

## Manufacturing

<b>Sector Overview:</b>	<ul style="list-style-type: none"> <li>▪ A critical sector of the South African economy that has contributed approximately a third of GDP from 1999 to 2008</li> <li>▪ Contains a variety of important sub-sectors namely food and beverages; textiles and clothing; wood and paper; petroleum products, chemicals and plastics; other non-metallic mineral products (glass and cement); metals and metal products; electrical machinery and apparatus, as well as transport equipment</li> <li>▪ The slowing down in the country's economic growth with the global recession can be attributed mainly to the poor performance of Manufacturing in this period. This poor performance is linked to a depleted export market for manufactured goods and weak demand for durable consumer goods</li> <li>▪ Investment to develop additional capacity in the sector is required to create further employment opportunities. The latter is important as Manufacturing employment has declined persistently from the early 1990s onwards</li> <li>▪ A few sectors drive the performance of the Manufacturing sector. These include the production of motor vehicles, parts and accessories; basic chemicals; basic iron and steel and other chemicals. Motor vehicles, parts and accessories has more than doubled its operations since 1994 and this can be attributed to the Motor Industry Development Programme (MIDP). The other sub-sector that has shown significant growth is basic chemicals, whose share of total manufacturing grew to over 13% in 2008</li> <li>▪ Textiles and clothing, as well as machinery and equipment, have shown the most notable declines in their shares of total manufacturing</li> <li>▪ Skills shortages are one of the main factors hindering the sector's ability to adjust, innovate and expand. With a relatively low level of highly skilled employees, the ability to produce technologically advanced goods that require high value addition and provide greater returns is limited. Manufacturing diversification is also constrained through this feature</li> <li>▪ South Africa's imports of goods and services for manufacturing activities have increased relatively faster than exports since 2000. The Manufacturing trade balance deficit has thus expanded widely from R36 billion in 2000 to R204 billion in 2008</li> </ul>
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Risks		Opportunities	
<b>Regulatory</b>	<p>A number of industries in the Manufacturing sector are at considerable regulatory risk from climate change. Major areas of risk include mandatory reporting of emissions, energy efficiency targets and emission reduction limits. The sector is characterised by a variety of energy intensive companies, including some of the most carbon intensive in the country.</p> <p><i>Petroleum Products, Chemicals and Plastics</i></p>	<p>A number of industries in South Africa could receive added impetus and support through climate change mitigation efforts. These industries include:</p> <p><i>Transport Equipment</i></p> <p>The development of the Medium and Heavy Commercial Vehicle (MHCV) industry, including domestic bus manufacture linked to improved public transport, remains an area of potential commercial</p>	<b>Growth of Existing Markets &amp; Industries</b>

Risks	Opportunities
<p>Aside from Eskom, the coal-to-liquids (CTL) provider Sasol is the single largest producer of emissions in the country. Sasol's emissions, dominated by direct process emissions, amounted to 72.7 million tons for 2009, or approximately 17% of total national emissions relative to the 2000 baseline. Carbon pricing risks for this company are clearly immense, and raise concerns over the extent to which this entity can be exposed to carbon regulation in the near future.</p> <p>Sasol recognises the considerable challenges posed by climate change for its business operations, and has begun diversification into renewable energy and biofuels, and is investigating the employment of Carbon Capture and Storage (CCS). Other areas of potential opportunity could include Combined Cycle Gas Turbine (CCGT) power generation and potential entrances into the hydrogen economy through syngas production.</p> <p>Other industries in this sub-sector are also at significant potential risk from climate change legislation.</p> <p>The production of chemicals is a carbon intensive activity and major players such as Afrox, AECI and Air Products South Africa, all of whom are members of the Energy Intensive Users Group of South Africa (EIUG), could face significant emission reduction targets under South Africa's National Climate Change Response Policy. As intensive users, these companies also face significant potential impacts through increased electricity prices linked to carbon pricing.</p> <p>Whilst the demand for chemicals is generally price inelastic, with the result that increased pricing could be passed onto customers, there are potential concerns for the competitiveness of South African chemical manufacturers vis-à-vis other chemical manufacturing companies if parity with competitor nations is not achieved.</p> <p>Whilst there may therefore be some benefits to a global</p>	<p>viability in South Africa. See discussion under 'the Transport, Storage and Communication' sector.</p> <p>In addition, support for large-scale wind power and concentrating solar power (CSP) in South Africa could provide a significant boost for domestic manufacturing production, drawing on the country's established automotive sector. Examples of components for renewable energy technologies that can be produced within existing industries include gearboxes, steel frames and pylons, fibreglass forms, coatings and motors. There are also commercial opportunities for the domestic manufacture of wind turbine blades and heliostats.</p> <p><i>Petroleum Products, Chemicals and Plastics</i></p> <p>Whilst requiring considerable investment and skills development, the chemicals industry can be used to support the development of a variety of low carbon technologies, including:</p> <ul style="list-style-type: none"> <li>▪ Fuel cells</li> <li>▪ Light emitting diode (LED) lighting</li> <li>▪ Plastics applications in automobile manufacture</li> <li>▪ Wind turbine technologies</li> <li>▪ Building insulation materials</li> <li>▪ Solar photovoltaic (PV) cells</li> </ul> <p><i>Electrical Machinery &amp; Apparatus</i></p> <p>This industry has substantial potential to benefit from the promotion of energy efficient technologies, including efficient pumps, motors, turbines, variable speed drives and lighting, as well as a range of efficient Information and Communication Technologies (ICT) and energy control equipment. Growth</p>

