

Commissioned by the Presidency
Republic of South Africa



Building a 21st Century South Africa

Researching the Infrastructure Inputs Sector Strategy for AsgiSA

Produced by Suren Singh
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The Support Programme for Accelerated Infrastructure Development (SPAID) is a partnership between the Business Trust and the Presidency that aims to support the achievement of the infrastructure development targets set in the Accelerated and Shared Growth Initiative.

Background

In his State of the Nation Address of February 2006, President Thabo Mbeki announced a multi-billion Rand, multi-year, public sector accelerated infrastructure investment programme. The programme focuses on infrastructure in the transport, energy and communication sectors, and on basic service delivery. It forms a key component of the Accelerated and Shared Growth Initiative for South Africa (AsgiSA).

On request by the President's Big Business Working Group a joint initiative between the Presidency and the Business Trust, the Support Programme for Accelerated Infrastructure Development (SPAID), was established. SPAID explores creative methods for achieving AgsiSA infrastructure investment targets through public/private sector cooperation.

SPAID Initiatives

1 Competitive Local Supply

In meeting its infrastructure investment targets, South Africa faces a number of critical challenges to ensuring sufficient competitive local supply. These challenges concern the availability of sufficient relevant information to build improved trust relations between local suppliers and project managers, to improve the development of strategic sourcing capabilities in the public sector, and enhance overall investment in the infrastructure inputs sectors. SPAID is exploring ways in which these processes can be facilitated.

2 Municipal & Provincial Infrastructure Development Capacity

A significant proportion of the infrastructure investment, some 50% by some estimates is planned to be spent through national, provincial and local government. The record of expenditure in many instances is poor and the capacity to ramp up activity is low. This challenge is particularly evident in the smaller municipalities where infrastructure and basic services are urgently required. Accordingly this sub-programme aims to identify ways of mobilising the private sector to respond to these challenges.

3 Public Private Partnerships (PPPs)

An estimated 5% of the infrastructure programme is planned for implementation through PPPs. A central issue is whether PPPs could play a greater role in meeting the AgsiSA targets. This sub-programme then sets out to review current mechanisms for establishing and operating PPPs in South Africa and to make recommendations as to how these can be enhanced and expanded.

4 Capital Project Expediting

This sub-programme sets out to review the need, and potentially develop proposals for, a facility enabling project implementers in both the public and private sectors to highlight and resolve key bureaucratic blockages, so that projects can be implemented timeously.

The Business Trust

The Business Trust combines the resources of business and government in areas of common interest to accelerate the achievement of national objectives. It is governed by a board of business and government leaders with funding to date of approximately R1,5 billion provided mainly by its 140 corporate partners. The Business Trust has agreed to fund the initial phase of SPAID. Current participants in the SPAID programme include the Presidency, National Treasury, the Department of Provincial and Local Government, the Department of Public Works and the Department of Public Enterprises.

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Foreword

Purpose of the AsgiSA Infrastructure Inputs Sector Strategy Process:

The purpose of this study is to assess the increase in public sector demand and the trends in supply for key infrastructure inputs.

The proposed increase in public sector investment will substantially expand demand for infrastructure inputs, which include construction materials, transport, capital equipment and skills. Consequently, if demand is not adequately anticipated, the result could be shortages, price spikes and delays in the completion of infrastructure projects. Conversely, the rapid increase in demand also promotes lucrative trade and investment opportunities.

This Research Report for the AsgiSA Infrastructure Inputs Sector Strategy and the ensuing consultation process therefore aimed to:

1. Assess the increase in demand and trends in supply for key AsgiSA infrastructure inputs
2. Bring together the main stakeholders to communicate the projected trends in infrastructure inputs demand and supply, identify challenges, and set up processes to address these challenges
3. Form the basis for work at the level of specific infrastructure input industries, if required, to address identified challenges

Key Findings:

The key¹ infrastructure inputs have been identified on the basis of perceived shortages. These perceived shortages are observed through domestic production shortages, increased levels of imports (and the emergence of import parity prices) and high PPI increases between 2004 and 2006 (the overall PPI increased 14% between December 2004 and December 2006). The quantified increase in public sector demand and production capacity has been established through broad research to generate demand projections of key public sector infrastructure inputs and industry supply capacity. These key infrastructure inputs demand and supply projections, however, cannot be directly compared to each other as no assessment of private sector demand for infrastructure projects has been undertaken. This was beyond the scope of the study. Furthermore, not all the demand-side projects have been assessed on the basis of infrastructure input projections.

From the projected supply analysis of infrastructure material inputs, the most sensitive infrastructure material inputs that could present supply challenges are carbon steel products (with a peak of 656.4 kilotons in **2008** strongly influenced by demand from Eskom), cement (a peak of 1.5 metric tons in **2009** driven by concurrent demand from Housing, Eskom, Gautrain, SANRAL and ACSA), timber (with significant incremental demand driven by Housing budget allocations), aggregate and sand (with a peak in **2008** arising from Gautrain, Eskom, SANRAL, ACSA and Housing), and bitumen (demand for which will peak in **2008**, driven by SANRAL and Eskom).

Industry has also indicated that there are no anticipated production and supply difficulties associated with clay bricks, float glass and plastic pipe (PVC). However, these infrastructure material categories registered some of the highest percentage PPI increases² between December 2004 and December 2006; with stock bricks increased by 26%, face bricks by 23%, cut-to-size glass for the building industry by 15% and PVC plastic pipes by 8%.

In addition to the supply and demand projections, several observations from the consultation and research processes have been made:

- **Escalating tender prices** result from increasing infrastructure input costs and insufficiently detailed tender contracts. This suggests the need for broad economy of scale cost guidelines and standardised procurement processes.

¹The infrastructure inputs that are being considered for the purpose of this study are not meant to be an exhaustive, nor a prioritised listing. Given that specific infrastructure inputs requirements of demand-side projects will impact on the relevance of such a listing (as some infrastructure inputs may be more critical from a supply and demand perspective than others), this prioritisation could only be potentially achieved as an outcome of this study. ²Statistics South Africa, www.statssa.gov.za

- **The vertical integration of construction companies** is promoted by the need to secure upstream infrastructure inputs and to offset cyclical industry risks. This may need thorough evaluation to ensure a fair, accessible and competitive market environment for construction materials inputs.
- **A shift in focus of construction companies** from residential construction to more lucrative infrastructure development tendered contracts is underway. This could present significant challenges to housing developments.
- **Contracting capacity** limitations are resulting from skills challenges. These could potentially result in project delays, deteriorating build quality and possibly deteriorating health and safety standards. The challenges, however, also present an opportunity for the contracting sector to consolidate scarce resources and develop economies of scale.
- **Environmental impact assessment (EIA)** backlogs and delays are contributing to delayed supply-side capacity expansions and investments within the cement and clay brick Industries. There is a need to optimise the EIA business process and further increase official capacity without compromising on the strategic value of the EIA process and its outcomes.
- **Downstream challenges** include the shortage of metal fabricators and artisan skills. These present a greater concern than infrastructure materials supply. There is therefore a need to evaluate intensive supplier development and the phasing of large infrastructure projects.
- **There is a need for improved collation and diffusion of infrastructure inputs, and construction and infrastructure development information.** This will inform infrastructure inputs capacity expansion planning, and infrastructure project planning and execution.

Conclusion

A strategy to evaluate trade and investment opportunities to increase the supply of these critical infrastructure inputs is required. This will help mitigate potential infrastructure inputs supply shortages and ensure minimal disruption to critical infrastructure projects during these rollout years. Currently the transportation of infrastructure inputs is chiefly undertaken by road, which embodies several critical limitations. It is apparent, therefore, that an urgent need exists to develop an optimised infrastructure inputs transportation strategy aligned to the Department of Transport's (DoT) National Freight Logistics Strategy.

Despite the initiatives from Government to increase education and training throughputs, skills challenges are immediate and expected to increase going forward. Government will need to intervene further given that the current Joint Initiative on Priority Skills Acquisition (JIPSA) initiatives do not seem to be adequate in addressing the skills deficit. There may therefore be a need to consider facilitating the bridging cost of skills development in partnership with the private sector over the short to medium term, to mitigate the risk of escalating skills costs (due to shortages) and delayed critical infrastructure projects over the medium to long term. Further initiatives from the private sector to improve training and skills development will also be required, complemented by a comprehensive and integrated skills development strategy for the infrastructure inputs sector.

As a way forward, the report therefore recommends the following:

- The development of a spatial infrastructure inputs information system
- Demand-side management
- The standardisation of tenders with respect to contract specifications and designs
- Supply-side monitoring of primary infrastructure input materials and critical services
- Skills development through intensified support of JIPSA and the CETA
- The development of an infrastructure inputs transportation strategy by the DoT
- The optimisation of regulatory (especially EIA) business processes, guidelines and information requirements

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Clay Brick Association (CBA)
Concrete Manufacturers Association (CMA)
Forestry South Africa (FSA)
PFG Building Glass and South African Glass and Glazing Association (SAGGA)
Aluminium Federation of South Africa (AFSA)
Aluminium Extruders Association (AEA)
South African Plastic Pipe Manufacturers Association (SAPPMA)
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Abbreviations and Definitions

