy is amongst Africa's most developed economies and has been built on the back of mining. The mining industry is about a century old but is very far from being fully tapped. The country is a treasure trove, with mineral deposits only matched by a few countries. Mining has been the driving force behind the economy; shaping the country's socio-political and cultural development in the process. The first mine was established in Springbokfontein farm in 1852. However, since mining activities have ceased, the area is still littered with old mine relics. Namaqualand can be considered as the cradle of SA's commercial mining, a real catalyst of the mineral revolution, on the back of which the country's modern industrial economy has been built, for example the discovery of diamonds in the Northern Cape in the late 1860s. The discovery of the 21¼ carat diamond Eureka in late 1866 and then the 83½ carat Star of South Africa in 1869 sparked the country's first great mineral rush, with more than five thousand diggers rushing first to the Vaal River and then Kimberley. The Big Hole, which is one of South Africa's most iconic mines, operated for 43 years between 1871 to 1914 and produced a phenomenal 14.5-million carats, among them the famous 128.53 carat Tiffany Yellow Diamond.

As result of such amazing discoveries the country has boomed towns sprung up on the gold and diamond fields. Immigrants and migrant labourers flooded in to seek their fortune and ancillary businesses were established by entrepreneurs eager to capitalise on the opportunities presented to them. As a result, the economy transformed in a very short space of time from one based simply on agriculture and trade into a thriving economy based on the rich mineral reserves located underground. Mining contributed directly to the establishment of the Johannesburg Stock Exchange. The development of infrastructure thus, provided the catalyst for the development of other economic sectors and, in so doing, elevated the status of the SA local economy.

With the growth of South Africa's local secondary and tertiary industries, as well as the decline of gold production, mining's contribution SA's GDP has declined over the past few decades but continues to make a valuable contribution to the economy (Fig 8), most notably in terms of foreign exchange earnings, employment and economic activity. The decline, however, may be offset by an increase in the downstream or beneficiated minerals industry, which the government has targeted as a growth sector.

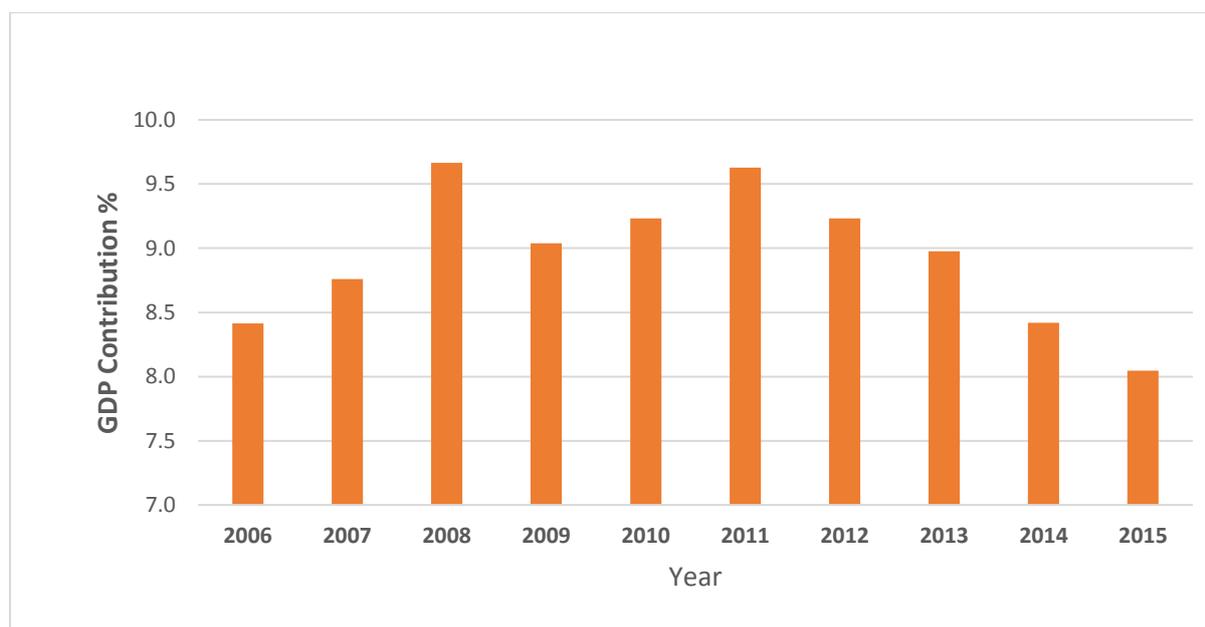
The mining industry continues to play an economical and socioeconomic role in SA's development. The country has 96 percent of known global reserves of chrome, manganese and gold reserves, respectively. As a leading producer and supplier of a range of minerals, the country offers a highly competitive investment location ensuring that it can meet specific trade and investment requirements of prospective investors and business people, whilst also meeting the development needs of its populace.

Mining companies are under pressure from rising operating costs and low commodity prices. Capital investment has been declining since 2008, making job creation difficult. Employment dropped by 7.0 percent from 481 521 in 2015 to 457 292 in 2016 while remuneration increased by 4.0 percent from R114.0 billion in 2015 to R118.9 billion in 2016, adding more pressure to operational costs.