Risks	Opportunities
<p>agreement to reduce emissions in the chemicals industry, under such an arrangement South Africa could find itself prejudiced in relation to chemical manufacturers in Europe, for example, given that carbon quotas are already in place for European chemical manufacturers.</p> <p><i>Wood and Paper</i></p> <p>As significant emitters and energy intensive users, pulp and paper companies in South Africa such as Mondi and Sappi are at considerable regulatory risk from climate change, as discussed under the 'Agriculture, Forestry and Fishing' sector analysis.</p> <p>In addition, it is worth noting that South Africa faces increasing global competition in the export of wood, pulp and paper products, particularly from mills in China and India, highlighting potential competitiveness risks from climate related legislation implemented at a national level. The pursuit of climate related uniformity with emerging manufacturers in Asia is thus desirable to support wider economic competitiveness.</p> <p><i>Metals and Metal Products</i></p> <p>This section focuses on aluminium, as well as iron and steel production. See also 'Mining and Quarrying' above for a discussion of additional metals.</p> <p>Aluminium:</p> <p>The production of primary aluminium, including the smelting of alumina to form aluminium, is a highly energy intensive process. At a minimum, 15 Megawatt Hours (MWh) of electricity is required to produce a ton of aluminium.</p> <p>South Africa has promoted comparative advantage in low industrial electricity prices and reliable supply as part of the development of the aluminium smelting industry in the country.</p>	<p>opportunities are also evident in efficient heating and cooling systems and the insulation industry.</p> <p>Major electrical companies have also moved into renewable energy as a key growth area, and are able to provide solutions in the reduction of transmission and distribution losses in electrical grids, as well as support clean coal technologies such as Integrated Gasification Combined Cycle (IGCC) and CCS.</p> <p>Domestic solar water heater manufacture remains an important potential economic opportunity in the country, linked to a wider industry of retailers and installers, and the promotion of employment for semi-skilled workers.</p> <p><i>Metals and Metal Products</i></p> <p>Substantial energy savings can be achieved through the enhanced use of recycled aluminium, a process that uses approximately 5% of the electricity required to produce primary aluminium.</p> <p>The increased use of recycled aluminium also supports domestic recycling schemes and local job creation opportunities. Aluminium can be expected to retain overall demand under climate change through the expansion of recycling efforts and heightened applications in vehicle manufacture.</p> <p>Opportunities for additional metals including copper, uranium and platinum are discussed under the 'Mining and Quarrying' section above.</p> <p><i>Clothing and Textiles</i></p> <p>As a sector under strain from competition from Asia, particularly China, the textiles industry cannot afford to increase any of its operational costs, including electricity costs. However, the promotion of an organic clothing and textiles industry in the country offers the</p>