AEA	Aluminium Extruders Association
ACMP	Association of Cement Manufacturing Producers
ACSA	Airports Company South Africa
ADT	Articulated dump truck (capital equipment)
AFSA	Aluminium Federation of South Africa
Aggregate	Any hard, inert materials (sand, gravel or stone) used for mixing with cementitious materials to form mortar or concrete
Asgi-SA	Accelerated and Shared Growth Initiative for South Africa
ASPASA	Aggregate and Sand Producers Association of South Africa
BBBEE	Broad based black economic empowerment
BEQ	Imperial brick equivalent unit
Bitumen	Is a mixture of organic liquids that are highly viscous, black, sticky, entirely soluble in carbon disulfide, and composed primarily of highly condensed polycyclic aromatic hydrocarbons. Bitumen is the residual (bottom) fraction obtained by fractional distillation of crude oil. It is the heaviest fraction and the one with the highest boiling point
C&CI	Cement and Concrete Institute
CBA	Clay Brick Association
CCGT	Combined Cycle Gas Turbine
Cement	Fine powdered materials which, when mixed with water, sets and binds together to form a hard, solid material. It is used as a component of mortar and concrete
CETA	Construction Education and Training Authority
cidb	Construction Industry Development Board
CKD	Completely Knocked Down (capital equipment)
CMA	Concrete Manufacturers Association
Concrete	A mixture of sand, stone, cement and water that sets and hardens
DEAT	Department of Environmental Affairs and Tourism
DHA	Department of Home Affairs
DME	Department of Minerals and Energy
DoT	Department of Transport
DPW	Department of Public Works
DTI	Department of Trade and Industry
DWAF	Department of Water Affairs and Forestry
e-NaTIS	Electronic National Transport Information System
EBEPTT	Engineers, built environment professionals, technologists and technicians
EC	Eastern Cape (Province)
ECSA	Engineering Council of South Africa
EIA	Environmental impact assessment
Empowerment	An integrated and coherent socio-economic process, located in the context of South Africa's national transformation programme, which is aimed at redressing the imbalances of the past by seeking to substantially and equitably transfer and confer the ownership, management and control of South Africa's financial and economic resources to the majority of its citizens. As a process, it seeks to ensure broader and meaningful participation in the economy by previously disadvantaged people to achieve sustainable development and prosperity
FBU	Fully built-up units (capital equipment)
FEL	Front end loader (capital equipment)
FS	Free State (Province)
FSA	Forestry South Africa
GDP	Gross domestic product
General Government	Refers to the accounts of National Government, Provincial Government and Local Government, the social security funds, extra-budgetary institutions, adjusted to net outflows between Government institutions

GFCF	Gross fixed capital formation
Government	Government of the Republic of South Africa
GP	Gauteng (Province)
HDPE	High-density polyethylene is a polyethylene thermoplastic made from petroleum. It takes 1.75 kg of petroleum, in terms of energy and raw materials to make 1 kg of HDPE
IDZ	Industrial development zone
JIPSA	Joint initiative for priority skills acquisition
kt	Kiloton
kt/y	Kiloton per year
KZN	Kwa-Zulu Natal (Province)
LME	London Metals Exchange
LP	Limpopo (Province)
m	Meter
m ² or sq mt	Square meter
m ³ or cub mt	Cubic meter
MOU	Memorandum of understanding
MP	Mpumalanga (Province)
MPRDA	Mineral & Petroleum Resources Development Act
mt	Megaton
mt/y	Megaton per year
MTEF	Medium term expenditure framework
NC	Northern Cape (Province)
NHBRC	National Home Builders Registration Council
NW	North West (Province)
OCGT	Open Cycle Gas Turbine
OH&S	Occupation, Health and Safety
PPI	Producer price index
PPP	Public private partnership
Project	Proposal for the Infrastructure Inputs Sector Strategy
PVC	Polyvinyl Chloride - is a widely used thermoplastic polymer in the construction industry
Rand or SAR	Currency of the Republic of South Africa
RFA	Road Freight Association
RRA	Rail Road Association
Sabita	South African Bitumen Association
SAISI	South African Iron and Steel Institute
SACEEC	South African Capital Equipment Export Council
SAGGA	South African Glass and Glazing Association
SANRAL	South African Roads Agency Limited
SAPPMA	South African Plastic Pipe Manufacturers Association
SARB	South African Reserve Bank
SARCC	South African Rail Commuter Corporation
SARMA	South African Ready Mix Association
SARS	South African Revenue Services
SEA	South East Asia (South East Asian)
SEIFSA	Steel and Engineering Industry Federation of South Africa
SKD	Semi knocked down (capital equipment)
SOE	State owned enterprises
StatsSA	Statistics South Africa
TLB	Tractor-loader-backhoe (capital equipment)
YoY	Year-on-year
WC	Western Cape (Province)

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Section 1 Introduction

In order for the South African Government to achieve its social objective to halve poverty and unemployment by 2014 the GDP growth rate needed is around 5% per annum ($\geq 4.5\%$ between 2004 and $\geq 6\%$ between 2010 and 2014)³. This growth rate is being stimulated through several public sector investment programmes.

The proposed increase in **public sector investment** will substantially expand the demand for infrastructure inputs, including construction materials, transport, capital equipment and skills. Consequently, if demand is not adequately anticipated, the result could be shortages, price spikes and delays in the completion of infrastructure projects.

This AsgiSA Infrastructure Inputs Sector Strategy Proposal therefore aimed to:

1. Assess the increase in demand and trends in supply for key infrastructure inputs
2. Bring together the main stakeholders to communicate the projected trends in infrastructure inputs demand, identify challenges, and set up processes to address these challenges
3. Form the basis for work at the level of specific infrastructure input industries, if required, to address identified challenges

The process leading to the Proposal therefore commenced with broad qualitative and quantitative research and consultation to forecast infrastructure input demand from 2007 to 2016, and where possible to identify potential shortfalls in the overall supply of infrastructure inputs.

³The Presidency, 2006: Asgi-SA overview, p 2.



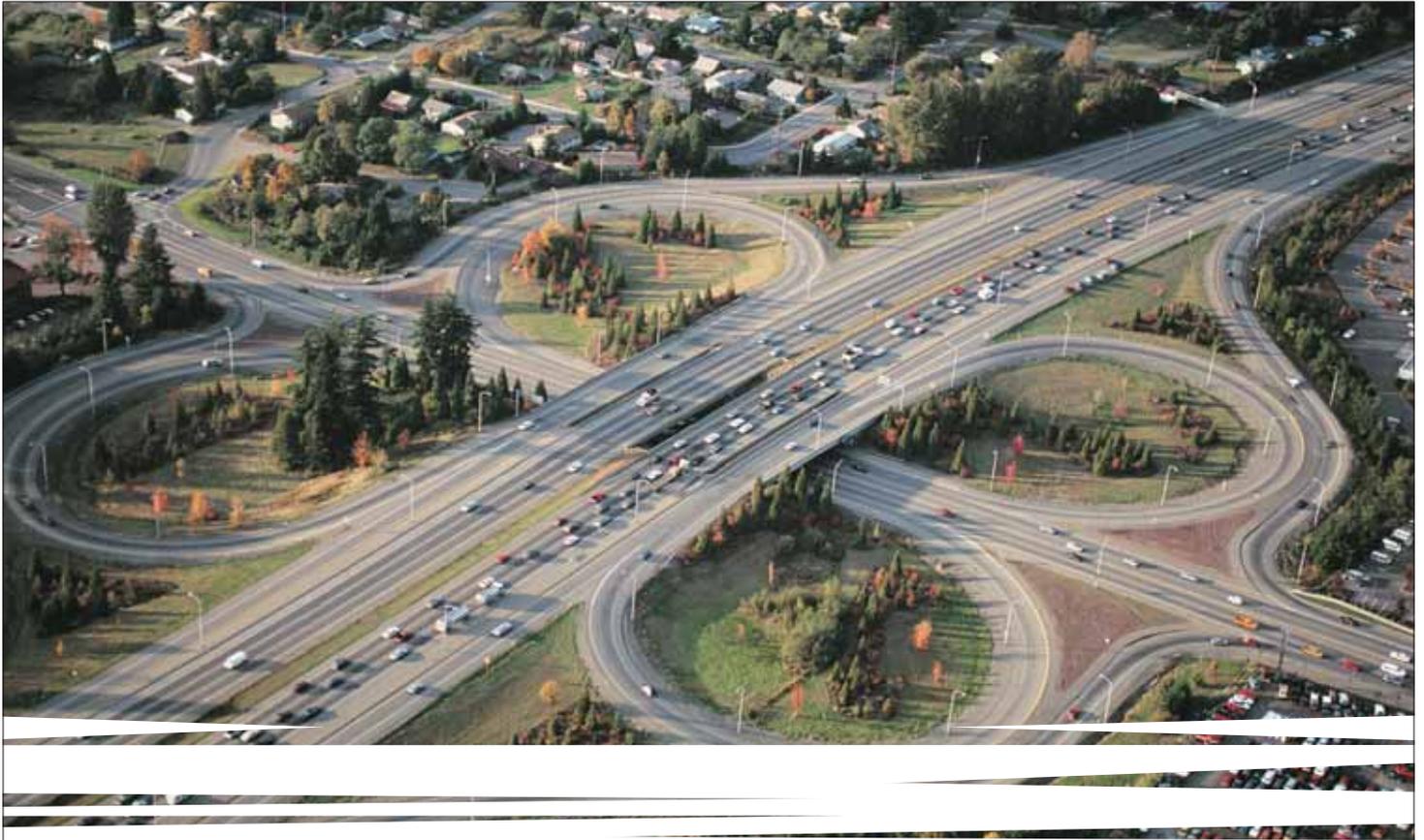
Section 2 Macroeconomic Overview

South Africa's economy is projected to grow at 4.8%⁴ in 2007 and to reach 5.1% and 5.4% in 2008 and 2009 respectively⁵. GFCF followed a growth trend throughout 2006, lifting the ratio of GFCF to GDP to almost 19%, and is currently the highest it has ever been since 1990 at over 20%.

Historically the private sector has been the most significant contributor to GFCF growth accounting for 72.6%⁶ of total investment in 2006. This trend is expected to continue into the future. Government will also increase investment growth over the medium term as it maintains its focus on service delivery and facilities provision, and having had public corporations embark on significant recapitalisation projects.

The most significant contributor to GFCF has have machinery and other equipment, followed by construction works. The residential building sector is expected to experience a cooling off period over the medium term, given rising household debt levels and the recent interest rate increases. The non-residential⁷ building sector seems set to maintain a longer-term real growth. Construction works, which grew at an average rate of 13.2%⁸ during the first nine months of 2006, are expected to continue to grow over the medium term before stabilising.

⁴National Treasury, 2007: Budget Review, p 21. ⁵National Treasury, 2007: Budget Review, p 21. ⁶National Treasury, 2007: Budget Review, p 22. ⁷Aveng, 2006: Annual Report 2006-Market Review, p 32. ⁸National Treasury, 2007: Budget Review, p 35.



