

# Chapter 4

## ECONOMIC INFRASTRUCTURE

*“Everybody sees to it and assists so that all life’s enablers are available in a humane way.”*

### Introduction

To achieve sustainable and inclusive growth by 2030, South Africa needs to invest in a strong network of economic infrastructure designed to support the country’s medium- and long-term objectives. Achieving this vision is possible if there is targeted development of transport, energy, water resources, and information and communication technology (ICT) networks.

### Challenges

South Africa has a relatively good core network of national economic infrastructure. The challenge is to maintain and grow it to address the demands of the economy effectively and efficiently. In the transport and energy sectors – dominated by state-owned enterprises (SOEs) – the economy has already been constrained by inadequate investment, alongside ineffective operation and maintenance of existing infrastructure. In the telecommunications field, dominated by private operators, the cost of services is prohibitive.

Large investments are needed to propel economic activity, using structured approaches to prevent inappropriate initiatives being favoured over urgent priorities. Poor investment decisions commit the state to continuing costs and subsidies that hinder other priority investments and, ultimately, constrain economic growth. Greater use of public-private financing should bring about improved decision-making and spending discipline, and result in more rigorous assessment, shareholder accountability and reporting. Improved discipline and coherent decision-making will in turn ensure easier access to capital.

Current investment levels are insufficient and maintenance programmes are seriously lagging. Government can achieve better outcomes by improving coordination of integrated development approaches, particularly pivotal development points (such as the Waterberg/Lephalale region, Coega and the strategic freight corridor from Gauteng to Durban) to ensure full benefits for the country. In these cases, collaborative investment involving a range of interested parties, from business to provincial and local governments, will support better results. Precedence should be given to infrastructure

programmes that contribute immediately and practically to greater regional integration. These include the African Union's north-south corridor programme and sector-specific projects (enhancing border facilities, improving energy and ICT connectivity and revising transport links).

To be successful, participants in strategic sectors can use a combination of cooperation and competition to improve the performance of SOEs. Mechanisms to ensure local industry remains regionally and globally competitive, while meeting domestic needs, are also required.

## Regulation

While some network industries lend themselves to competition (power generation and ICT services, for example), core components such as electricity grids, gas and water pipelines, and railway lines tend to be natural monopolies. With high fixed costs and decreasing average costs of service provision as more customers join these networks, it is often difficult to stimulate meaningful competition or to encourage multiple market entrants. In such cases, effective economic regulation is essential.

Over the past two decades, independent regulatory authorities have been established worldwide to issue licences, ensure access to networks, set prices, and establish technical and service standards. South Africa has dedicated regulatory agencies for electricity, gas and petroleum pipelines, telecommunications and ports.

These regulators should ultimately safeguard reliable and competitively priced services for consumers, and promote affordable access for poor and remote households. They should ensure that utilities and operators are efficient and financially viable, so that they can invest in maintaining, refurbishing and extending these networks.

After more than 15 years of sector regulation, it is fitting to analyse the effectiveness of these regulators.

Although regulators have succeeded in issuing licences, developing pricing methods and establishing technical and service standards, they have not achieved the positive outcomes initially envisaged. Based on the performance of the ICT, electricity and port sectors, South Africa is slipping down international benchmark rankings. The reliability of electricity supply has deteriorated, and prices that were previously below economically viable levels are now rising at rates that consumers are unable to absorb. Communications quality, speed and cost are significantly worse in South Africa than in comparable nations, with a similar situation in rail and port performance.

Regulators face two key difficulties. First, because they are responsible for ensuring that consumers have access to reliable and quality infrastructure, they are required to play a proactive role in guaranteeing that infrastructure planning consistently promotes adequate levels of investment. Government departments need to work with regulators and utilities to ensure that their licence and price approval processes and other strategic decisions create investor certainty and encourage new investment. Second, because infrastructure investments tend to be capital intensive and require large chunks of investment, associated financing requirements need to be catered for through economically viable pricing levels. If prices fall in real terms during periods of low investment, new investments will demand very steep price increases. Regulators can do more to smooth prices and avoid such economic shocks.

Recently, there has been much rethinking about the institutional arrangements and design of network regulators. Regulation works best where there is sufficient political will to support regulation; regulators are legally independent, publicly accountable and their decision-making transparent; and where the regulator is backed by adequate institutional and human capacity. South Africa faces challenges in all these areas. As a result, it makes sense to restrain the initial decision-making discretion held by regulatory agencies, and to support their roles with clearly defined policy, so that they operate in a more predictable policy environment that is well understood, and supported by detailed decision-making rules.

A far-reaching review of current infrastructure regulators is needed to clarify roles and accountabilities, update legislation and subsidiary regulations, and reform institutional arrangements and design.

An improved regulatory performance is vital for national development. Institutional capacity building remains a core challenge in this area, requiring sustained training to improve leadership and technical capabilities. The quality of regulation, however, is not just about the regulator. The state itself must have adequate capacity and capability to formulate effective policy; support the design, establishment, review and improvement of regulators; and respond to issues identified by capable regulators.