Risks	Opportunities
<p>The primary aluminium production industry in South Africa is therefore at significant risk from climate regulation in the form of emission reduction limits and raised electricity prices. However, it should be noted that aluminium companies have generally entered into long-term electricity supply contracts with Eskom for uninterrupted power at agreed upon prices. As such, the potential exists for increased pressures on electricity prices through carbon regulation to be borne by Eskom, and in turn, passed down onto consumers and cross subsidised.</p> <p>Carbon pricing and industry emission targets can be expected to slow or retard investment in the national aluminium production industry, although current concerns regarding the insufficient electricity reserve margin has already prevented Rio Tinto Alcan from investing in a new aluminium smelting project at Coega (Rio Tinto Alcan, 15 October 2009).</p> <p>Iron and Steel:</p> <p>Many companies within the EIUG are situated in the iron and steel industries, including some of the highest reporting emitters in the country, such as ArcelorMittal South Africa. This sub-sector of the economy is therefore at significant risk from national climate regulation. It is highly likely that this sector will have to adopt stringent targets if the national emission reduction objectives are to be achieved, along with the cement, mining, power generation, forestry and CTL industries.</p> <p>In addition to national regulatory risks, iron and steel producers are at considerable global regulatory risk through the establishment of sector-based agreements for reduced emissions in iron and steel, implemented at an international scale. Whilst such initiatives could offer certain opportunities for the industry, including in the form of sector emissions trading, developments in international climate negotiations</p>	<p>opportunity to produce premium brands in areas where countries such as China will find it more difficult to compete.</p> <p>The promotion of local purchasing, linked to socially and environmentally accredited products, could also help retain employment and competitiveness in an industry that is currently unable to compete in the low cost market. Targeted energy efficiency measures and support to this industry could also assist to reduce the carbon footprint of locally produced textiles and clothing, whilst protecting industries from rising electricity prices.</p> <p><i>Pulp and Paper</i></p> <p>Certain opportunities exist in the pulp and paper industry to support biomass based power generation. However, wood chips and pulp and paper are currently excluded from the national Renewable Energy Feed-In Tariff (REFIT), and would require some form of financial assistance to achieve market access. A Cogeneration Feed-In Tariff (Cofit) is currently under consideration by the National Energy Regulator of South Africa (NERSA) and could provide the necessary support for exported power generation in this industry.</p>

## Risks

need to be monitored closely in this regard.

Finally, a related risk for steel is that tighter vehicle emission standards and fuel economy efforts, including in the EU, can be expected to further drive the demand for increased aluminium usage in vehicles in comparison to steel, given the ability of aluminium to support lighter vehicle design.

### *Non-Metallic Mineral Products (Cement and Glass)*

The South African cement industry is at both national and regional risk from climate change regulation. Companies such as Pretoria Portland Cement (PPC) the country's largest cement producer, ranks within the top 6 emitters currently reporting under the CDP, with a total emissions footprint of approximately 6 million tons of CO<sub>2</sub>e, with much of this contained in process related emissions.

As with iron and steel, cement has been targeted by the EU and others for inclusion within future sector-based emission reduction programmes, which could place global sector-based caps on emissions in this industry. On the other hand, the introduction of carbon pricing in South Africa could place competitiveness concerns on domestic cement production *unless* globally defined agreements are reached on reducing cement emissions.

Glass manufacture is also an energy intensive process and glass companies could face sizeable risk in the form of raised electricity prices through carbon pricing. Mandatory reporting of emissions and stipulated energy efficiency targets, as for many industries in the Manufacturing sector, are also likely under a concerted national climate change response.

### *Food and Beverages*

Emissions in the domestic food and beverages sector can be substantial, with SABMiller placed within the top 15 emitters reporting voluntarily to the CDP. Risks here include carbon pricing and raised fossil fuel and electricity prices.