Section 3 GFCF Infrastructure Investment Pipeline

Capital formation plans have increased to significant levels following the upsurge in the economy over the past three years. It is projected that they will sustain high levels of growth over the medium term. A step change has been announced in private sector capital expenditure, stimulated by sustained economic growth, optimism and good demand. Such expenditure occurs alongside increased Government spending, which is in turn driven by the need to modernise critical economic and social infrastructure.

Then, there is strong investment in the economy by public corporations challenged to increase operational energy and logistics capacity, resulting from strong economic growth. This has also led to increased capacity utilisation. Taken together, these factors are cumulatively likely to strain the limited availability of infrastructure inputs capacity over the medium term and beyond.



Section 4 Infrastructure Investment Projects

Annualised demand for infrastructure inputs within Government and the Public Corporations from 2007 to 2016 respectively were analysed for: Eskom, Transnet, Gautrain, preparations for the 2010 FIFA World Cup™, Coega IDZ, roads, dams, airports, housing, and municipal and provincial infrastructure and public works. These are individually discussed below.

4.1 Eskom

Eskom is under increasing pressure to expedite its R150 billion capacity expansion plans to ensure reliable supply from the country's national electricity grid. These plans will include generation, transmission and distribution related projects, renewable energy developments, and projects in Southern Africa. Generation projects will include:

- The Arnot capacity increase
- Ingula pumped storage
- The completion of return to service projects at Grootvlei, Camden and Komati
- New coal base station projects, Medupi and Project Bravo.

Eskom also plans to erect 12,197 kilometres of transmission lines between 2007 and 2015. These generation and transmission projects have been included in the analysis. No data was available, however, regarding distribution related projects.

Overall peak demand for major infrastructure inputs for transmission and generation projects is expected to occur in **2008** and **2009**. Steel demand (excluding roof sheet steel) is expected to peak in **2009** when 524.5 kilotons will be required due to strong demand from the Medupi power station, Project Bravo and the construction of transmission lines. Total steel demand (excluding roof sheet steel) between 2007 and 2015 is expected to reach almost 3 megatons.

Eskom's projects will require substantial quantities of roof sheet steel, primarily for its Medupi power station and Project Bravo. From Eskom project input projections, it is estimated that approximately 85 million square meters of roof sheet steel will be required between 2007 and 2014, with a peak demand of 24 million square meters in 2013.

Total cement demand from 2007 to 2015 is expected to be 551.46 kilotons, with peak demand for cement in **2008** (114.74 kilotons). Strong demand for cement is, however, evident between 2007 and 2011 with annualized demand requirements of 68.58 kilotons in 2007, 114.74 kilotons in 2008, 111.4 kilotons in 2009, 91.96 kilotons in 2010 and 83.09 kilotons in 2011. Peak demand for cement in 2008 will be driven primarily by demand from Ingula pumped storage (25 kilotons), Medupi power station (20 kilotons), Project Bravo (20 kilotons) and transmission related projects (49.58 kilotons).

Aluminium demand for conductors will peak in **2009** when 59.44 kilotons will be required for various transmission related projects. The total demand for aluminium is expected to reach 205.53 kilotons between 2007 and 2015, with the highest demand projected between 2008 and 2010 (56.7 kilotons in 2008, 59.45 kilotons in 2009 and 37.7 kilotons in 2010).

All power station projects will require substantial quantities of clay bricks with a projected total of 2 megatons between 2007 and 2013. Consistent demand of 480 kilotons of clay bricks annually is expected between **2008** and **2010**, driven by construction of the Medupi power station and Project Bravo. Bitumen demand will be greatest in **2007** (32.8 kilotons) and 2008 (30.5 kilotons), driven by demand from the Ingula pumped storage scheme. Total bitumen demand is expected to be 63.4 kilotons between 2007 and 2012.

In terms of skills, **2008** will be the peak demand year for 240 general and project managers, 289 specialist engineers and plant designers, 59 quantity surveyors and 80 planners. Peak demand for construction managers and related technologists is expected in 2010 and 2011 when approximately 420 construction managers and 180 technologists will be required.

The most prominent artisanal skills requirements are for electricians, boilermakers, fitters and welders which all peak in **2011** at approximately 1,000 each. During 2011, a total of approximately 4,435 artisans will be required. Eskom generation projects will also require substantial plumbing, carpentry and bricklaying skills, with peak requirements of 100 plumbers in 2010, 160 carpenters and 160 bricklayers in 2009.

Eskom has raised serious concerns relating to:

- Materials availability, steel and cement especially
- Specialist engineering suppliers
- Imported equipment delivery
- Project management, engineering and contractor skills availability
- Artisan skills
- Transport availability and site accommodation facilities in Limpopo Province, Mpumalanga Province and along transmission corridors

The concentrated capital expenditure rollout for the substantial generation and transmission projects will thus place significant pressure on the limited availability of infrastructure inputs (especially materials and skills) within a timeframe where several public sector projects run concurrently.

4.2 Transnet

Growth in the South African economy has placed significant pressure on Transnet's freight logistics capacity, which has also suffered historically from maintenance and capital expansion under-spending.

In addition to the extensive business reengineering process (Vulindlela) currently being undertaken by Transnet, focus has also been placed on substantial maintenance and capital investment projects. At a total of R64.5 billion over the medium term, these projects are designed to provide a holistic and efficient service oriented package. Based on the capital expenditure rollout plan, peak investment activity is expected to occur in financial years **2007/08** and **2008/09** at R15.2 billion and R14.5 billion respectively.

Spoornet's capital expenditure totalling R31.5 billion will focus on the following areas:

- The iron ore corridor expansion (rail and Saldanha infrastructure)
- The Richards Bay coal line and infrastructure expansion
- Refurbishment and maintenance programmes
- General freight fleet renewal/ upgrade programmes

Significant equipment and facilities upgrades will also be undertaken at Transwerk at a total cost of R2.6 billion.

The NPA will spend R18.6 billion on:

- The completion of the Port of Ngqura
- Container terminal expansion in Cape Town and Durban
- The Durban port entrance channel project to enable growth and servicing of larger ships

SAPO will improve port handling logistics within a projected budget of R6.3 billion to facilitate:

- Container terminal expansion in Durban, Cape Town and Ngqura
- Multi-purpose terminal expansion in Durban
- Iron ore terminal expansion
- Richards Bay dry bulk terminal expansion.

Capital expenditure at Petronet totalling R4.9 billion will focus on:

- The new multi-product pipeline
- Upgrades of the gas pipeline
- Terminal and logistics facilities

Transnet's massive expenditure plan will be susceptible to import sensitivity (given the significant projected imported content), EIAs and skills inputs. However, Transnet has developed substantial strategies and practical management mechanisms to manage these risks within the confines of a transitional environment.

The Transnet capital expenditure programme will strain limited national infrastructure inputs and skills resources, given the sheer magnitude of the programme. However, the precise nature of this impact could not be ascertained since there was no accessible information regarding infrastructure inputs demand projections.

4.3 Gautrain

The PPP Gautrain project comprises two key components impacting on infrastructure inputs. These are the civil works and the electrical and mechanical components.

Peak civil works material input requirements will be experienced in 2008. These will include reinforcing steel (30,000 tons), cement (98,000 tons), aggregate-stone (310,000 tons), aggregate-sand (261,000 tons) and diesel (10.15 million litres). Requirements for these inputs are expected to be slightly lower in 2009 than the projections for 2008. Electrical and mechanical inputs requirements are also expected to peak in **2008** and **2009**, driven by the need for concrete sleepers (28,848 tons in 2008) and blocks (3,832 tons in 2009) respectively.

Skills requirements for management, engineers and planners appear to be fairly consistent over the project duration with the need for artisans peaking in 2009 at 550 persons. The concessionaire has raised concerns regarding the production of fabricated structures, inconsistent power supplies, skilled labour and professional staff shortages, and believes that these could all be resolved through interactions with and/or the establishment of task teams with relevant stakeholders through the involvement of Government.

There does not seem to be any potential immediate infrastructure inputs challenge to the Gautrain project which is beyond the proposed resolution mechanisms as presented.

4.4 2010 FIFA World Cup™

The 2010 FIFA World Cup™ infrastructure projects embrace the development of five new stadiums and five stadium upgrades including adjoining precinct development and the development of the Johannesburg Bus Rapid Transit System. Infrastructure inputs projections indicate overall peaks in **2007** and **2008**.

Total steel demand, of reinforcing and structural steel, is expected to be 48.754 kilotons from 2007 to 2010. However, this projection did not include data for the new Greenpoint stadium and some minor upgrade projects. It would thus be reasonable to assume an estimated total steel demand for all projects to be in the order of 58 kilotons for the period 2007 to 2010, with peak demand occurring in 2007 (approximately 26.38 kilotons) and in 2008 (approximately 27.96 kilotons).

Projections for total cement demand from 2007 to 2010 are expected to be 224.395 kilotons. This does not include three of the five new stadiums, where no information was made available. Based on the available data for the other projects, it would be reasonable to assume that the total projected demand for cement during this period to be approximately 325 kilotons. Peak demand for cement is expected in 2007 and 2008 at 100.24 kilotons and 113.47 kilotons respectively.

Overall skills requirements for the analysed projects indicate a peak in **2008** when 59 project and general managers, 61 architects, 53 quantity surveyors, 53 construction managers, 157 related technologists, 159 plumbers, 422 bricklayers and 247 electricians will be required. Peak demand for 175 Specialist engineers and 21 planners is expected to precede the overall 2008 peak and occur in 2007.

Sensitivities raised by the host cities include:

- Material inputs supply, especially steel and cement
- Material inputs delivery resulting from increasing traffic congestion
- Material inputs distribution
- Limited availability of scarce skills (artisans, engineers and management)
- Limited capacity of manufacturing and fabrication companies

4.5 National Roads Infrastructure

The focus of SANRAL over the next decade will include road preservation through periodic maintenance, strengthening of roads with a lifespan of five years or less, and road capacity expansion. Over the medium term, 489 national roads related projects will be in the pipeline. Road infrastructure inputs (by volume) are expected to peak in **2009** with the most significant being cement (161 kilotons), aggregate and stone mix (5 megatons), ready-mix concrete (262 kilotons), bitumen (71 kilotons), cranes (30t x 38 units), and 432 tipper trucks. Concerns have been raised by SANRAL over the supply of cement, aggregate and bitumen in particular.