SA shifted from a primary to a secondary economy with the discovery of gold and diamonds, and is currently making a transition to a tertiary economy (up to 65% of GDP now comes from this sector). Nevertheless, mining continues to play an important role in the economy of the country, as a foreign exchange earner and employer of the people. However, the mining industry will also have to make some serious changes to stay relevant, including an increased emphasis on:

- Sustainable mining methods (which take into account the social and environmental impact of the industry);
- Value addition through beneficiation, achieving BEE targets and
- The promotion of equitable sharing in a rich resource base.

FIGURE 8: MINING GDP CONTRIBUTION, 2006-2015



Source: South African Reserve Bank

The industry remains faced with myriad of challenges, after more than 160 years of commercial enterprise. It is riddled with rising commodity prices, declining demand, and labour unrests. However, SA still has one of the most diverse and important mining industries in the world, as well as attractive resource base that holds much promise for future mining activities. Its contribution to the economy continues to be diversified as new ways are sought to maximize the full potential of the industry through beneficiation. Beneficiation is one way to ensure that mineral resources contribute towards the country's economy by expanding downstream value addition.

2.1.2. Agriculture Sector

The agricultural industry goes way back before the Second World War, which ended in 1945. Agricultural activities were undertaken for private consumption at the time. Before 1994, about 73 percent of land belonged to the white population of South Africa, while black people only occupied tribal areas. Agriculture generally developed during the 1960s at a greater rate with significant expansion taking place in all sectors. However, agriculture suffered the serious effects of high inflation and debt that eroded other sectors of the economy in the early 1990s. Post-1994 the most significant achievement in terms of policy change was the deregulation of the marketing sector to bring it in-line with the social and economic democratization of the

country as well as with international trends. During the transformation process, greater emphasis was placed on developing small-scale agriculture.

The agriculture sector is crucial to SA socio-economic development. However, the future of the sector depends on critical issues such as climate change, population growth, skills shortages, changes in consumer needs and shifts in the global economy and related market. The sector is one of the most employment-intensive sector of the economy, its potential impact on empowerment and poverty relief is much larger than its actual weight in the economy suggests. While the primary agricultural sector contributes about 3 percent to the country's GDP, it represents about 7 percent of formal employment. It is also important to note that the sector is labour-intensive compared to other sectors, because it employs about 4.6 percent of the total labour force. The mining and manufacturing sectors, in comparison, represent 8.5 percent and 12.5 percent of the economy whilst employing only 2.3 percent and 11.8 percent of the labour force respectively. The agricultural sector therefore uses two units of labour per unit of value added, whilst the ratio is 0.3 and 0.94 for the mining and manufacturing sectors. If the entire value chain of agriculture is taken into account, its contribution to GDP reaches about 12 percent. It is also a major earner of foreign exchange. The primary agricultural sector has grown by an average of approximately 9.9 percent per annum since 1970, while the total economy has grown by 12.9 percent per annum over the same period, resulting in a drop in agriculture's share of the GDP from 7.1 percent in 1970 to 2 percent in 2015. All these factors emphasize the key role of the agricultural sector to national and household food security.

The spending focus is on increasing food production by providing agricultural support to smallholder farmers through the comprehensive agricultural support programme; and implementing the Landcare, Ilima/Letsema food production and Fetsa Tlala food security programmes. The linkage of mining and agriculture is recognized right in this programmes. Apart from incentives that are issued to such programmes, farmers are trained to maximize harvest, which include the use of fertilizers in small allocated land areas. Phosphate is used in the manufacturing of fertilizers, while vermiculite may be used in so many different forms in agriculture. When these fertilizers are manufactured locally to support this projects the economy gets a boost from the different sectors, such as the mining, agriculture and fertilizer sectors, respectively. The former sector also ranks high in terms of its backward linkages with the manufacturing sector. Continued investment in extension, research and infrastructure (particularly transport and irrigation) will have a significant impact on a large number of households and the greater economy due to its employment and food security effects. This would also ensure that the sector maintains its international competitiveness and resulting positive trade balance.

The industry currently faces a number of challenges that include scarcity of water resources, desertification and soaring input costs. In addition, land reform has been a thorny issue in the history of the country when addressing these various problems. A land reform policy was formed which consist of land restitution, tenure and redistribution. Land restitution is a legal process whereby people who can prove that they were dispossessed of their land after 1913 can regain their land or receive due financial compensation for it. Land tenure aims to address insecure tenure in the former homelands and land redistribution aims to redress the racial imbalances in land ownership. The land redistribution policy has been identified as one of the key policies within SA; it covers support services and finance for farmers in a form of low interest loans.