### Phasing

The following activities are proposed for the immediate future:

- Institute a far-reaching review of current infrastructure regulators to clarify roles, strengthen accountability, update legislation and regulations, and reform institutional design.
- Establish a unit in the Presidency (Monitoring and Evaluation) to undertake periodic regulatory impact reviews, and to provide advice and support to regulatory authorities.

## The energy sector: empowering South Africa

### Vision

By 2030, South Africa will have an energy sector that promotes:

- *Economic growth and development* through adequate investment in energy infrastructure and the provision of quality energy services that are competitively priced, reliable and efficient. Local production of energy technology will support job creation.
- *Social equity* through expanded access to energy services, with affordable tariffs and well targeted and sustainable subsidies for needy households.
- *Environmental sustainability* through efforts to reduce pollution and mitigate the effects of climate change.

Specifically, South Africa aims to have adequate supplies of electricity and liquid fuels to avoid disruptions to economic activity, transport and welfare. Although likely to be higher in future, prices for energy services will still be competitive with South Africa's major trading partners. In addition, more than 95 percent of the population should enjoy access to electricity within 20 years.

To realise this vision, South Africa's energy system needs to be supported by effective policies, institutions, governance systems, regulation and, where appropriate, competitive markets.

### Storylines

In 20 years, South Africa's energy system will look very different: coal will contribute much less to primary energy needs, while gas and renewable energy resources, especially wind, solar and imported hydroelectricity, will play a much larger role. Electric vehicles will be widely used. The economy's energy intensity will continue to decline, and energy-efficient options will be widely available and increasingly adopted. The country's energy market will be more diverse, with greater opportunities for investors to provide innovative and sustainable energy solutions within credible and predictable regulatory frameworks.

### *The energy reality*

Over 70 percent of South Africa's primary energy derives from coal, as does more than 90 percent of electricity and a third of liquid fuels. The economy is electricity intensive, and as a result, South Africa emits more than its share of carbon dioxide and contributes disproportionately to climate change. The high level of carbon emissions is exacerbated by the size of the energy-intensive mining sector. In the past, domestic electricity has also been underpriced, resulting in energy-intensive beneficiation investments. Energy intensity is one and a half to four times higher than the Organisation for Economic

---

Cooperation and Development average (depending on whether GDP is measured in nominal or purchasing power parity terms).

Adequate supply is a key concern, especially for electricity and liquid fuels. South Africa experienced multiple power failures between 2005 and 2008, resulting in lower economic growth and widespread inconvenience. While the 2009 recession depressed demand, supply-demand balance remains tight. Similarly, the distribution of petrol, diesel and gas has not always been reliable.

South Africa has a mixed-energy economy, with varying patterns of state ownership and regulation across subsectors. The electricity sector is dominated by the state-owned utility Eskom (accounting for 96 percent of production) and is regulated by the National Energy Regulator of South Africa, which is also responsible for the regulation of gas and petroleum pipelines.

Private petroleum companies (with the exception of PetroSA) dominate the liquid fuels sector, and wholesale and retail prices are regulated. In contrast, coal prices are deregulated and the industry is privately owned. Private firms produce uranium, although the country's only nuclear power plant is owned by Eskom. There is a nuclear regulator (mostly addressing safety and licensing issues) and the National Ports Regulator. Through Transnet, the state also owns and operates most of the ports (except the Richards Bay Coal Terminal and some private terminal concessions), the national rail network, and the petroleum pipelines that transport petroleum crude and product to Gauteng and surrounding areas.

The quality of market competition and regulation in the energy sector has been far from optimal. The economy requires increased competition in electricity generation, along with better regulation of price, supply and quality in electricity and petroleum products.

Ineffective policy-making and regulation in transport, especially rail, has contributed to crippling constraints. Lack of rail capacity has blocked the expansion of coal exports. The privately owned Richards Bay Port has export capacity one-third higher than existing rail capacity from the coal fields.

Perhaps the most successful achievement in the energy sector over the past 15 years has been the National Electrification Programme. In the early 1990s, two out of three South Africans did not have electricity; now nearly 80 percent of the population has access. The prices and supply of paraffin, liquefied petroleum gas and alternative household fuels, including sustainable supplies of biomass and renewable energy sources, are far from optimal, even though paraffin and liquefied petroleum gas prices are regulated. Too many households rely on costly inferior fuels that also pose health risks.

## Key policy issues and planning priorities

Policy and planning issues are addressed below in each of the key energy sources, followed by a discussion on trade-offs and phasing considerations to 2030.