## Opportunities

Risks	Opportunities
<p><i>Major Exports and Imports</i></p> <p>Finally, a variety of manufactured products for export, including pulp and paper products, prepared foodstuffs, mineral products, chemicals, base metals and precious metals could face increasing costs for air freight and/or ocean shipping through the enacted EU Directive on Aviation and moves to bring maritime emissions into international climate reduction efforts. Much will depend in this regard on the robustness of aviation and maritime emissions trading markets, in determining the price for emission allowances.</p> <p>Corresponding issues could also be experienced for an increased cost of imports, impacting the overall balance of payments. See analysis of the 'Transport, Storage and Communication' sector for further detail on current and proposed measures to curb aviation and maritime emissions.</p> <p><b>Trade and Market Access</b></p> <p>Potential exists for a Border Tax Adjustment (BTA) to be placed on South African cement, iron and steel if an effective carbon pricing regime is not implemented in South Africa. This threat is most applicable from the EU at present. Whilst the United States is also a major steel and cement manufacturer and concerned regarding carbon leakage, it is unlikely that appropriate legislation to impose a BTA will be passed in the near future in the US, although medium to long-term risks remain.</p> <p>The ability to produce vehicles that comply with increasingly stringent fuel economy and emission standards can be expected to form part of the continuation of the motor vehicle manufacturing industry in South Africa. Increasingly stringent standards in the European Union, including escalating limitations on CO<sub>2</sub> emissions, will prevent the sale of vehicles in the EU unless imported vehicles can achieve these emission reduction standards. Ultimately, the influence of climate change and enhanced fuel and emission</p>	<p><b>New Markets &amp; Industries</b></p> <p>Major areas of economic opportunity exist in the promotion of emerging low carbon technologies in South Africa. Key areas include the use of Platinum Group Metals (PGMs) as a catalyst for fuel cells, the capturing of hydrogen during syngas production, the development of electric vehicles, and thin-film solar Photovoltaic (PV) power.</p> <p>Optimal Energy has recently produced the Joule, South Africa's first fully electric multi-purpose urban passenger vehicle. A zero-emissions vehicle, the Joule uses lithium-ion batteries to power the car. According to Optimal Energy, the Joule's maximum speed is 135kmph, accelerating from 0kmph to 60kmph in less than five seconds. It takes around seven hours to charge the battery pack for a range of 300km, using a normal 220V home outlet.</p> <p>The Joule has already been displayed at the Paris Motor Show with considerable success, and the</p>

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<p><b>Supply Chain</b></p>	<p>standards will hamper the competitiveness of the country's automotive sector unless adjustments are made. The automotive sector is in a difficult position, however, as the cost for compliance and the achievement of harmonisation with global vehicle standards will be derived at considerable financial cost.</p> <p>An increased emphasis on teleworking, car pooling and public and non-motorised transport both nationally and internationally could also slow the growth of new vehicle sales and usage, with associated impacts on maintenance and replacement requirements.</p> <p><i>Food and Beverages</i></p> <p>Concerns regarding product food miles, and associated attempts to reduce the carbon footprint of imported goods, particularly food and beverages, poses supply chain risks for material suppliers in these industries.</p> <p>Both glass and polyethylene terephthalate plastic (PET) manufacturers have been placed under increasing scrutiny as attempts are made to reduce the carbon content associated with packaging materials.</p> <p>The proactive response of the fruit and wine sector in South Africa underlies the strong commercial need to reduce</p>	<p>Department of Science and Technology (DST)'s Innovation Fund has provided R50 million towards the Joule's roll-out. Optimal Energy anticipate to start production towards the end of 2012, with plans to ramp up rapidly to 50 000 cars a year. Around 5% to 10% of these will go to the local market, with the rest earmarked for the UK and EU (Engelbrecht, 2010).</p> <p>The University of Johannesburg has also been at the forefront of solar power research and development, with the establishment of the world's first thin-film solar module technology. Following completion of a pilot plant in Germany, it is anticipated that the country's solar manufacturing plant will be operational in Paarl in approximately two and a half years (Engineering News, 20 November 2009). The plant is expected to be able to produce 40MW of modules per annum.</p> <p>The project is a public private partnership between, amongst others, the Central Energy Fund, National Empowerment Fund, Sasol and the University of Johannesburg. The European Investment Bank has already agreed to invest €40-million in the Paarl based production facility (Engineering News, 12 October 2009).</p> <p>Considerable potential exists for technology transfer to support the implementation of CCS in the Sasol synfuels programme. This is currently considered the most cost effective area for carbon capture in South Africa, given more readily accessible CO<sub>2</sub> concentrations available within the Sasol production process (UKTI, 2008).</p> <p><b>Country Level Investment, Finance &amp; Technology Transfer</b></p>