2.2. CONTRIBUTIONS OF MINING AND AGRICULTURE TOWARDS FOOD SECURITY

SA needs the mutual coexistence of both agriculture and mining sectors in order to realize rapid economic growth in the country and meet the National Development Plan objectives by eliminating poverty and reducing inequality by 2030. Government needs to seek ways to enable the co-existence of the two sectors. The two sectors have been identified as critical key job drivers by absorbing unskilled workforce. However, mining activities have been found to pose a serious threat to arable land, water resources and food security. Mining activities are often associated with pollution and loss of soil fertility, which could be a threat to food security if not properly managed. The other major challenge posed by mining activities is water contamination and land degradation. Water is a scares resource; which needs to be used sparingly. Land that is degraded is weaker than under graded land, which can lead to even further degradation through shocks to the landscape. Such land need to be rehabilitated back to a state usable for agriculture.

After the 2008 food price increases that threatened food security, linkages between the mining and agriculture have been reconsidered. The SA government has already redirected funds to focus on the role of agriculture to secure food in the country. Mpumalanga is the country's major coal producer accounting for 80 percent of the coal that generates power and gets exported. This region presents an opportunity to demonstrate how mining can still exist alongside agricultural activities and contribute towards the local vision for economic development, job creation and food security.

According to the *European Centre for Development Policy Management* (ECDPM) in Maastricht, the mining industry can contribute to the development of local communities, perhaps by moving a step beyond traditional corporate social responsibility towards corporate economic responsibility activities. Mining can also play a constructive role by providing complementary support to local communities in developing productive economic activities. These could come in two main forms, namely:

1. Supporting the development of linkages within the mining sector, by providing services to the sector or by developing upstream and downstream industries to transform raw materials into higher value-added products. For example, phosphate mining company can add value to local communities by contributing to economic activities like diversifying downstream and developing a fertilizer production plant.

2. Promoting linkages outside the mining value chain notably in the field of agriculture, given its importance in many African resource-rich countries.

There is a strong need to set up a solid industrial base, hence temporary industrial linkages are axiomatic and undisputable. But complementary to this, exploring the linkages between agriculture and mining is equally important for self-evident reasons: agriculture is the engine of growth for many African countries, which own a quarter of global arable land.

The SA government together with mining companies could use the mining sector to compensate and lift the agricultural sector to a higher level of development, notably by using financial resources from the mining sector to incentivise agriculture projects. Support to the value chain development and to local entrepreneurship in agribusiness is therefore, key.

Furthermore, the SA government has strong interests in making sure that policies in both sectors are designed in such a way that they generate positive outcomes and complement each other, rather than antagonize one another. This way, benefits from mineral resources will trickle down to the rest of the economy and act as a catalyst for broader economic transformation and ability to create stability in food supply to the citizens.

2.3. POLICY

SA has sufficient regulatory instruments to manage the symbiotic relationship between mining and agriculture. These regulatory instruments are predicated on the Constitution, the supreme law of the land, which guarantees the right to an environment that is not harmful to human health and well-being. It prescribes that the environment should be protected for the benefit of

present and future generations. It enshrines the right to basic necessities such as food and water. The Constitution also affords the right to exploitation of natural resources for the benefit of all South Africans. It enjoins the State to take reasonable legislative and other measures to ensure the realization of these rights.

The State has, since the advent of democracy, developed a plethora of legislations and policies to regulate mining and agriculture to achieve the model objectives enshrined in the constitution. The sustainability of agriculture and mining is based on sustainable and integrated management of natural resources as well as prudent environmental management. This is evident by the fact that, three departments look into mining applications including Department of Environmental Affairs, Department of Water Affairs and Sanitation and Department of Mineral Resources. The MPRDA is part of the pursuit of legislative reform that embodies the spirit and support of the constitution. The Act provides for ecologically sustainable development of the nations' natural resources and seeks to promote economic and social development.

Regulatory framework of governing mining and agriculture evolved over time, to resolve challenges that used to impede coexistence of these two sectors. In addition, the framework continues to evolve, illustrated by amendments to the MPRDA, which seek to improve on the consultation process by the applicants with surface right or land owners, in particular, and interested and affected parties. The detailed and involved consultation process will entail giving adequate notices, clear and accurate information to surface rights or land owners regarding the planned prospecting or mining operations. These have enabled the parties to make informed decisions regarding the impacts of mining on land and the necessary measures to safeguard the environment. Structures such as the Regional Mining Development and Environmental Committee (RMDEC) and a Ministerial Advisory Council (MAC) are dully constituted by representatives of relevant State Departments within the national, provincial and local sphere of Government or relevant organs of state within each sphere. They have been established to consider issues, including co-existence between relevant sectors and advise accordingly in the spirit of co-operative governance and to advance the national developmental imperatives.

The proposed amendments to the MPRDA bill will make provision for certain minerals to be declared strategic, once enacted. These are minerals that the Minister of Mineral Recourses will, after consultation with the minister of a relevant state department, declare as strategic from time to time in the Gazette, having regard to the national interest and the need to promote sustainable development of the nation's mineral and petroleum resources. Minerals necessary

for agricultural purposes may for example be subject to this provision, highlighting their significance in ensuring a food secure country. Laws put in place, need to ensure that key minerals are preserved for long term purposes to avoid shortages in future, for example regulating the export of minerals needed for meeting the country's developmental objectives.