Skills requirements are also projected to peak in 2009 with the need for 227 general and project managers, as well as 227 specialist engineers. SANRAL's skills concerns relate primarily to construction and engineering management and artisan skills, given that 906 artisans and 1359 semi-skilled artisans will be required in 2009.

SANRAL has suggested the narrowing of the salary gap between the public and private sector, re-employing of retired professionals on a contract basis, and increasing the retirement age for scarce skills resources as proposals to ease the skills shortage. The organisation has expressed concerns about the infrastructure inputs outlook and has elected to place certain projects on hold for a reasonable period until they return to economic viability.

4.6 Expanded Provision of Housing

Infrastructure inputs demand projections for 40 square metre houses have been based on growth expectations from 168,902 units in 2007 to 254,346 units in 2009. From 2010 until 2016, 625,324 units would need to be constructed annually to eradicate current backlogs. This represents a 245% step change between 2009 and 2010.

Annual material inputs requirements for some of the sensitive materials at peak demand for 40 square metre houses will be 187.06 kilotons of reinforcing steel, 24,94 million square metre of roof sheet steel and 2,65 megatons of cement from **2010** to **2016**. The most significant capital equipment requirements will be for TLBs and excavators which peak at 624 units and 312 units respectively in 2010. The need for 20 ton trucks will also increase significantly in 2010, to peak at 9,597 units. This is 3.7 times the number required in 2007. Material inputs requirements for 40 square metre flats are low compared to those for 40 square metre houses, given that 4,327 units will be produced at peak in 2007. The most significant inputs requirements will be those for 173,080 square metre of roof sheet steel and 14,5 kilotons of cement in 2007.

Skills requirements for the construction of 40 square metre houses will peak from **2010** to **2016** with the need for 6,235 construction managers/supervisors, 1,871 general and project managers and 624 structural engineers. The requirements for artisans totals 10,589 in 2007 and peaks at 39,283 in 2010, with the most significant peak requirements being for bricklayers (31,176 in 2010), followed by plumbers and carpenters (3,118 each in 2010) and steel fixers (1,247 in 2010). The peak requirement for electricians is expected to be 624 in 2010. Unskilled and semi-skilled job creation relating to construction labourers will peak at 93,529 jobs in 2010 from 25,214 jobs in 2007. 40 square metre housing construction is therefore expected to create a total of 38,610 jobs in 2007, increasing to a projected 143,634 jobs in 2010.

Construction of 40 square metre flats, with a peak of 4,327 units in **2007** (data only provided for 2007/08), will require 43 construction managers, 13 general and project managers and 273 artisans, with the most significant peak requirements being for bricklayers (216 in 2007), followed by plumbers and carpenters (22 each in 2007). Unskilled and semi-skilled job creation relating to construction labourers will peak in 2007, with an estimated 649 contract labourers required.

The Department of Housing has raised serious concerns regarding the shortage in contractor capacity (especially large contractors), labour shortages and building materials (especially cement and steel) supply, and has promoted the idea of stimulating enterprise and job creation opportunities within the areas of housing material production. These are seen as severe challenges that could potentially impact the delivery of houses to meet rising demand levels and to eradicate the current housing backlog through a proposed Housing Development Agency.

4.7 Airports Infrastructure

ACSA operates South Africa's ten principal airports. Growth in the South African economy has resulted in substantial investments and planned expansions of passenger terminals, parking, aprons, taxiways, and access and service roads. Maintenance and rehabilitation of existing runways at international and domestic airports are also part of the comprehensive infrastructure upgrade package.

Infrastructure inputs for airports are projected to peak in 2008, flanked by reasonably strong demand for inputs in 2007 and 2009. The significant (total) infrastructure inputs relating to buildings, facilities and aprons during the 2008 peak include: steel, at 28,320 tons, cement at 70,779 tons, clay bricks at 10 million BEQ, glass at 23,162 square metres, ceramic tiles at 103,884 square metres, roof sheet steel at 514,033 square metres, aggregate stone mix at 674,933 tons and ready-mix concrete at 357,255 tons. Bitumen requirements also peak in 2008 at 22,271 tons.

The demand for construction managers and specialist engineers will peak in 2008 at 152 and 68 respectively. 56 architects, 28 quantity surveyors and 19 project managers will be required during the peak in 2007 in preparation for the rollout of significant expansionary development and facilities related projects.

ACSAs infrastructure rollout and expansion plans for buildings and facilities could be sensitive to certain critical input materials shortages, given the large demand volumes in 2008. These include steel, cement, clay bricks, glass, ceramic tiles, roof sheet steel, aggregate stone mix and bitumen. Any shortages could potentially result in project delays to ACSAs critical path infrastructure rollout plan.

4.8 Significant Provincial and Municipal Infrastructure Investments

Provincial and municipal infrastructure projects have been analysed to present a broad overview of the significant Government infrastructure projects investment pipeline over the medium term.

Large provincial education infrastructure projects by value totalled R859.56 million, with a peak in **2008/09** of R283.12 million. This represents 7.4% of the medium term budget allocation for education infrastructure, which suggests a high number of smaller valued projects. The concentration of the largest education infrastructure projects is in the EC (R407.169 million), WC (R122.716 million) and GP (R117.263 million) with a focus in the EC on a new youth centre, primary school rehabilitation, office accommodation and the provision of water and sanitation.

The 51 largest provincial health infrastructure projects account for 49.9% of the R16.253 billion MTEF budget for health (hospitals and clinics) at R8.106 billion, with a peak in **2008/09** of R2.964 billion. The largest infrastructure budget goes to GP (R2.9 billion), primarily for the construction of new central and regional hospitals, followed by NC (R1.679 billion) and KZN (R1.054 billion).

Provincial roads infrastructure expenditure will be directed at new road construction, upgrades, rehabilitation and preventative maintenance. The 55 largest provincial roads infrastructure projects total R3.139 billion, with a peak in **2007/08** of R692 million. The largest budget is allocated to LP (R829 million) followed by the EC (R538 million), both for the upgrading of roads from gravel to tar.

Large municipal projects (defined as those over R150 million) over the medium term total 6 projects, with a focus on water, sanitation and roads. The largest project, valued at R737 million, is located in KZN with a focus on increasing water distribution capacity.

The broad analysis, covering only the major projects by value, seems to suggest that there are many (approximately 160) high value projects in the provincial and municipal pipeline, complemented by a host of smaller value projects, that makes up the balance over the medium term. This could further impact on Grade 7, 8 and 9 civil engineering contractors and their subcontractors, thereby placing pressure on limited contracting capacity going forward.

4.9 Significant Investments by National Departments

Large-scale infrastructure investment projects relating to DWAF and DPW have been analysed to assess their future impact on the Public Sector Infrastructure pipeline.

DWAF has 6 major infrastructure projects over the period 2007/08 to 2012/13 with a combined value of R10.8 billion. One project has commenced during 2005/06 and a second (De Hoop dam) is expected to commence during 2007/08, with the remaining four in the feasibility and planning stages. Based on the investment value projections for the six projects, capital expenditure peaks are expected in **2009/10** and **2010/11** at R1,976 and R2,034 million respectively, with an interim peak in 2007/08 at R1,508 million. Infrastructure spend will translate to a demand for infrastructure inputs, with a peak demand for steel and ready-mix concrete for the De Hoop Dam expected in 2008 and 2009.

Infrastructure projects for DPW total 2596 projects with a total value of R10.98 billion over the medium term and beyond. An analysis of 39 significant infrastructure projects with a combined value of R5.526 billion revealed a peak in expenditure expected during the 2007/08 financial year. Sampled capital projects totalled R3.94 billion and planned maintenance R1.59 billion. Most of the capital projects would be concentrated in GP, FS and WC with a focus on the development of new departmental office accommodation, extensions and upgrades, while planned maintenance will occur predominantly in GP with a focus on upgrading and maintenance of departmental office accommodation and official residences.

On the basis of the sample of 6 DWAF and 39 DPW infrastructure projects analysed, representing a combined project value of R16.34 billion (or half of the total DWAF and DPW infrastructure budgets), there is a concentration of high value

projects with a large number of low value projects accounting for the balance. This could impact on the limited Grade 7, 8 and 9 civil engineering contractor's capacity and also present challenges relating to infrastructure inputs.

4.10 Coega Industrial Development Zone (IDZ)

The Coega IDZ is a phased development around industry clusters with custom secure areas (CSA) dedicated for export oriented manufacturing companies located in the zone. The first infrastructure investments in the Coega IDZ are focused on areas where investors have to locate. These include Zones 1-5 that have been reserved for the following sectors and activities:

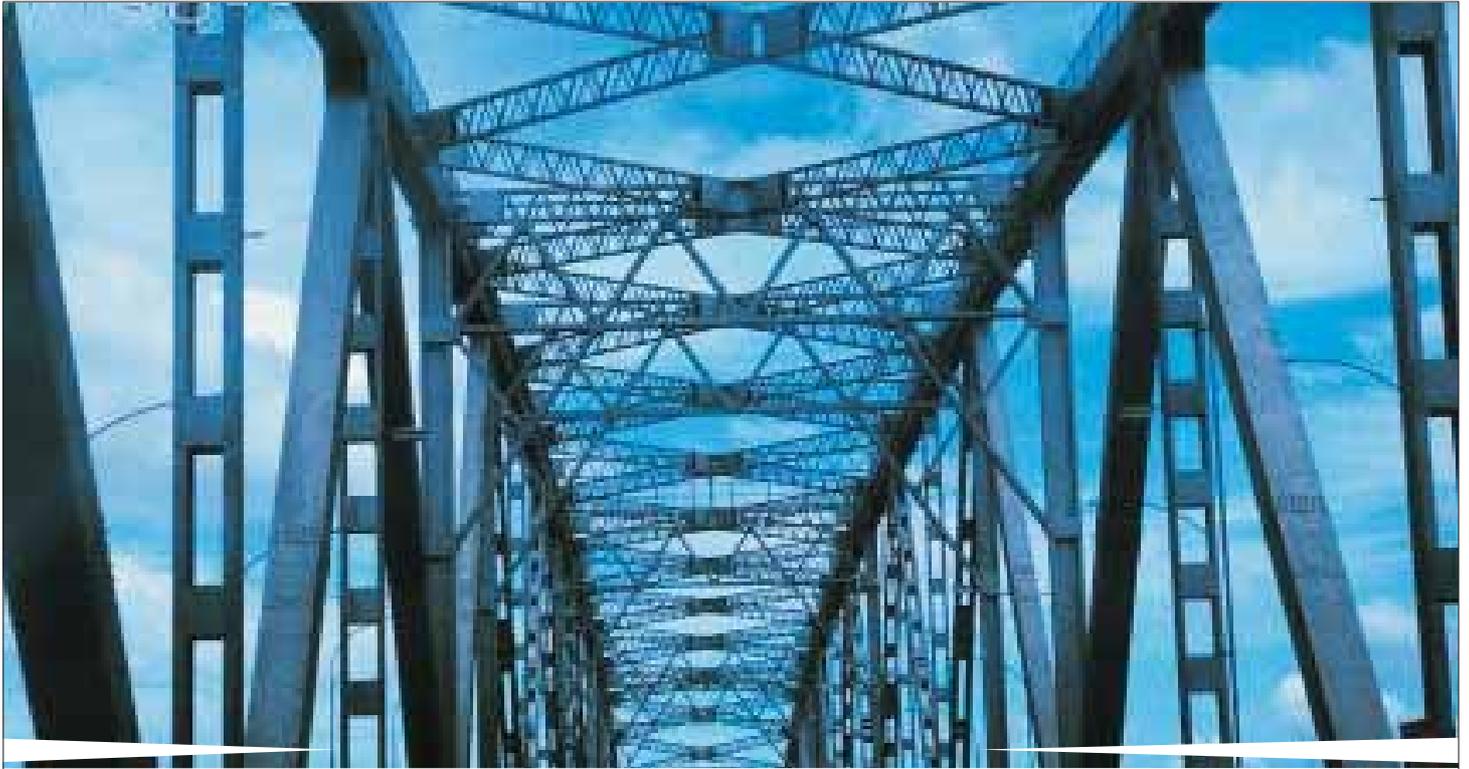
- Zone 1 – light electronics and commercial
- Zone 2 – automotive
- Zone 3 – textiles, agri-processing
- Zone 4 – academic and training, services
- Zone 5 – heavy to medium manufacturing

Infrastructure implementation of the zone could be seen as bulk distribution (first tier) of services in the actual industrial sectors, followed by secondary distribution (second tier) servicing up to the site boundaries and finally site services (third tier) for specific investor requirements.

Coega IDZ top structure infrastructure capital expenditure is expected to peak in **2010/11** at R725 million. Top structure investment is the largest contributor to the total infrastructure capital expenditure, which will remain fairly stable between 2007/08 and 2010/11 at an average of R1.086 billion. Investments in road and bridge bulk infrastructure will be the largest and is expected to peak in **2007/08** at R216 million. Bulk water and electrical infrastructure will also peak in **2007/08** at R48 million and R53 million respectively. Investments in bulk sewer facilities are only expected to peak in **2010/11** at R96 million.

In keeping with the phased rollout of the IDZ and the attempts to attract targeted sectoral investments, capital expenditure for zone infrastructure development is expected to occur as follows: investment in Zones 1, 2 and 3 development are all expected to peak in 2007/08 at R152 million, R123 million and R66 million respectively. Investment in Zones 4 and 5 development will peak in **2008/09** at R60 million and R85 million respectively, while investment in Zone 6 development will only peak in **2010/11** at R97 million. Zones 7 to 10 are also expected to be rolled out between 2008/09 and 2011/12 with peak infrastructure development activity expected in **2010/11** at R127 million.

^{19,20,21} Statistics South Africa, www.statssa.gov.za



Section 5 – Infrastructure Inputs

The key⁹ infrastructure inputs have been identified on the basis of perceived shortages. These perceived shortages are observed through domestic production shortages, increased levels of imports (and the emergence of import parity prices) and high PPI increases between 2004 and 2006. Overall PPI increased by 14% between December 2004 and December 2006.

The analysis of broad infrastructure inputs aims to generate a macro understanding of the future supply industry dynamics for steel, aluminium, cement, concrete, ready-mix, clay bricks, timber, float glass, plastic pipes, aggregate, bitumen, capital equipment (including yellow metal equipment), road transportation and skills. These are discussed below.

5.1 Steel

Overall PPI increased by 14% between December 2004 and December 2006. Steel PPI¹⁰ increases between 2004 and 2006 were 21% unworked structural steel, 10% structural steel products, 7% reinforcing steel, 15% mild steel plate, 23% uncoated sheet, 15% galvanised sheet, 2% mild steel angles and 58% flat rolled stainless steel products. The consumption of and hence the demand for, carbon and alloy steel is currently on an exponentially increasing trend, which saw a 29% increase in apparent demand from 2005 to 2006. There has also been an increase in imports and a reduction in the levels of exports in an effort to supply the current and rising levels of domestic consumption. Producers have also announced plans to increase capacity of certain construction related products.

⁹ The infrastructure inputs that are being considered for the purpose of this study are not meant to be an exhaustive, nor a prioritised listing. Given that specific infrastructure inputs requirements of demand side projects will impact on the relevance of such a listing, as some infrastructure inputs may be more critical from a supply and demand perspective than others, this prioritisation could only be potentially achieved as an outcome of this study. ¹⁰ Statistics South Africa, www.statssa.gov.za

The projected domestic availability of significant carbon steel¹¹ flat product inputs to the building and construction industry, such as hot dipped galvanised sheet steel (approximately 60% of total sales to construction) is expected to increase from 394 kilotons in 2006 to 660 kilotons in 2011. The projected domestic availability of carbon steel long products such as light structural sections (approximately 65% of total sales to construction) and heavy structural sections, wire rod (approximately 45-50% of total sales to construction) and reinforcing bar (approximately 80% of total sales to construction) are all expected to increase. Increases will be from 352 kilotons in 2006 to 483 kilotons 2011 for light structural sections; 188 kilotons in 2006 to 230 kilotons in 2011 for heavy structural sections; 628 kilotons in 2006 to 810 kilotonst in 2011 for wire rod; and from 370 kilotons in 2006 to 547 kilotons in 2011 for reinforcing bar.

Stainless steel projected domestic availability is also expected to increase. It will rise from 17 kilotons in 2006 to 119 kilotons¹² in 2011 for hot rolled sheet and coil and from 109 kilotons in 2006 to 285 kilotons¹³ in 2011 for cold rolled sheet and coil.

Traditionally the South African market is oversupplied with up to 50% of production being exported, but given the current demand pipeline for several large-scale infrastructure projects, it can be expected that supply shortages as and when they occur are likely to be very product specific.

5.2 Aluminium

The South African aluminium industry comprises primary aluminium production and redraw rod (by BHP Billiton), rolled products (by Hulamin) and a range of extruded products produced by Hulamin, Wispeco, AGI and Lafarge.

The overall PPI increase between December 2004 and December 2006 was 14%. Aluminium PPI¹⁴ increases between 2004 and 2006 were 43% profiled aluminium roofing, 35% extruded aluminium section, and 33% profiled aluminium roofing at distributor level. The industry has confirmed that there is currently no capacity problem regarding the domestic supply of primary aluminium with Southern Africa producing 1.5 megatons per year. Domestic aluminum extrusion capacity of 81 kilotons will, however, reach its current production limit during 2012¹⁵, at the projected rate of domestic demand escalation (expected to reach 80.7 kilotons in 2012), and additional capacity will be required. Industry has indicated that extrusion capacity will increase incrementally from the current 81 kilotons per annum to 100 kilotons per annum in 2015.

Current input challenges include the aluminium price and casting capacity of extruded billets to ensure inputs into the aluminium extrusion process. Imports of extruded products from China, Malaysia and Brazil are also of concern to the industry, and these countries are currently the subjects of anti-dumping action being brought to the DTI by the AEA. It would appear that the aluminium industry is able to plan production capacity for anticipated domestic consumption, which will thus not lead to product shortages, especially for extrusion.

5.3 Cement

Overall PPI increased by 14% between December 2004 and December 2006. Cement PPI¹⁶ increases between 2004 and 2006 were for retail cement at 4% above the overall PPI increase, and for ordinary and extended cement at 2% above the overall PPI increase. The current 50% cumulative growth in cement demand over the past five years was not projected by the cement industry, given the average annual historic growth rates of 2% between 1971 and 2001.

Current installed cement capacity of the four major cement producers NPC, PPC, Holcim and Lafarge, including independent third party blenders, was approximately 14.8 megatons in 2006. Significant new capacity is currently either under construction or at various stages of implementation to increase domestic availability of cement from 14.8 megatons per year in 2006 to 21.4 megatons per year in 2011 and to thereafter potentially increase this capacity further to 25.4 megatons per year by 2016.

The industry has indicated that additional investment during the period 2012 to 2016 will depend on sustainable and profitable market growth, since investment in new projects or the expansion of current ones have long lead times and are costly (typically

¹¹ Excludes capacity at Scaw Metals. ¹² This figure represents gross domestic availability, but whatever cannot be sold in the domestic market will be exported. ¹³ This figure represents gross domestic availability, but whatever cannot be sold in the domestic market will be exported.

¹⁴ Statistics South Africa, www.statssa.gov.za. ¹⁵ Assumes reserve factor for increased domestic market demand and/or substitution of imports by domestic production, thus investment from 2012, if not investment is only required from 2014. ¹⁶ Statistics South Africa, www.statssa.gov.za.

in excess of R2.5 billion per 1 megaton per year green fields plant). The industry has identified several key challenges that need to be addressed, particularly in the areas of skills availability and rail logistics, which are considered both short and medium term challenges.

Expectations are that cement will continue to be imported to meet any shortfalls that may arise currently and in the future, but imports will be dependent on the exchange rate and destined primarily for coastal regions, given the logistics challenges of transporting cement.