### Balance domestic coal supply security with growth in exports

Given fixed investment and low direct costs, coal will continue to be the dominant fuel in South Africa over the next 20 years. Internationally, South Africa ranks fifth as a coal producer and exporter. South Africa's largest economically recoverable energy resource is coal, which is also its top mineral export earner. A national coal policy is urgently required, based on a realistic estimate of reserves, the sustainable supply of domestic coal needs for power, synthetic fuels and chemicals, and sustainable expansion of coal export markets. A strategically negotiated way to reduce carbon intensity will help South Africa contribute to mitigating climate change, while responding to the imperatives of growing the economy, creating employment and reducing poverty.

Policy and regulatory uncertainty in the mining sector, too little investment in new infrastructure, and a failure to maintain existing infrastructure have all contributed to the coal industry's stunted development. As coal reserves in the central basin diminish, a new rail corridor to the Waterberg coal field will need to be developed within an overall strategic infrastructure investment plan, which will also address additional water supplies for the Lephalale area. Transport infrastructure for the central coal basin and the coal line to Richards Bay also needs strengthening. With targeted focus, rail capacity will match port export capacity by 2020. Other possibilities include a link with Botswana coal deposits, and a trans-Kalahari rail connection, linked to expanded port capacity at Walvis Bay in Namibia.

More formal structures will foster collaborative action between government, Eskom, Transnet, Sasol, independent power producers and the coal industry to optimise domestic coal use while maximising coal exports. Collaboration in the earlier development of the railway from the central basin to Richards Bay and the development of the Richards Bay port offers a valuable lesson.

Collaboration is also needed to address the coal industry fragmentation that has accompanied black economic empowerment in the sector. As a result, few smaller companies have the financial muscle to sign long-term take-or-pay contracts with Transnet to incentivise investments in initiatives that address railway line capacity expansion. Government and the private sector can work together to solve this impasse and maximise economic value from this industry.

The security of coal supply for some existing coal power stations is increasingly under threat. Coal miners are unwilling to sign new long-term contracts with Eskom, as they can get much higher returns through exports to India and other Asian countries. A balance has to be found between exports and local supply security, with a fair deal

---

between government and coal industry leaders. Detailed planning will determine the best use of specific resources, backed by conditions set in mining licences. It may be necessary to institute export permits for particular grades of coal as a temporary measure, with future energy investments influenced by coal prices that reflect international market price, and possible carbon taxes.

Cleaner coal technologies will be supported through research and development investments and technology-transfer agreements in ultra-supercritical coal power plants, fluidised-bed combustion, underground coal gasification, integrated gasification combined cycle plants, and carbon capture and storage, among others.

### **Explore gas as a viable alternative to coal (and nuclear)**

Substituting gas for coal will help cut South Africa's carbon intensity and greenhouse gas emissions. Possibilities include coal seam methane, shale gas resources in the Karoo basin and imports of liquefied natural gas. Experiments are under way to assess the potential for using methane gas associated with coal deposits. Underground coal gasification technology is also being developed. These resources and technologies could make a significant contribution to South Africa's energy needs, while reducing greenhouse gas emissions and carbon intensity.

According to the United States Energy Information Administration (2011), technically recoverable shale gas resources in South Africa form the fifth largest reserve globally. Confirmation of recoverable reserves is still necessary through further drilling of test wells. Shale gas has the potential to contribute a very large proportion of South Africa's electricity needs. For example, exploitation of a 24 trillion cubic feet resource will power about 20 gigawatts (GW) of combined cycle gas turbines, generating about 130 000 GW-hours of electricity per year. This is more than half of current production. South Africa will seek to develop these resources, provided the overall environmental costs and benefits outweigh the current costs and benefits associated with South Africa's dependence on coal, or with the alternative of nuclear power.

A global market has developed for liquefied natural gas imports, the prices of which are increasingly delinked from oil prices. With South Africa needing to diversify its energy mix, liquefied natural gas imports and the associated infrastructure could provide economic and environmentally positive options for power production, gas-to-liquids production (at Moss gas) and use of industrial energy.

### **Diversify power sources and ownership in the electricity sector**

Key elements addressed below relate to decarbonising power sources, the need to increase private participation and investment in this field, issues of distribution and pricing, and widening access to affordable electricity services for the poor.

*Balance supply security, affordability and climate change mitigation aspirations in the power sector*

South Africa will need to meet about 29 000 megawatts (MW) of new power demand between now and 2030. A further 10 900 MW of old power capacity will be retired. As a result, about 40 000 MW of new power capacity needs to be built. Eskom is building two more coal-fired power stations, each with capacity of about 4 800 MW – leaving a clear gap between future needs and committed investments.