The proposed amendments to the MPRDA further provide for an integrated approach to licensing. This entails synchronized processing and approval of applications for water use licenses, environmental authorisations and mining rights. The mine environmental management function have effectively been removed from the MPRDA and transferred to the NEMA. The transfer of the mine environmental management function and synchronization of processes is consistent with the principles of co-operative governance as enshrined in the constitution and aimed at improved environmental protection and sustainable exploitation of the Nation's mineral and petroleum resources.

The Environmental Impact Assessment (EIA) also took effect on 8 December 2014 and repealed its regulations, published on the 1st August 2010. These regulations include a number of provisions to provide for the transition of the environmental regulation of mining from the MPRDA, No. 28.2002 to the National Environmental Management Act, No.2 1998 (NEMA). Under this regulation Minister of DMR will be authorized to appoint Environmental Mineral Resource Inspectors, who will have the same powers as Environmental Management Inspectors under NEMA to enforce environmental legislation at mines. This will ensure minimal damage to the environment until satisfactory compliance to environmental laws regulating the mines. The regulation will also ensure that rehabilitation is implemented once mining is complete.

2.4. MAXIMISING LINKAGES BETWEEN THE MINING AND AGRICULTURAL SECTORS FOR ECONOMIC DEVELOPMENT

Agriculture and mining both rely on global natural resources to create wealth. As industries, they also rely on each other to prosper. Agriculture depends on mined minerals such as phosphates to fertilize the soil. On the other hand, mining needs agricultural products to feed the industry's workforce. Apart from these dependencies, mining and agriculture share the need for infrastructure which both entail the risk of environmental damage and have impacts on local communities. Finally, agriculture and mining can compete for key resource-based inputs such as land, water and labour.

Both industries can aid national economic growth, contribute to a healthy trade surplus and provide an inflow of investment capital. Each can have positive or negative consequences for the other industry. To maximise the positive and mitigate the negative consequences, agriculture and mining must work together. This requires clear policy frameworks and coherent industry strategies.

In order to make the most of linkages between the two sectors, the following issues below must be addressed:

- How to ensure positive, sustainable outcomes from mining and agriculture for food security and development;
- How policy, investment, and research and development can be better used to provide pro-poor benefits;
- How to use the expertise and infrastructure from mining in developing countries; and particularly in Sub-Saharan Africa, to help poor agricultural and rural communities emerge from poverty

According to Forum for Agricultural Research in Africa, improving the productivity of agriculture is central to addressing poverty in Africa. Currently, the industry uses only basic technology, a major contribution to often low yields for strategic crops and livestock. By investing in research and technology, agriculture could close these gaps to drive the economies of Africa and attract an ever increasing unemployed or under employed and disgruntled youthful population and convert untapped arable land into gainful agriculture.

Furthermore, according to ***Comprehensive Africa Agriculture Development Programme (CAADP)*** an organization that seeks to address policy and capacity issues across the entire agricultural sector and African continent the target should be to see:

- Dynamic agricultural markets within countries and between regions in Africa;
- Farmers taking part in the market economy and enjoying good access to markets so that Africa, could capitalise on its comparative and competitive advantages, becoming a net exporter of agricultural products;
- A more equitable distribution of wealth for rural populations-in terms of higher real incomes and relative wealth. Rural populations will have more equitable access to land, physical and financial resources, and knowledge, information and technology for sustainable development;
- Africa as a strategic player in agricultural science and technology, meeting the growing needs and demands of African agriculture; and

- Environmentally sound agricultural production and a culture of sustainable management of natural resources as a result of better knowledge, more information and the application of technology.

When a mine site is established there is a lot of new infrastructure that comes with it-often new or larger ports, transport networks, new accommodation, as well as whole new towns and all of the services that come with that, including water supplies and emergency services. Sometimes it can mean giant leaps forward in agriculture or some other area as a result of mining. Production from mining cannot be consumed, however, mining revenues can indirectly make mining outputs into food through the income generated which can be used to improve agricultural outputs and to provide greater income security to their populations. This strategy was adopted in Botswana. Botswana's government, however, has not focused on food self-sufficiency, but on economic diversification to improve family incomes so that people can buy more nutritious food and support a more efficient and innovative agricultural sector. Mining can be a catalyst for structural transformation, benefitting a range of industries including agriculture.

Natural resources in themselves are not a curse, provided countries are not dependent on one natural resource. Diversity in natural resources will enable countries to address bottlenecks that can benefit other sectors, strengthening government policy, building skills capacity and promoting valuable linkages.

2.5. OPPORTUNITIES AND CHALLENGES FACED BY THE INDUSTRIES

According to the *Farming Facts and Futures Report 2015* by WWF, SA agriculture sector is at a significant crossroads, facing numerous challenges that all need to be resolved concurrently. Increasing resource limitations include depleted soils, over-extracted soils and polluted water. This sector is also most directly exposed to increasing risk and vulnerability due to climate change. Changing weather patterns alter rainfall patterns and water availability, resulting in shifting, unpredictable growing seasons and variability of crop yields.