5.4 Concrete Products

The overall PPI increase between December 2004 and December 2006 was 14%. Cement and concrete product PPI¹⁷ increases between 2004 and 2006 were for the following: cement building blocks at 10% above the overall PPI increase, fibre cement roof sheets at a 13% increase, concrete pipes also at 13%, and concrete roof tiles at 1%. The concrete product manufacturers do not foresee any difficulties regarding the domestic availability of concrete products from their production facilities, provided the critical input materials (cement and aggregate) are available and accessible.

Domestic availability of paving, roof tiles, masonry, floor slabs, retaining blocks and concrete infrastructure products are all expected to increase by an average of 9% from 2006 to 2008, thereafter remaining constant up to 2010. These increases are expected as follows: from 16 million square metres in 2006 to 19 million square metres in 2008 for paving; from 205 million in 2006 to 243 million in 2008 for roof tiles; from 4 billion BEQ in 2006 to 4.75 billion BEQ in 2008 for masonry; from 1.6 million square metres in 2006 to 1.9 million square metres in 2008 for floor slabs; from 0.5 million square metres in 2006 to 0.594 million square metres in 2008 for retaining blocks and from 385 kilotons in 2006 to 457 kilotons in 2008 for concrete infrastructure products.

Investment in concrete product manufacturing capacity is also increasing (according to the CMA) in line with the current growth in demand. However, these capacity expansions are more capital than labour intensive, with labour intensive job creation potential existing downstream in concrete product installation.

5.5 Ready-mix Concrete

The ready-mix channel concrete industry has experienced rapid growth of 17%¹⁸ over the past five years, a growth arising from the increased levels of construction activity. The industry foresees potential for future plant and logistics expansion. However, this expansion will not be labour intensive, given the automated nature of these plants. Jobs will be created in the logistics component of the business as the need for trained and experienced truck drivers increases.

Projected domestic availability of ready-mix concrete is expected to rise from 7.92 megatons in 2006 to 15.94 megatons in 2016, with an average annual growth rate of 6.2% expected between 2007 and 2011. Thereafter availability will increase at an average annual growth rate of 7.6% between 2012 and 2016. SARMA also expects the fleet size to increase from 1583 carrier units in 2006 to 3589 carrier units in 2016 to facilitate the logistics distribution of ready-mix concrete.

The industry does not anticipate any difficulties regarding the domestic availability of ready-mix concrete, but has raised concerns relating to the current limited availability of raw materials including cement, extenders and aggregates coupled with increasing traffic congestion, which is impeding operational efficiency.

5.6 Clay Bricks

Overall PPI increased 14% between December 2004 and December 2006. Clay brick PPI¹⁹ increases between 2004 and 2006 were for stock bricks, at 12% above the overall PPI, and face bricks at 9% above the overall PPI. The clay brick industry has thus far coped with the upswing in demand, but also recognises the need for further capacity expansion likely to favour job creation in rural communities. The industry has also taken an opportunistic stance in promoting clay bricks at a time when cement shortages have constrained the availability of concrete blocks, and has further recommended the use of clay bricks for low cost housing.

¹⁷ Statistics South Africa, www.statssa.gov.za ¹⁸According to SARMA ¹⁹ Statistics South Africa, www.statssa.gov.za

Some of the challenges facing the industry include increasing product transportation costs and the availability and accessibility of coal inputs. Investment impediments include regulatory compliance challenges and the perceived absence of specific investment incentives. However, domestic availability through increased production capacity is expected to grow at an average annual rate of 3% from 4.892 billion BEQ in 2006 to 6.575 billion BEQ in 2016.

5.7 Timber

Timber PPI²⁰ has increased between December 2004 and December 2006, with the most notable being flush doors at 3% above the overall PPI increase of 14%. Over the decade 1994 to 2003, sawn timber sales doubled to 2,549 thousand cubic metres, and demand for sawn timber continues to exceed projections. The projected domestic availability of sawn timber is dependent on the plantation yield rate and mill recoveries from sawlogs. It has been estimated that at a conservative annual average demand growth rate of 2.5% per annum, the demand for sawlogs in 2033 will be approximately 10.04 million cubic metres. The projected domestic availability of sawlogs, however, is expected to result in a consistent supply shortage over the next 30 years averaging 38% per annum.

This sawlog shortage is primarily due to sub-optimal and reduced sawlog plantations arising from State Forest restructuring, associated Government policies and increasing levels of domestic demand. The industry has sought to reduce shortages through increased plantation yields, increased mill recoveries and improved forest protection. However these have had a limited impact on reducing the current and projected shortages. It is thus inevitable that sawlog and/or sawn timber imports are required as a short to medium-term intervention to supplement current production, in meeting rising demand for timber products.

Investment in afforestation needs to take place to ensure long-term domestic availability of sawlogs. It has been estimated that to meet the projected sawlog demand of 10,038 thousand cubic metres in 2033 based on a plantation yield factor of 16,2 cubic metres per hectare per annum, that approximately 620,000 hectares of pine sawlogs need to be planted. This represents an additional 236,266 hectares over the next 30 years (8,000 hectares per annum). This goal presents unique challenges due to appropriate land availability, competitive challenges (relating to returns on investment over 30 years), finance and access to suitable incentives. It is therefore unlikely that afforestation of this magnitude will be achieved.

South Africa is thus facing a growing imbalance between the demand and supply position of construction and industrial timber, which does not bode well for the industry's ability to meet escalating infrastructure input requirements. South Africa is likely to become an importer rather than an exporter of sawn timber. In view of shortages, sawlog prices and sawn timber prices are also likely to rise, leading to further concerns around import parity pricing of locally produced timber.

5.8 Float Glass

The overall PPI increase for this material between December 2004 and December 2006 was 14%. Float glass PPI²¹ has changed between 2004 and 2006, with the most notable being an increase of 15% for glass for the building industry (cut-to-size) and a "decrease" of 15% for glass for the building industry. The float glass industry does not foresee any difficulties regarding the domestic availability of float glass products to support general building, construction and infrastructure growth. The domestic availability of float glass products including clear, bronze and grey as well as coated float products is expected to increase at an average annual growth rate of 5.2% from 195 kilotons in 2006 to 325 kilotons in 2016.

The commissioning of a second float glass facility will bring additional capacity on line in April 2007, and any further shortfalls will be supplied through product specific imports. The industry has confirmed that an additional float glass line expansion is a distinct possibility if demand growth outperforms current expectations on a sustainable basis.

5.9 Plastic Pipes

The overall PPI increase between December 2004 and December 2006 was 14%. Plastic pipe PPI²² increased between 2004 and 2006, with the most notable being an increase of 8% for PVC pipe. The plastic pipe industry does not foresee any

^{20,21,22} Statistics South Africa, www.statssa.gov.za

difficulties regarding the domestic availability of plastic pipe products to support general building, construction and infrastructure growth. Continuous and incremental capacity expansion coupled with line process improvements will lead to further increases in plastic pipe domestic availability. The industry has, however, raised concerns relating to the import of plastic pipe, which impacts on installed capacity and employment.

Domestic availability of PVC pipe is expected to increase from 114 kilotons in 2006 to 168 kilotons in 2016. This represents an average annual increase of 3.9%. HDPE pipe is expected to increase from 26.5 kilotons in 2006 to 57.6 kilotons in 2016. This represents an average annual increase of 8.1%.

5.10 Aggregate and Sand

Aggregate and Sand PPI²³ increased by 10% above the overall PPI of 14% between December 2004 and December 2006, while sand PPI increased by 2% during the same period. The aggregate and sand industry has seen recent growth driven by strong macroeconomic performance and an increase in construction activity. The local aggregate industry is highly fragmented and it is estimated that there are over 1,000 quarries operated by more than 300 companies in South Africa. However only about half of the total industry sales are reported to the DME.

Poor aggregate and sand industry regulation and poor management of permitted reserves have been cited as impediments to responsible growth and environmental management of aggregate resources. BEE (relating to mixed messages from the DME) and poor facilities maintenance (crusher plants etc.) have also been raised as impediments towards growth and increased operational efficiencies.

The domestic availability of aggregate and sand, which is ultimately linked to the sales of cementitious products, is expected to continue on a growth trajectory before receding slightly in 2011 and 2012. Projected domestic availability is expected to increase from 114.1 megatons in 2007 to 120.2 megatons in 2010, representing an annual average growth rate of 1.75%. This growth is expected to be primarily driven by investments in the additional capacity expansion of existing operations of approximately R200 million annually over the next 3-5 years. It is expected that the industry will continue with the growth trend to 134.2 megatons by 2016, representing an annual average increase of 3.16% between 2012 and 2016.

The industry does not anticipate any difficulties regarding the domestic availability of aggregate and sand, but has raised concerns relating to industry regulation and demand certainty as being central to promoting growth and development.

5.11 Bitumen

There are four oil refineries that produce bitumen from refined crude oil residue. Domestic and export bitumen sales in 2006 were 308 kilotons and 164 kilotons respectively, with approximately 90% of local sales arising from Government demand for road and runway projects. Bitumen imports are costly due to the need for handling bitumen in hot bulk, and require additional investment in dockside tanks and support logistics.

Supply challenges affecting domestic bitumen availability include the scheduling of shutdowns, limited storage and loading capacity, "cleaner fuels" legislative concerns and the potential future product rationalisation of NATREF's operations (to produce fuel only rather than bitumen periodically).

Domestic availability over the next 12 months is expected to show a shortfall of approximately 20 kilotons, due to unforeseen supply problems at SAPREF and NATREF, coupled with planned plant shutdowns. The four refineries have a potential total bitumen processing capacity of 725 kilotons per annum, assuming there is sufficient storage capacity and loading facilities in place to dispatch bitumen. There may therefore not be a need for expansion over the medium term from 2007 to 2010 as there is surplus capacity of 253 kilotons per annum, provided the annual average domestic growth of bitumen over this period does not exceed 16.2%.

Over the long term there will be a need for further investment in bitumen distillation, blending and dispatch facilities at all refineries, and improved optimisation of surplus production capacity for bitumen exports, to cope with demand primarily from Government infrastructure projects.

²³ Statistics South Africa, www.statssa.gov.za

5.12 Capital Equipment (Yellow Metal Equipment)

The overall PPI increase between December 2004 and December 2006 was 14%. Civil engineering plant (capital equipment) PPI²⁴ increased by 10% between 2004 and 2006. Demand for mass yellow metal equipment, that is, excavators as opposed to niche trucks, has internationally been driven by growth and infrastructure development in India and China. Demand in North America has reduced.