Power generation plants contribute about half of South Africa’s current greenhouse gas emissions. If the sector follows the proposed carbon scenario of peak, plateau and decline, the balance of new capacity will need to come from industrial cogeneration, gas, wind, solar, imported hydroelectricity, and perhaps a nuclear programme from around 2023. Aggressive demand-side programmes will also be necessary. The Department of Energy’s Integrated Resource Plan (2010-2030) lays out these options in a policy-adjusted scenario that seeks a trade-off between least-cost investment, technology risks, water-use implications, localisation and regional imports. The plan includes 21 500 MW of new renewable energy capacity by 2030 – the largest envisaged in any African country to date. Further refinements and regular updates of the plan will be necessary to track demand and energy-efficiency gains, and to assess whether new supply technologies are delivering timely and affordable power. To ensure supply security, a back-up plan is required, with a flexible portfolio of incremental, rapidly implementable response measures. Improved data collection, stakeholder involvement and publication systems will be necessary for more effective planning.

Increasing the diversity of South Africa’s electricity production energy mix is important – not just for mitigating climate change – but also for enhanced supply security. For example, combined cycle gas turbines offer flexibility in the power system and complement variable supply from renewable energy sources. Furthermore, in addressing electricity supply security and climate change, South Africa will also explore regional options. Developing the region’s hydroelectric resources is a priority, first in countries such as Zambia and Mozambique. Botswana, Zimbabwe and Mozambique have considerable undeveloped coal reserves. The Southern African Development Community (SADC) has very low per capita carbon emissions. This should be weighed against the potential for accelerated economic development that lies in exploiting abundant power resources, coupled with enhanced inter-regional electricity trade.

Ultimately, South Africa’s electricity plan needs to balance decarbonisation of the power sector and increased use of new and renewable energy technologies (alongside their associated higher investment costs) with established, cheaper energy sources that offer proven security of supply. As South Africa seeks an appropriate balance between responding to climate change concerns and employing least-cost power generation technologies to propel economic growth, it will adopt a least-regret approach. South Africa needs to remain competitive both in the transition to and in a low-carbon future.

---



### *Widen participation and accelerate investment in electricity sector*

While it is government policy that independent power producers should complement Eskom's generation investments, South Africa has yet to see the number and scale of private investments in other regions of the world, including other African countries. Given the amount of investment needed, as well as Eskom's stressed balance sheet – and limited fiscal resources – private investment will need to be accelerated.

Rapid progress is critical in linking power expansion plans with clear allocation of new build opportunities between Eskom and independent power producers. It is also important to initiate timely, internationally competitive bidding processes for new capacity. There is a central need to build institutional capacity to run effective procurement processes and to negotiate robust contracts. South Africa could learn from Kenya, which has allocated responsibilities clearly and built appropriate capacity to the extent that it has an enviable record in competitively procuring and contracting independent power producers. Given time constraints and the costs of delayed decisions, government needs to quicken its plans to establish an independent market and system operator, which would address the issues above and, preferably, also incorporate transmission assets. Remaining regulatory uncertainties need to be resolved, including questions of independent power producers selling to customers other than Eskom, issues of wheeling over the grid, and rights to trade electricity.

### *Electricity distribution*

A reliable electricity supply depends on a sufficient number of functioning power stations and a reliable grid network to transport electricity to users. Municipalities distribute about half of South Africa's electricity, with increasing local supply failures. Previous government policy included transferring municipal distribution assets to six regional electricity distributors. Little progress was made in the past 10 years, not least because a constitutional amendment shifting responsibility for electricity distribution from local to national government was abandoned in the face of increasing opposition. During this policy hiatus, municipal investments in infrastructure have been inadequate, with maintenance and refurbishment backlogs now exceeding R30 billion.

Given these realities, a more pragmatic solution would be to invest in human and physical capital in the 12 largest distributors, which account for 80 percent of the electricity distributed by local government. This is a high priority, and the programme needs to be driven nationally in collaboration with these municipalities. Eskom, together with metropolitans and cities, could take over distribution on a voluntary basis from smaller, poorly performing entities. Medium-sized municipalities performing reasonably could continue with delivery.

To enable improved demand-side management and future energy savings, the next 20 years will see smarter management of electricity grids through innovative control systems and smart-meters. More distributed generation systems are likely, both to meet local demand and to feed back into the grid.

### *Electricity prices*

Electricity price increases are necessary to finance Eskom and private investment in new capacity. Government has probably reached the limit of its fiscal and guarantee support for Eskom. Eskom's access to private debt is also becoming more difficult and expensive. Failure to raise electricity prices to reflect costs will result in Eskom being unable to meet debt obligations. Maintenance and investment programmes will be delayed, and, ultimately, the lights will go out.

There are, however, concerns that sharp price increases could dampen economic growth and development. Investments in generation plant and networks are typically capital intensive and lumpy. Management of debt-to-equity and interest cover ratios often requires steep price increases. However, after the majority of the debt is amortised, utilities could receive significant free cash flows. It is important that the regulator establishes appropriate mechanisms to pre-fund capital and to create smooth tariff paths by taking a long-term perspective, so that consumers face more predictable and manageable price rises. There are clear lessons from the way the Trans-Caledonian Tunnel Authority smoothed water tariffs.