SA economic growth and development will increasingly be based on trade-offs between the mining and agriculture sectors for access to limited and constrained resource base. This includes increasing competition between these sectors for limited available water, land and energy resources.

Rising wealth, urbanization and a fast-growing middle class have changed the country's consumption patterns, with more citizens consuming excessive processed and high-protein foods, especially meat, dairy products and empty calorie high sugar diets. These foods are more land and water-intensive than fruit, vegetable and grain crops, and further stress existing land resources.

In an effort to address such challenges, WWF South Africa, in partnership with Nedbank, has developed a sustainable agriculture programme. The programme works in collaboration with the agricultural sector and other key stakeholders to effectively maintain healthy, functioning ecosystems within farmlands through the development and implementation of sustainable production practices.

Plans and programmes towards ensuring food security for South Africa are in place supported by Government's commitment as outlined in the objectives of the National Development Plan. In 2014 the heads-of-states of African countries signed the Malabo Declaration to affirm their commitment to the eradication of hunger and to halve poverty by 2025. All 54 members of the African Union signed the declaration. By signing this declaration each member agreed to adopt sound policies for agriculture and rural development and allocating at least 10 percent of their national budgetary resources towards implementation of these policies in five years.

South Africa's local fertiliser industry is exposed to international markets and uncertainty of the exchange rate within agricultural value chain. The country is importing increasing amounts of fertiliser on an annual basis to satisfy local demand. This poses a challenge in that the country is becoming increasingly reliant on imports, which has a negative effect on food prices as well as on the grain producers ability to produce affordable food in case of an international shortage. This situation need not be prevalent as the country has potential in expanding its fertiliser industry to cater for domestic use and supply neighbouring countries.

Phosphate rock is an essential mineral used in the production of fertilisers. Unfortunately, it is a non-renewable resource with current global reserves expected to be depleted in 50 -100 years. South Africa's reserves are estimated at 1.5 Mt and the country is ranked 5th in the world. It is important that the government ensures more effective ways to preserve the minerals and continual future supply of minerals. The country cannot afford to allow for accelerated depletion of phosphate rock, only to import it in future. This will only put an upward pressure on production costs of fertilisers, which will in turn make the product expensive. This scenario could lead to difficulties in food production, which would result in food shortage in the country. Farmers also need to adopt new farming methods, such as planting high-yielding crop

varieties and applying nutrients, notably nitrogen, phosphorus and potassium (NPK) and other inputs such as biological control of pests. The use of fertilizers, some derived from phosphate rock has been successful in alleviating a great deal of hunger in the face of significant population growth. In order to sustain agricultural productivity at current and predicted future levels, it is crucial to determine the full extent of the supply of this finite resource.

Infrastructure that is used to produce primary fertiliser materials is very old and also expensive to replace. However, as part of social responsibility, mining operations in agricultural regions could consider investing in agricultural infrastructure through technology. This situation would also present expansion in investment opportunities and development of new plants to meet the domestic demand. The fertiliser industry of SA is dominated by a few large suppliers that supply raw materials to other fertiliser manufactures, opening up an opportunity for more players to come on board to ensure sufficient supply to the industry.

Transport and distribution costs of fertilisers are significant contributors to the price of fresh produce to local farmers. Transportation is mainly conducted by road, but use to be predominantly by rail in the last ten years. However, it is much more cost- efficient for phosphate producers to move enough phosphate rock to produce phosphoric acid and MAP between Phalaborwa and Richards Bay through rail transport.

2.6. OUTLOOK

Achieving the best outcomes for local agriculture by government without help could be difficult. Aid agencies and Research Organizations thus have an important role to identify and promote best-practice approaches. It appears that the ingredients to enhance economic development are already available, however they need to be mixed well, this is to say different ministries, and different Government Departments need to communicate much more as a whole government to come up with the relevant policies to establish the enabling environment that would allow the two sectors to work together. Effective policy-coordination is necessary to support better systems of innovation in both sectors. An Africa-wide coordinating body may be needed to facilitate such a cross-sectorial approach.

There is no doubt that a well-managed and imaginatively governed mining-development could bring significant benefit to agriculture. However, the challenge is to create the context where such conditions can exist. Furthermore, the role of mining in the economy plays a significant

part in ensuring food security in the form of direct activity or indirectly by supporting social and labour plans geared to develop agriculture.

Where mining and agriculture already co-exist, its success will depend on the preparedness of the government, communities and the mining industry to work together to create sustainable, pro-poor development. When all is in place, economic success is inevitable. The mining and agriculture sectors will support one another and contribute even more to the economic growth.

CHAPTER 3: CHEMICAL EVOLUTION

South Africa's chemical industry is the largest in Africa. It has a major role to play in ensuring that the growth of this sector in South Africa becomes a catalyst for continental competitiveness. The chemical sector has a potential of creating local value chain alignment and integration of other sectors into main stream economy leading to job creation. The chemical industry's contribution is about a quarter of South Africa's manufacturing production and it produces noteworthy yields that are used in practically all other economic sectors of industry.