Major supply challenges facing the local industry include shortages relating to material inputs, skills inputs and access to competitive EXIM and pre-shipment financial products.

The increasing trend towards imports also affects the sustainability of domestic production, job retention and job creation. Investment, local value-add and job creation potential is high. However, these will be dependent on low cost production driven by economies of scale. Such production also needs to be complemented by globally competitive capital equipment sector industrial incentives and reasonable working capital financing costs.

Domestic availability has been projected under the assumption that there will be sustained levels of demand in South Africa, complemented by relatively inexpensive access to imported products. Domestic availability of all categories of capital equipment analysed, including earthmoving equipment, draglines/buckets and construction equipment, indicate an increasing trend from 2006 to 2010, stabilising thereafter. The estimated increased demand could provide a unique window of opportunity for the creation of a sustainable and viable local capital equipment industry.

The industry has indicated that the domestic availability of ADTs, draglines/buckets, concrete mixers and plate compactors will be biased toward local production, whereas TLBs, FELs and dumpers will continue to be more dependent on imports. Industry has not raised any concerns relating to the domestic availability of yellow metal capital equipment. It would appear that whatever cannot be sourced in South Africa will be imported and this is likely to be very product specific.

5.13 Road Transportation

The success of South Africa's infrastructure growth challenges will be dependent on the ability of the logistics infrastructure, in particular transportation, to cope with demands placed on it. Freight has been increasingly moved from rail to road due to speed, reliability, reduced double handling and pilferage, breakages and losses. However, this trend further entrenches structural inefficiencies, road deterioration and heavy vehicle traffic congestion that are unsustainable over the long term.

Currently road freight costs are competitive with rail in relation to the services and benefits offered. Should Government decide to implement a 'user pays' system, to recover costs associated with road damages, environmental and accident costs, road freight costs could increase substantially.

Transportation corridors are increasing in road freight density, especially the Gauteng – Durban and Gauteng – Cape Town corridors. These would need to be monitored in terms of the movement of infrastructure inputs. Freight loads along these corridors will need to move to rail within the medium to long term. This will be dependent on Spoornet's transformation and recapitalisation plan, and the availability of appropriate inter-modal interfaces, modern infrastructure facilities and security at transportation nodes.

Freight volumes transported by all modes will also have to be suppressed during the period of the 2010 FIFA World Cup™. This development is expected to have a considerable impact on warehousing, materials storage systems and operating hours. This could in turn adversely affect ongoing Eskom, Transnet, roads infrastructure, Gautrain, housing and dam infrastructure projects if proactive plans are not developed and implemented.

Internationally, road transportation is under excessive pressure because of road deterioration, congestion, pollution and expensive fuel supplies, with the US having moved to the user pays system for large commercial vehicles over 36 tons. In

²⁴ Statistics South Africa, www.statssa.gov.za

South Africa, the road freight industry continues to grow significantly with projections for a 6–7% annual growth rate. Infrastructure inputs such as cement are also being moved to road transportation, resulting in a 10% annual growth rate in 2006.

However, several generic challenges affect the road freight industry, including:

- Congestion
- Poor road infrastructure
- Inconsistent weighbridge tolerances and thresholds
- Access to vehicle asset finance
- Hijacking
- HIV/AIDs
- Shortages of experienced drivers
- Inadequate and unsafe roadside rest and parking facilities
- Operating conditions

From a construction perspective, the road freight industry has cited specific challenges relating to the following:

- Lack of information on infrastructure projects and materials movement to inform operations planning and capacity expansion
- Delays at construction sites
- Vehicle damage at construction sites (a high risk environment)
- High insurance costs and low transport rates for operators engaged in this environment

The road freight industry has expressed concerns regarding further investment in increasing fleet sizes, indicating that the potential for road freight vehicle investment would be informed by the availability of work and its sustainability, since an increased asset base ultimately translates to increased operating risk.

There are therefore several challenges that seem to plague the road transportation industry, which currently provides an important service for the movement of infrastructure inputs. An urgent need therefore exists for the collection of accurate information surrounding the movement of infrastructure inputs to inform an integrated logistics strategy for the infrastructure inputs sector. What is abundantly evident, however, is the urgent need for a cost effective and reliable rail transportation service through Spoornet's accelerated transformation and recapitalisation plan to move rail-appropriate cargo back onto rail.

5.14 Skills

The skills shortage has been acknowledged by Government and industry. The skills deficit appears to be on a path where demand will continue to outstrip supply as a result of the substantial growth in infrastructure investment.

The step change in announced private sector projects in 2005 and 2006 will result in additional skills requirements, the precise nature of which is beyond the scope of this study. Government-initiated projects also suggest a significant number of small (by value) municipal, provincial and national projects that will require more skills spread over several projects rather than a concentration of skills in fewer large projects. Public corporations are expected to rollout a limited number of overlapping large projects, in addition to several other concurrent stadium, Gautrain, airport, dam, housing and national roads projects. However, the skills requirement for each of these projects is expected to be in the order of 10's for professionals and 100's for artisans, with only Eskom requiring about 2,000 artisans at peak levels of demand for each of its new power station projects.

Skills demand in the civil engineering industry has led to a rapid increase in employment to 107,000 employees in 2006 (13% higher than in 2005), further stimulated by strong optimism in the future outlook, the sector recorded a confidence index of 98/100 in December 2006. The industry has indicated that a skills crisis does exist to the extent that it takes longer to source skilled workers with the surge in skills demand resulting in a 30% premium to retain existing critical staff.

The issue of skills supply is rather complex, requiring several integrated interventions that also impact on the skills pipeline. The cidb has indicated that certain systemic issues need to be addressed including input issues (matric pass rates etc.), institutional issues (alignment between theoretical training and apprenticeships), quality and relevance of qualifications and experiential learning.

JIPSA has also proposed a programme of action to increase artisan supply by 50,000 in four years. In essence this programme focuses on increasing throughput. To achieve this, several critical success factors are currently being addressed, including the formal acceptance of and agreement on requirements for the 16 priority trades, alignment between training pathways, recognition and support for employer led interventions and the development of a business plan. Although the initiative will seek to minimise the projected skills deficit, JIPSA projections indicate that there will still be a shortage of some 29,400 artisans in 2012.

Given the need for professional skills, JIPSA has also proposed a programme to increase the throughput of EBEPPT's through focused interventions to improve intake selection, provide academic support in order to bridge secondary education shortcomings, and to provide academic development and pre-entry support. Infrastructure investment, an increase in staff capacity and student bursaries also forms part of this holistic package. JIPSA has also proposed that the process from graduation to professional registration needs to be addressed through workplace experience and technical, management and business training under mentorship and supervision. The plan will reduce the skills shortage; but JIPSA figures still suggest a shortage of 30,400 technicians and 22,800 engineers in 2012 in the best-case scenario.

The construction industry has also recognised the need to secure skilled human resources and is implementing strategic plans to identify, educate, train and develop new entrants. This is in addition to proactively developing a long term pipeline of leadership talent. Retention of scarce and critical skills is also receiving priority attention, as it is a cost effective option.

In addition to these interventions by Government and the private sector, Government has also recognised the need to import scarce and critical skills as a short term intervention to support South Africa's developmental agenda, through the relaxation of work permit regulations. It has therefore announced the immediate availability of 34,825 quota work permits in 53 skills categories for 2007/08. Approximately a third of these quota work permits will benefit the construction and infrastructure inputs sectors directly and indirectly.

The current skills shortage will thus require an intensive transient strategic approach focusing on the importation of scarce and critical skills in the short term, coupled with the accelerated throughput of graduates, diplomats and technicians in the medium term with a strong emphasis on experiential learning in conjunction with the private sector and SOEs.



Section 6 Observations/Considerations

Several observations have been made from the consultation and research processes:

- **Escalating tender prices** resulting from increasing infrastructure input costs and insufficiently detailed tender contracts. This suggests the need for broad economy of scale cost guidelines and standardised procurement processes.
- **The Vertical integration of construction companies** is promoted by the need to secure upstream infrastructure inputs and to offset cyclical industry risks. Naledi²⁵ has indicated that: " Given the soaring materials prices, the vertical integration of the largest contracting companies could give Government pause (as) in effect the state was paying historically high prices for tenders to contractors who then obtained from affiliated companies materials that were also going up in price" . It has also been found that by the mid-2000, materials-producing subsidiaries of large construction companies were generally more profitable than the actual contracting business and for the largest construction companies (Aveng and Murray and Roberts), production of inputs accounted for some two fifths of their turnover and the bulk of their profits in 2006²⁶. This phenomenon may therefore need to be thoroughly evaluated to ensure a fair, accessible and competitive market environment for construction materials inputs.
- **A Shift in focus of construction companies** from residential construction to more lucrative infrastructure development tendered contracts is underway. This could present significant challenges to housing developments.
- **Contracting Capacity** is limited and according to the cidb, grade 7, 8 and 9 contractors are faced with skills challenges in executing infrastructure projects. Apart from skills challenges, contracting capacity challenges could potentially result

²⁵ National Labour and Economic Development Institute., 2007: The Construction Sector – An analysis of its contribution to economic growth, employment and poverty reduction in SA, March 2007, p 52. ²⁶ National Labour and Economic Development Institute., 2007: The Construction Sector – An analysis of its contribution to economic growth, employment and poverty reduction in SA, March 2007, p 53.

in project delays, deteriorating quality and possibly even deteriorating health and safety standards. The challenge also presents unique opportunities for the sector to consolidate scarce resources and develop economies of scale for contracting work, which will encourage efficiency, skills transfer and above all ensure adherence to prescribed standards.

- **Environmental Impact Assessment** backlogs and delays are contributing to delayed supply-side capacity expansions and investments within the cement and clay brick industries. There is a need to optimise the EIA business process and further increase official capacity without compromising the strategic value of the EIA process and its outcomes.
- **Downstream challenges** include the shortage of metal fabricators and artisan skills. These present a greater concern than infrastructure materials supply, and there is a need to evaluate intensive supplier development and the phasing of large infrastructure projects.
- **There is a need for improved collation and diffusion of infrastructure inputs, construction and infrastructure development information.** This will inform infrastructure inputs capacity expansion planning and infrastructure project planning and execution.