Devising and targeting special tariffs for low-income families is a further challenge. Free basic electricity and cross-subsidised tariffs are already available for many low-income households, but need to be applied more consistently and comprehensively to shield poor consumers from high price increases. Since the costs of these subsidies will become significant in future, any increases in their level, or a new subsidy mechanism, should be assessed carefully for fiscal implications.

Electricity prices could also be affected by carbon taxes. However, given the existing structure of the electricity market, together with Eskom's dominant position, carbon input taxes on power generation are unlikely to lower carbon intensity. The regulator and Eskom will be forced to pass these additional costs directly to captive consumers, who do not have the choice of alternative, cleaner electricity supplies. In addition, high electricity prices, unrelated to carbon taxes, are already encouraging consumers to conserve energy.

Nevertheless, it may still make sense to have an economy-wide carbon tax, coupled with conditional exemptions in some sectors (or rebate or recycling schemes), to send a broad signal to the industry and consumers that they are living in a carbon-constrained world. To achieve meaningful shifts in technologies for electricity generation, it is important that this tax is introduced alongside direct low-carbon policy actions. A conditional carbon tax exemption could be applied to the electricity sector, provided it

---

progressively moves to a lower carbon generation mix, as mandated in the Integrated Resource Plan. This would significantly increase renewable energy and diversify generation sources.

#### *National electrification and energy poverty*

The energy needs of poor households are still inadequately met. Between a fifth and a quarter of South Africans still have no access to the grid. The electrification programme has slowed and the original goal of universal access by 2014 is not feasible. The programme will need a thorough review of targets, planning, technology choices, funding and implementation. Subject to costs, South Africa could aim for at least 95 percent coverage by 2030, with alternative “off grid” options offered to households for whom a connection is impractical.

Even poor households with access to electricity can afford to use only modest amounts, and rely on other sources such as paraffin, gas and fuel wood. Useful research in the 1990s around household energy has had little follow-through. This work should be extended to develop integrated programmes to tackle energy poverty, including sustainable production of fuel wood and its safe combustion in efficient stoves in rural areas.

#### **Re-assess the desirability of nuclear power investments**

According to the Integrated Resource Plan, more nuclear energy plants will need to be commissioned from 2023/24. Although nuclear does provide a viable base-load alternative, South Africa needs a thorough investigation on the implications of nuclear energy, including its costs, safety, environmental benefits, localisation and employment opportunities, uranium enrichment, fuel fabrication, and the dangers of weapons proliferation.

South Africa will face major challenges in financing the capital costs of a nuclear fleet. Nuclear plants involve massive, lumpy investments (given that a single unit can now be as large as 1 600 MW). It will also be extremely challenging to build the institutional and skills base for running new-generation nuclear plants. All possible alternatives need to be explored, including the use of shale gas, which could provide reliable base-load and mid-merit power generation through combined cycle gas turbines. Developing nuclear power plants requires long lead times. A maximum of one year remains to agree on a decision-making process for new nuclear investments.

#### **Delay investment plans in a new petroleum refinery**

South Africa faces several related pressures on liquid fuels over the next decade. Refined fuel products are needed to run the economy. Much of the demand is on the Highveld, far from the coast. Over time, South Africa should improve the standards of fuels, for health reasons and more efficient engines, thereby reducing fuel demand and carbon

---

emissions. There are constraints on the country's ability to emit carbon dioxide or carbon equivalents. Fuel costs need to reflect all costs related to the market and the external environment. At the same time, undue fuel price increases should be avoided, as these will have a negative impact on the economy through higher costs.

South Africa produces about 5 percent of its fuel needs from gas, about 35 percent from coal, and about 50 percent from local crude oil refineries. About 10 percent is imported from refineries elsewhere in the world. South Africa has a sizeable capital stock and management capacity to produce fuel from gas. However, gas stocks from existing fields are declining and to use this capital stock to the point where it is not commercially viable is not advisable. Instead, feedstocks need to be found to support continued production – and, ideally, to secure sufficient stocks to increase production. Without feedstock constraints, production can increase by about a third through major new investment in the Moss gas plant.

There are several options to secure feedstocks. Investing in gas fields close to or adjacent to existing fields in the Southern Cape is the best option, as marginal costs are lower. This will also allow further exploitation of existing fields, maximising use of existing capital. PetroSA is best placed to lead this investment, given the existing capital it holds and its management abilities and experience. In the longer term, the Mossel Bay refinery could use either liquefied natural gas imports or Karoo shale gas, if it becomes available. Policy-makers face a tough decision, because South Africa has run out of refining capacity. The country now has to import a share of its refined fuel needs. There are five options to deal with this:

- Build a new oil-to-liquid refinery.
- Build a new coal-to-liquid refinery.
- Upgrade the existing refineries or allow significant expansion of one or more of the existing refineries, or both.
- Import refined product.
- Build a refinery in Angola or Nigeria – and buy a share of the product of that refinery.