Fluorspar is an essential mineral, with many downstream applications that are essential to a variety of vital industrial procedures. Its primary use is in the manufacturing of hydrogen fluoride (HF). Hydrogen fluoride is the first building block obtained from fluorspar for the production of fluorochemicals. Given its basic part in the fluorochemical, aluminum and steel area, the supply of fluorspar would be significant for economic stability in future.

Fluorochemicals are substance compounds that have fluorine particle in their structure, they range from the simple fluorine gas (F_2) and hydrogen fluoride to the more complicated fluorinated organic compounds, such as, perfluorodecalin ($C_{10}F_{18}$). The pharmaceuticals and agrochemicals industries are of critical significance, as they are high value products. Fluorochemicals, produced using naturally occurring fluorspar, are subsequently used to make the dynamic pharmaceutical ingredients in medicines. Approximately 15 percent of the medications that have been marketed in the previous 50 years contain fluorochemicals.

According to the *Department of Trade and Industry (the dti)*, the medical goods sector, which comprises of pharmaceuticals, medical devices and medical diagnostics, is the fifth largest contributor to South Africa's trade deficit. Government is targeting the pharmaceutical industry as a growth area for high technology, economic development and employment.

South Africa holds the largest reserves of fluorspar in the world, only 5 percent of these reserves are being beneficiated and about 95 percent of mined fluorspar is exported in its raw form. Pelchem is the only fluorochemicals producing company in South Africa, with its plant based at the Nuclear Energy Corporation of South Africa's (Necsa's) campus at Pelindaba.

The fluorochemicals sector play a crucial role in meeting the needs of an expanding world and in providing solutions to the challenges of the future. It greatly contributes to a more

sustainable society by developing innovative technologies and products while ensuring the safe, responsible and sustainable management of chemicals throughout their life cycle. The development of fluorochemicals in contributing to the growth of the country will further be outlined.

3.1. CHEMICALS INDUSTRY

The South African government has identified the manufacturing and chemical sectors as one of the sectors with potential to catalyse industrial growth. The South African chemical industry has achieved many successes after the implementation of Responsible Care programme, which is a unique, voluntary and global initiative that is committed to help raise the industry's standards. This sector continues to strengthen its commitment to sustainability.

The South African chemical industry is of considerable significance to the economy. The chemical industry contributes approximately 5 percent to the country's gross domestic product (GDP), 25 percent to manufacturing output and employing over 200 000 people. In 2015, the South African chemical industry output was valued at R383 364 million and basic chemicals output valued at R115 870 million. The export and import value of the industry sales amounted to R66 billion and R113 billion respectively.

The country's petroleum and chemical productivity contracted in the fourth quarter of 2016 instigating contraction in the manufacturing industry by 3.1 percent. However, local manufacturers have also benefitted from both a weak rand, which has managed intensity, and relatively less expensive costs when considering in transportation of imports, which has helped to keeping up current production levels.

The products of the chemical industry are used throughout various downstream sectors, where they play a crucial role in our daily lives, taking from components of luxury goods, to indispensable products such as those that purify drinking water, those that cleanse and provide health benefits, as well as the products that are used to treat diseases and infections through pharmaceuticals.

3.2. UPSTREAM AND DOWNSTREAM INDUSTRIES

The South African chemical industry is diverse and complex. It consists of two broad based categories, namely upstream sector which is concentrated and well developed and

downstream industries which is diverse but remains underdeveloped. A well-developed upstream industry is technologically intensive in the manufacture of basic chemicals as raw materials and downstream chemical sector is labour-intensive and turns the raw materials from upstream sector into intermediate and final products (the dti).

The chemicals sector is the fourth-largest employer in manufacturing, behind food products, motor vehicles, parts and accessories, and metal products. Products of the chemicals and metals sectors are the basis for almost every manufacturing activity. The chemical sector is thus a crucial industry from for advancing South Africa's economic growth.

3.3. OPPORTUNITIES IN THE CHEMICALS INDUSTRY

The chemical sector created numerous creative activities to encourage satisfactory jobs while expanding supportability. Supportability is a business basic for the industry, and many firms now have a maintainability technique or strategy set up. The global economic crisis has significantly affected work in the chemical industry. Numerous specialists, in all cases, have lost their occupations, and financial recuperation is probably not going to prompt a quick change in the work circumstance. The economic stillness, has given the chemical sector a chance to build its upper hand through activities to make the industry more aggressive, beneficial and productive.

The chemical industry employment activities are creating work opportunities and will progressively do as such. The chemical industry employment was estimated at 156 570 employees and the employment figure of basic chemicals was 23 025 individuals with relative declines in employment being observed in the past two years (Quantec, 2016). The slow growth in employment matches with the moderate economic development seen in the industry. There are a few components that effect on the execution of the chemicals industry and on the demand of abilities in the sector.

There are opportunities in the African marketplace, where there is potential for chemical industry exports, with roughly 50 percent of these exports from South Africa. There is additionally collaboration on energy supply as Independent Power Producers were presented by the Department of Energy in 2016, which have prepared R195 billion in direct investment and brought 2145 MW into the energy grid, the simplicity of trade and international freight logistics and contribution on employment training efforts.