Section 7 Infrastructure Inputs Conference

The findings of the research report were presented to stakeholders from Government, Industry and Labour. This was done to communicate projected trends in infrastructure inputs demand, confirm identified challenges, identify additional challenges and establish processes to address them. This was undertaken through an Infrastructure Inputs Conference on 21st May 2007 convened at Gallagher Estate, Midrand. The conference was addressed by the Deputy President and attended by 156 Government, Industry and Labour delegates.

Delegates to the conference were issued with the draft research report for the infrastructure inputs sector strategy in advance of the conference and were encouraged to participate in one of three commissions:

- Non-metallic minerals, quarrying and wood products
- Base metal products, petroleum products and capital equipment
- Skills and transport services

The discussions at the respective commissions confirmed the captured content contained in the research report for the infrastructure inputs sector strategy, and further amplified certain important cross-cutting issues, common to several infrastructure inputs sub-sectors. To the extent that the interactions during the commissions at the conference sought to consolidate concerns around specific issues, seek clarity on specific challenges and generate consensus regarding a process moving forward, the process was successful. The process also allowed for constructive engagement between infrastructure inputs sector representatives, Government and Labour delegates to improve their understanding of challenges and the unique opportunities for trade and investment that exist at present.

Several cross-cutting issues were identified or emphasised, including:

- The need for a transport logistics strategy, especially in congested regions
- Regular demand projections; these should be embraced within an appropriate mechanism to include regional (spatial) dimensions, major private sector projects (where possible), and appropriate levels of aggregation and timing (frequency of data collection and dissemination)
- Environmental impact assessments: the development of guidelines for sub-sectors
- Improved regulatory framework for quarries
- Downstream supply development
- Cost of retaining skills
- Electricity supply
- Electricity disruptions
- Standards normalisation
- A mechanism to incorporate people that have skills but no qualifications
- Lack of, or insufficient, industry training
- Low levels of experienced contracting and management capacity (critical skill)
- Skills development and retention of drivers
- Inadequate transport regulation enforcement





Section 8 Conclusion

The purpose of this study has been to assess the increase in public sector demand and trends in supply for key infrastructure inputs. This has been established through broad research to generate demand projections of key public sector infrastructure inputs and industry supply capacity. These demand and supply projections, however, cannot be directly compared to each other as no assessment of private sector demand for infrastructure projects has been undertaken. This was beyond the scope of the study and not all the demand-side projects have been assessed on the basis of infrastructure input projections.

From the projected supply analysis of infrastructure material inputs, the most sensitive infrastructure material inputs that could present supply challenges are:

- Carbon steel products, with a peak of 656.4 kilotons in **2008** strongly influenced by demand from Eskom
- Cement, with its peak of 1.5 megatons in **2009** driven by concurrent demand from Housing, Eskom, Gautrain, SANRAL and ACSA
- Timber, with significant incremental demand driven by Housing budget allocations
- Aggregate and sand, with a peak in **2008** arising from Gautrain, Eskom, SANRAL, ACSA and Housing
- Bitumen, with a peak in **2008** driven by SANRAL and Eskom.

Industry has also indicated that there are no anticipated production and supply difficulties associated with clay bricks, float glass and plastic pipe (PVC). But these infrastructure material categories also registered some of the highest percentage PPI increases²⁷ between 2004 and 2006: stock bricks, with an increase of 26%; face bricks at 23%; glass for the building industry cut-to-size at 15%; and PVC plastic pipes at 8%.

A strategy to evaluate trade and investment opportunities to increase the supply of these critical infrastructure inputs is thus required to mitigate potential infrastructure inputs supply shortages and to ensure minimal disruption to critical infrastructure projects during these years.

Transportation of infrastructure inputs is currently biased in favour of road transportation which has several limitations, and there is an urgent need to develop an optimised infrastructure inputs transportation strategy that is aligned to the DoT's National Freight Logistics Strategy.

Skills challenges are immediate and are expected to increase despite initiatives from Government to increase education and training throughputs. Government will need to intervene further given that the current JIPSA initiatives do not seem to be adequate in addressing the skills deficit. The public sector may therefore need to consider facilitating the bridging cost of skills development in partnership with the private sector over the short to medium term against the risk of escalating skills costs (due to shortages) and delayed critical infrastructure projects over the medium to long term. Further initiatives from the private sector to improve training and skills development will also be required, complemented by a comprehensive and integrated skills development strategy for the infrastructure inputs sector.

²⁷ Statistics South Africa, www.statssa.gov.za



Section 9 Recommendations

Some of the possible mechanisms to address the demand- and supply-side challenges could include:

- **Demand-side monitoring:** as a proactive information system to predict transient demand-side peaks and provide regular information on planned projects and their respective input needs
- **Demand-side management:** to critically assess the potential phasing of certain large Government infrastructure projects, thus ensuring minimum delays on critical projects
- **Standardisation of Government tenders:** to improve the overall efficiency of the tendering process and minimise perceived tendering risks by service providers
- **Supply-side monitoring:** as a proactive tool to predict potential supply-side limitations and to investigate possible trade and investment solutions
- **Skills development:** in addition to support for the JIPSA initiatives, additional benefit could be derived through building additional capacity at the Construction Education and Training Authority
- **Transportation:** the development of an integrated transportation strategy by the DoT that addresses congestion issues, the promotion of rail (as a mode of preference) and improved information regarding infrastructure inputs transportation patterns to inform DoT planning
- **Regulatory:** the development of clearer guidelines and an optimised EIA business process for both private suppliers and local and provincial governments on timeframes and information requirements
- **Development of an Infrastructure Inputs Cluster Sector Strategy:** to address the immediate supply-side limitations in the short term and systemic limitations of the infrastructure inputs industry over the medium to long term.

The focal areas of the strategy could include:

1. Industry collaboration (incorporating materials and transportation strategies)
2. Policy interventions
3. Integrated skills development

Further research is recommended in the following areas to improve the knowledge base relating to infrastructure inputs:

- The impact of vertical integration in the construction industry on the supply of infrastructure inputs
- The collective assessment and impact of all known public and private sector skills development initiatives
- The collection of accurate information surrounding the movement and transportation of infrastructure inputs to inform an integrated logistics strategy for the infrastructure inputs sector that is aligned to the DoT's National Freight Logistics Strategy

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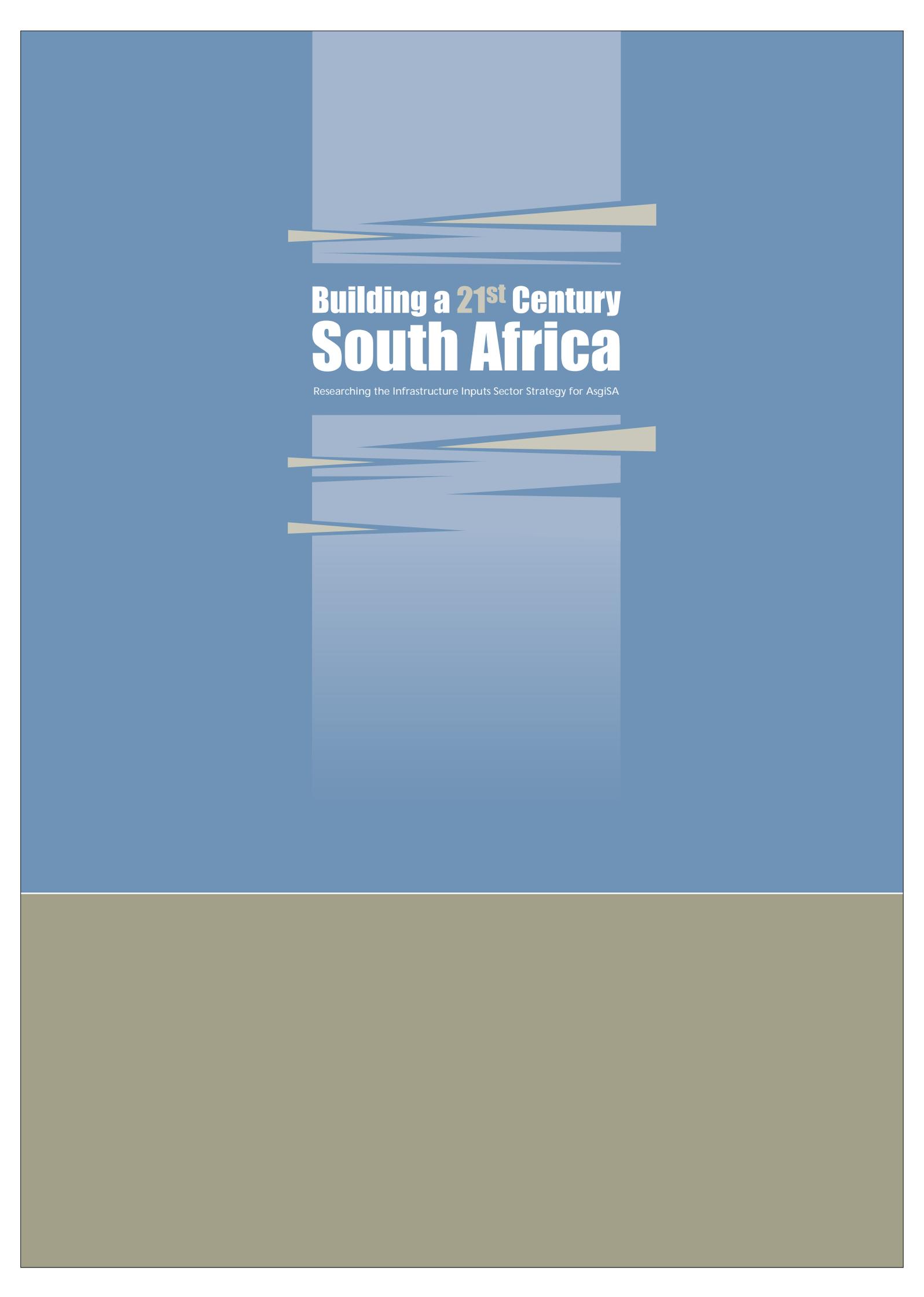
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