There are no easy answers – each option has significant disadvantages, risks and advantages. To make a decision, it is necessary to assume where refining margins will be in 15 years. Refining margins are quite low, and are likely to remain so for at least another decade, given a surplus in refined product. If this assumption is valid, South Africa will have to export the surplus<sup>1</sup> product at a loss, covered by local fuel consumers through the basic fuel price. This is unfair, politically risky, and economically reckless. It also highlights the importance of considering alternatives.

---

<sup>1</sup>A surplus will arise in the early years as a new refinery investment will need to be large enough to capitalise on economies of scale and will initially produce more than needed in the domestic market.

---

Option	Advantages	Disadvantages
<b>New oil-to-liquid refinery</b>	<ul style="list-style-type: none"> <li>-A degree of fuel security</li> <li>-The capacity to export</li> <li>-Industrial externalities (especially in plastics) arising from the concentration of refining capacity and expertise</li> <li>-Potential to move to cleaner fuel standards more quickly, and at lower cost</li> </ul>	<ul style="list-style-type: none"> <li>-South Africa would probably have to export the surplus product at a loss (or with local fuel users subsidising exports)</li> <li>-The size of the project leads to increased risk – and the potential for significant macroeconomic implications (this would need to be about 400 barrels per day, to achieve economies of scale)</li> <li>-A greenfields site will need to be found in Durban – or the product will need to be transhipped from Coega to Durban, and then piped to Johannesburg, increasing costs</li> <li>-Some existing refineries may need to be closed, risking loss of skills and managerial know-how</li> </ul>
<b>New coal-to-liquid plant</b>	<ul style="list-style-type: none"> <li>-Would allow for use of indigenous and abundant feed stocks</li> <li>-Scale makes 80 000 barrels per day feasible</li> <li>- South Africa has technology and managerial expertise in this area</li> </ul>	<ul style="list-style-type: none"> <li>-The process is heavily carbon intensive – and with a carbon tax of US\$25 a tonne, the economics look less favourable</li> <li>-It is a large capital-intensive investment in a capital-constrained country</li> <li>-This will require significant government subsidies, either directly or indirectly</li> </ul>
<b>Upgrade existing refineries</b>	<ul style="list-style-type: none"> <li>-Will use the present oil companies' capacity and skills set</li> <li>-Will allow South Africa to keep Durban as a petrochemicals hub</li> <li>-Will lower costs, due to new pipeline in Durban</li> <li>-The risk is largely borne by the private sector</li> </ul>	<ul style="list-style-type: none"> <li>-Durban is a densely populated city – and there are already environmental concerns about the site</li> <li>-Oil companies will want to pass both risks and costs on to the public sector and/or consumer</li> <li>-The space for a major upgrade may not exist</li> </ul>
<b>Import refined product</b>	<ul style="list-style-type: none"> <li>-Refining margins are low at present, so this option is cheaper</li> <li>-This will not consume significant capital, in the context of current capital constraints</li> </ul>	<ul style="list-style-type: none"> <li>-Fuel security is lower with this option – given dependencies</li> <li>-If refining margins rise quickly, the import bill and current account deficit will be negatively affected</li> </ul>
<b>Partner with Angola or Nigeria</b>	<ul style="list-style-type: none"> <li>-These countries need refined products and have the input products</li> <li>-South Africa will co-finance, thereby sharing risks</li> </ul>	<ul style="list-style-type: none"> <li>-Political risk associated with these options is high</li> <li>-The cost of building in these countries is high, given limited skills, infrastructure and poor governance</li> </ul>

The least risky and most cost-effective option seems to be continued importing of a share of refined product needs, until the country reaches a stage where it can absorb the output of either a new refinery or a major upgrade of an existing refinery. It is envisaged that South Africa will continue to import, taking a decision on the next steps by 2016 or 2017 at the latest. Timing is important, given lead-time requirements to develop a new refinery (estimated at about eight to 10 years – with outputs of a new refinery needed by 2025 to 2028, if no other options are implemented). Decisions need to consider fuel security, employment, the current account, the rand, interest rates, fuel standards and competition.

Bio-fuels are also a possibility, but because South Africa is largely a dry country, production is more likely to be located elsewhere in the southern African region.

If South Africa adopted a consistent carbon price across the economy of about R100 per tonne of carbon, the carbon cost of fuel used for transport would translate into an increase of only 5 percent at the pump compared to 20 percent for the electricity sector. This would send a weak signal to consumers to conserve petrol or diesel. It would be far more effective to tax vehicle sales, based on their carbon emission levels. This would encourage consumers to opt for more fuel-efficient vehicles, cutting emissions from liquid fuels.

Over the next 20 years, South Africa can expect to see a shift towards electric vehicles, making it even more vital to decarbonise electricity generation. Greater use of public transport will also be encouraged, as outlined in the transport section of this report.