3.4. CHALLENGES IN THE CHEMICALS INDUSTRY

South Africa currently supplies about 10 percent of the fluoride requirements to a global fluorochemicals industry but earns less than 0.5 percent revenue of the US \$20 billion global fluorochemical industry due to low levels of basic chemical conversions that take fluorspar into value-added materials to serve multiple industries.

Studies conducted on the local chemical industry states that “Local chemical market is becoming increasingly competitive, owing to intensified regulations on emissions and waste, which puts chemicals manufacturers and end-users under pressure. The biggest challenges in the South African chemicals market are the large volumes of raw chemical materials that continue to be imported and are subject to exchange rate fluctuations.

There are a number of challenges facing fluorochemical suppliers, such as obtaining access to key raw materials such as fluorspar, as exports from China have increasingly come under restrictions. Another challenge is dealing with the ever shifting regulatory environment for fluorocarbons, which are subject to multiple global and national regulations that vary considerably and change over time, as well as the competition with alternative products which is increasing in a number of sectors, particularly blowing agents and commercial refrigeration, placing pressure on fluorochemical suppliers serving these markets”.

Major challenges facing this sector include poor domestic demand, high imports and a volatile exchange rate. One of the underlying issues is the transformation of the sector to increase the level participation by ensuring the empowerment of previously marginalised individuals.

Another challenge is the outdated technology and processes used to refine and produce chemicals in South Africa. As a result, the chemical products manufactured are not competitive, compared with similar international goods, lowering demand for locally produced chemicals. Upgrading technologies requires high capital investments, which are not easily accessible in South Africa, owing to high cost. In 2015, the chemical industry was hit hard by electricity tariff hikes and load shedding as their processes depend heavily on electricity consumption, but the grid has stabilised since then.

3.5. POLICIES

The Strategic Approach to International Chemicals Management (SAICM) held its fourth International Conference on Chemicals Management in 2015, engaging upon further actions to ensure that chemicals are used and produced in ways that minimize adverse effects on human health and the environment. Furthermore, the United Nations Framework Convention on Climate Change's (UNFCCC) 21st Conference of Parties (COP) took place towards the end of November 2015, where a global agreement was reached to limit the effects of climate change.

The South African chemicals sector is highly complex and widely diversified, with end products often being composed of a number of chemicals that have been combined in some way. The synthetic coal and natural gas-based liquid fuels and petrochemicals industry is also prominent, with South Africa being the world leader in coal-based synthesis and gas-to-liquids technologies.

The Fluorochemical Expansion Initiative (FEI) is in line with the larger national programmes such as National Industrial Policy Framework (NIPF), the Advanced Manufacturing Technology strategy and beneficiation strategy for SA minerals in developing the fluorochemicals industry through improved local beneficiation of the country's fluorspar reserves.

The country supplies around 10 percent of the global fluorochemical industry's fluoride requirements worth about US\$16 billion a year, but captures less than 0.5 percent of this revenue owing to the low level of local beneficiation. In addition, there are niche skills and processes for developing and working with fluorine at the Nuclear Corporation of South Africa (Necsa), and at Pelchem SOC Ltd, which will help to create a fluorochemical beneficiation hub in the country.

The Department of Environmental Affairs (DEA) is thinking about conscripting a chemicals management Bill, of which it will incorporate provisions for industrial chemicals registration and hazard evaluation to chemicals before they are brought into the South African market. This was reported by the Minister of Environmental Affairs Ms. Edna Molewa in October 2015, after a survey of South Africa being adequately utilized as a dumping site for unsafe chemicals prohibited in the countries that manufacture and export them. A draft Bill was expected to be presented to parliament before the finish of 2016.

The Department of Labour and the Department of Health also conscripted the updates to the Hazardous Chemical Substances Regulations (Occupational Health and Safety Act) and Hazardous Substances Act in 2015, with a point of joining parts of the UN Globally Harmonized System (GHS) for chemicals grouping and naming. These drafts were printed in the Government Gazette towards the end of 2015.

Owing to Montreal Protocol prerequisites, advanced world countries are in the last phases of eliminating ozone-exhausting, while boundaries for developing countries started to produce results in 2015. Therefore, Hydrochlorofluorocarbons (HCFCs) demand will decay through 2016. The hydrofluorocarbons (HFCs) market, which developed significantly amid the 2001-2011, will proceed with its solid advances as HFCs supplant HCFCs in the emerging countries. Among other fluorochemical items, fluoropolymers will see the most quick picks up popular, driven by growing opportunities for high performance materials in the motor vehicle, chemical handling, electronics and coatings markets. Demand for inorganic and specialty fluorochemicals will ascend all through 2016, after solid development in worldwide aluminum production. Furthermore, rising production of semiconductors, propelled batteries and other electronic components will fuel demand for specialty gasses and other high-value fluorochemicals.