Risks	Opportunities
<p>carbon emissions across the life cycle of exported beverages and foodstuffs, from farmed produce through to product manufacture, packing and distribution. Effective responses are required to address key areas of the supply chain including issues related to agricultural inputs, refrigerated road transport, the promotion of vehicle efficiency and modal freight shifts from road to rail.</p> <p><i>Transport Equipment</i></p> <p>Motor vehicle manufacture could face increasing costs through higher prices for supplies of steel, aluminium, glass, rubber and plastics as a result of climate regulation.</p> <p><i>Petroleum Products, Chemicals and Plastics</i></p> <p>Significantly reduced demand growth for refined petroleum products and coal-to-liquids fuels could lead to slowed demand in these industries, although it should be noted that substantial overall economic gains are anticipated from improved vehicle efficiency standards and public transportation.</p> <p>Chemicals and plastics manufacture could see operational costs rise as the price of key fossil fuel inputs, such as crude oil, experience price increases under climate change.</p> <p><b>Country Level Investment</b></p> <p>Concerns are raised regarding future investment in the aluminium smelting industry in South Africa in the context of climate change. Strong regulatory responses and the imposition of carbon pricing is likely to deter new investment, driving investments to less regulated environments or countries characterised by a reliance on hydropower or nuclear energy .</p> <p>Nevertheless, with a constrained electricity reserve margin, carbon intensive grid and escalating electricity prices, future investments in this industry are already uncertain at present. Competitiveness losses in comparison to counties with low carbon electricity are likely to take place unless widespread</p>	

Risks	Opportunities
<p><b>Investor</b></p> <p>aluminium recycling is implemented.</p> <p>Significant investor related risk is located in the development of new primary aluminium smelting facilities and coal-to-liquids facilities in the country, in the absence of a thorough assessment of climate change regulatory and pricing risks.</p> <p>The achievement of the national climate change target can be expected to require the use of CCS in future CTL plants, factors that would need to be carefully considered in feasibility assessments and financial estimates.</p> <p><b>Reputational</b></p> <p>Reputational concerns from climate change can be high in a number of industries within the Manufacturing sector. Companies with a high emission footprint, such as Sasol, have already been placed under intensive scrutiny over their environmental performance and have embarked on efforts to diversify their economic activities. Climate change poses an additional area of reputational risk that, if left unattended, could result in substantial media coverage, potential environmental advocacy and heightened investor concerns.</p> <p>Brand integrity is also important in the food and beverages sector, given the strong customer interface and ability of consumers to rapidly alter purchasing decisions. Backsberg's efforts to become the first carbon neutral wine estate in South Africa highlights the potential brand and marketing benefits that can be associated with mitigation efforts, whilst retaining value for premium brands.</p> <p>Publishing houses and the print media could also face certain reputational issues in South Africa for failure to address their carbon footprint. A number of periodicals and newspapers in developed countries have embarked on efforts to measure and reduce their carbon footprint to enhance customer relationships.</p>	

**Summary:**

The Manufacturing sector is at substantial risk from climate change on a variety of fronts, from heightened regulatory concerns through to extensive supply chain, investor and reputational risks. Proactive screening and risk management is critical to ensure that competitiveness relative to other producer nations is maintained, whilst ensuring that the development of any sector-based climate change agreements for cement, iron and steel provide meaningful opportunities for South African industries.

The sector is also characterised by substantial economic opportunities, including through the production of energy efficient machinery and equipment, the domestic assembly of public transport equipment and the development of renewable energy technologies, including thin-film solar PV, wind power, concentrating solar power and solar water heaters. The work of upstream industries such as chemicals and metals can also play an important role in the realisation of low carbon solutions.

A number of opportunities are therefore presented to support domestic manufacturing content in South Africa, an outcome that remains a key objective of government's industrial policy. Enhanced domestic manufacturing output can also be supported through relevant state-led procurement efforts.

Nevertheless, climate change poses additional challenges to the make-up and emphasis of the this sector – key concerns relate to the ability of the sector to invest in efficient technologies and develop sufficient skills to support value addition and product diversification, linked to changing global preferences and an emphasis on low carbon alternatives.