### **Leverage cross-sector synergies for integrated energy planning**

The above policy and planning priorities may seem sector-specific and supply-side focused, but the energy industry is still predominantly organised in individual supply sectors. It is therefore necessary and useful to outline actions needed in specific sectors. However, energy and fuels may be substituted – and demand-side measures may substantially reduce energy needs. South Africa's energy planning system needs to recognise these facts and become more holistic and integrated. It is difficult for the Department of Energy to deal effectively with these cross-cutting issues, including institutional capacity, governance, competition, regulation, investment, and economic, social and environmental impacts. The commission may play a convening role in enabling these conversations and actions across different government departments, industry and consumers.

## Trade-offs

Key trade-offs to consider when deliberating South Africa's future energy mix include the need to:

- Balance the desire to move to a lower carbon-intensive power generation mix (with more expensive and variable renewable energy technologies) with the imperative of maintaining competitive electricity prices and secure electricity supply to power economic growth and development.
- Manage the desirability of moving to a less carbon- and energy-intensive economy with the priority of maximising the benefits from South Africa's extraordinary mineral resources. The country needs to explore credible ways to improve the energy efficiency of mining and minerals processing, while expanding mineral extraction, beneficiation and exports. What is the appropriate mix of beneficiation versus the less energy- and carbon-intensive export of unprocessed minerals?
- Balance state ownership of energy enterprises and utilities with effective regulation and the structural and market reform necessary to achieve greater competition and private sector involvement.
- Contrast the potential for job creation as the energy system is transformed (both in terms of the nature and volume of jobs) with possible job losses resulting from a move away from the coal mining industry. Jobs created for a new energy system may require more skills, potentially supporting the international competitiveness of locally manufacturing energy equipment.

## Phasing

The phasing of necessary activities for the move to a different energy context by 2030 is included below according to short-, medium- and long-term priorities:

Short term (next five years)

- Develop a national coal policy and investment strategy based on a realistic estimate of reserves, the sustainable supply of domestic coal needs for power and industry, and the sustainable expansion of coal export markets within the context of diminishing carbon intensity.
  - Invest in a new heavy-haul rail corridor to the Waterberg coal field, within the context of an integrated strategic infrastructure investment plan for the Lephalale area (this will address, among other factors, the additional water supplies needed).
  - Strengthen rail infrastructure for the central coal basin and the coal line to Richards Bay. Government will broker a partnership between Transnet and the private sector for these projects.
  - Forge a compact between government and coal industry leaders that balances domestic coal needs with export opportunities. Detailed plans will determine the optimal use of specific coal resources, backed by conditions set in mining licences. Export permits for certain grades of coal will be
-

instituted as a temporary measure if coal supply security for domestic power production is affected by growing exports of lower quality coal to India and other eastern countries.

- Determine economically recoverable coal seam and shale gas reserves through exploratory drilling. Environmental investigations will continue to ascertain whether sustainable exploitation of these resources is possible.
- Eskom will commission the Medupi coal power station and the Ingula pumped storage plant. In addition, at least 3 725 MW of renewable energy will be contracted from the private sector, supported by numerous energy-efficiency improvements.
- The Independent System and Market Operator Act will be passed, following which Eskom's system operator, planning, power procurement, purchasing and contracting functions will be transferred to an independent SOE. Plans will also be established to transfer Eskom's transmission assets into this entity. Capacity will be built to support the development of dynamic, frequently updated, indicative power and transmission expansion plans and the effective procurement and contracting of independent power producers (including those able to provide renewable energy technologies).
- Amend the National Energy Regulator Act (2004) and the Electricity Regulation Act (2006) to ensure a more efficient and predictable regulatory environment.
- Ring-fence the electricity distribution businesses of the 12 largest municipalities, representing 80 percent of municipal distribution. Resolve maintenance and refurbishment backlogs and develop a financing plan, alongside investing in human capital.
- Develop a new and sustainable national electrification plan.
- Investigate the implications of greater nuclear energy use, including the potential costs, safety, environmental benefits, localisation and employment opportunities, uranium enrichment aspects, fuel fabrication, and the dangers of weapons proliferation. A decision-making process to support the assessment of possible investments in nuclear energy (or alternative base-load options) will be defined.
- Upgrade existing refineries to ensure they meet new fuel quality standards. Imports will continue, ensuring that the growing deficit in petroleum products is met. Petroleum refiners and importers will hold strategic stocks of sufficient size to ensure supply security.
- The National Planning Commission, in partnership with the Department of Energy, will convene an interdepartmental process to support developing and regularly updating integrated energy plans.



**Medium term (to 2020)**

- By 2020, it is envisaged that coal rail capacity will match coal port export capacity.
- Eskom will have commissioned the Kusile coal-fired power station by 2020. At least 7 000 MW of renewable energy will be contracted, mostly from private independent power producers.
- Liquefied natural gas infrastructure will be in place to power the first combined cycle gas turbines.
- Targeting of pro-poor tariff measures will be improved – extending comprehensively to all who qualify.
- Electrification coverage will reach 90 percent, with integrated household energy supply strategies allowing affordable access to complementary energy sources, including solar, water and space heating.
- A decision will be taken on whether South Africa should continue with petroleum product imports or invest in a new refinery.