3.6. OUTLOOK

The South African government through the Department of Trade and Industry and Department of Science and Technology are driving the Fluorochemical Expansion Initiative (FEI) industry projects which are aimed at expanding the country's fluorochemicals industry. This will be done through increased local beneficiation and value addition to the country's raw materials. It is anticipated that in the coming years the pharmaceutical industries will spur demand for fluorochemicals.

Global demand growth for fluorochemicals is forecast to accelerate, rising by 3.8 percent per year to 3.8 million metric tons by 2018. China will continue to have strong gains in fluorochemical demand in 2016, further increasing its position as the world's largest national market, as will other Asian countries such as India. Above average gains are also forecasted for the smaller Eastern Europe and African markets, fueled by demand for aluminum fluoride in their rapidly expanding aluminum metal industries. However, fluoropolymers will still be the fastest growing product segment. Increasing demand for automotive, refrigerants and aluminum in the developing countries is anticipated to increase the demand of

fluorochemicals. The global fluorochemicals market has also projected to produce 5.4 kt by 2022, rising at a compound annual growth rate (CAGR) of 4.3 percent from 2016 to 2022.

The rising end-user industries such as oil & gas, automobile, pharmaceutical, construction are increasing the refrigerant markets thus driving the market of fluorochemicals globally. Refrigerants market had generated \$14.8 billion in 2014 and is expected to generate up to \$23.6 billion in 2022. The major driving factors are the increasing cold chain market globally and rising demand of cooling products. The global cold chain market has generated \$167.2 billion in 2015, and is expected to reach up to \$234.5 billion by 2020.

Fluorochemicals have become progressively significant in semiconductor and other electronics production, stimulating growth in the global market for performance fluorine chemicals. Global demand for fluorine containing chemicals is projected to increase by 2.3 percent from 2016 to 2021 with the anticipated value of \$19.7 billion. This increment will be driven by increasing production of refrigeration and cooling equipment globally, as well as acceleration in primary aluminum output.

Global fluoropolymers market demand was 720.8 kt in 2014 and is expected to reach 1,600.4 kt by 2022, growing at a CAGR of 10.3 percent. In the vicinity of 2015 and 2019 there will be critical moves in the market segments served by HFCs as particular HFCs and mixes are eliminated and substitution items are staged in.

In the short to medium term there is an expected market shift from HFCs to hydrofluoroolefins (HFOs) particularly in refrigerants products. HFC producers will be inclined to rationalise HFC production due to tighter markets as restrictions on HFCs are imposed at the beginning of 2018.

CONCLUSION

The South African economic growth estimate for 2016 has been revised down to 0.5 percent from 0.9 percent on the back of weak commodity prices which constrained demand. The *National Treasury* forecasts a moderate recovery over the next three years, with GDP growth reaching 2.2 percent in 2019 as the global economy recovers and business as well as consumer confidence rebound.

The mining of development minerals such as industrial minerals has important implications for locally driven industrialisation towards broad based development. The industrial minerals sector presents the country with the opportunity to develop a strong and varied industrial base along with potential creation of a critical mass of small scale miners contributing to the creation of decent jobs as well as alleviating poverty. This is in line with the Governments' various industrial policies (Mineral Beneficiation Strategy, the NGP, NIPF/ IPAP2016), with the National Development Plan lying at the centre of all the priorities of the South African Government. These minerals, despite their low unit value, offers the highest, most sustained and realistic potentials for greater value retention and linkages with the rest of the economy

Sales for industrial minerals is expected to rise in the medium term, underpinned by the fact that most industrial minerals have a high value-added potential because the same mineral can often be used in different industrial applications.

Since growth in industrial minerals is mainly driven by the construction and agricultural sectors, the outlook is optimistic on the back of rising demand for fertilisers from the agricultural sector and expected improvement in activity in the construction sector suggesting a moderate pickup in building activity in the years ahead. Use of industrial minerals in the agricultural sector for fertiliser applications is expected to rise in the short to medium term, on the back of a continuous increase in crop production to accommodate the growing population.

With the South African economy forecast to grow by only 1.7 percent in 2017, demand for raw materials especially in the built environment is expected to be subdued as the industry continues to face increased levels of financial strain on the back of higher interest rates and escalating building costs. As a result, consumer confidence is expected to remain at its current low levels as residential building activity is not expected to show significant improvement in the short term. However, there is a silver lining as government continues to prioritise infrastructure investment and plans to spend R987.4 billion on infrastructure development in the next three years, which will stimulate demand for building materials.

Government's infrastructure development programme is set to continue driving the demand for construction materials in the medium term. This growth will be underpinned by expansion in public works programmes coupled with energy and transport infrastructure projects, as set out in the National Transport Master Plan. There is a huge drive to develop the country's rail network and ports infrastructure in a bid to improve the ease of doing business in South Africa and thus increase the level of investment.

The future of the South African industrial minerals sector remains positive, their use in a wide range of applications will support growth as they contribute to almost every sector of the economy. Sectors like manufacturing, refractories, glass, cement, construction, chemical and paint as well as the agricultural sector will continue to drive local demand for these commodities supporting Government's localisation goals.

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