**Long term (to 2030)**

- By 2030, more than 20 000 MW of renewable energy will be contracted, including an increasing share from regional hydroelectricity.
  - Rail and port capacity will be further enhanced to support increased coal exports.
  - About 11 000 MW of old Eskom coal power stations will have been decommissioned, but close to 6 000 MW of new coal capacity will be contracted – some sourced from other southern African countries (subject to South Africa’s commitments in climate change negotiations).
  - Cleaner coal technologies will be promoted through research and development investments and technology transfer agreements in, among others, the use of ultra-supercritical coal power plants, fluidised-bed combustion, underground coal gasification, integrated gasification combined cycle, and carbon capture and storage.
  - The extent of economically recoverable coal seam and shale gas reserves will be understood. Subject to acceptable environmental controls, these gas resources, supplemented by liquefied natural gas imports, will begin to supply a growing share of power production. This could potentially avoid the need for further base-load nuclear generation.
  - Rising energy prices, an economy-wide carbon tax, and sector exemptions, coupled with direct action (such as the Integrated Resource Plan in the electricity sector, scaled taxes on the sale of high-emission vehicles, equipment and building standards, and targeted energy-efficiency programmes) will drive South Africa’s energy sector on a path of lower carbon and energy intensity.
  - By 2030, 95 percent of South Africans will have access to electricity.
  - Electric vehicles will be widely used.
-

## Water resources and services

### Vision

Before 2030, all South Africans will have affordable access to sufficient safe water and hygienic sanitation to live healthy and dignified lives. Standards of service provision will vary across the country, however, with differentiation between densely built-up urban areas and scattered rural settlements. While local government will retain responsibility for ensuring adequate service provision in its areas, regional utilities will provide services where municipalities have inadequate technical and financial capacities. Water supply and sanitation services (water in pipes) depend on the availability of adequate water resources and, if not managed properly, may damage the natural resource (water in rivers and underground). For this reason, the authorities responsible for water resource management will coordinate their activities with local service providers, and monitor and support them.

In 2030, the country's economic and social development will reflect an understanding of and an alignment with available water resources. As a result, all main urban and industrial centres will have a reliable supply of water to meet their needs, while increasingly efficient agricultural water use will support productive and inclusive rural communities. The natural water environment will be protected to prevent excessive abstraction and pollution. Water should be recognised as a foundation for activities such as tourism and recreation, further reinforcing the importance of its protection. In addition, where rivers are shared, South Africa will ensure that it continues to respect its obligations to neighbouring countries.

### The water reality

Changes in the water sector since 1994 are evident in water-related policy, practice, institutional frameworks, role players and outcomes. Policy shifted from a focus on infrastructure development to a more holistic water resource management approach that addresses both the water demand and supply.

The mandate for these reforms came from the priority in 1994 to ensure that all South Africans gained equitable access to at least a safe and reliable basic water supply and dignified, hygienic sanitation. Between 1994 and 2010, the number of South Africans with access to basic water supplies increased from 23 million to 46.3 million (59 percent to 93 percent of the population), while the number with improved sanitation increased from 18.5 million to 39.4 million (from 48 percent to 79 percent).<sup>2</sup>

---

<sup>2</sup> Department of Water Affairs (2010). *Statistical overview of water sector*. Department of Water Affairs.

Enhanced water resource management and infrastructure development underpinned this progress. Improved infrastructure investments have also formed a key part of delivery since 1994, addressing problems resulting from earlier underinvestment. Changes include establishing institutions to focus on this task, such as the Trans-Caledon Tunnel Authority, and critical partnerships within the region, such as the Lesotho Highlands Project. However, implementing well crafted policies and strategies remains a challenge. Deteriorating water quality is a particular problem. Although much attention has focused on potential mining pollution in Gauteng, more serious and systemic problems are emerging as a result of poorly funded and managed municipal wastewater works, as well as the rapid expansion of mining, notably in the Mpumalanga Highveld.

While significant progress has been made in ensuring greater access to water, backlogs still exist. The commission's *Diagnostic Report* also notes that access to potable water increased from 84.5 percent in 2002 to 89.3 percent in 2009. However, variations between regions are great – only 75 percent of households in the Eastern Cape have access to potable water (although this is up from 56.8 percent in 2002).<sup>3</sup>

While water restrictions due to drought have been limited in recent years, the real test of the resilience of the water resource management system will only come when there is a severe drought. For example, Australia is just recovering from an eight-year drought that highlighted many failings in its supply and management systems.

## Storylines

### *Manage, monitor and protect water resources for growth and sustainability*

As water use becomes more intensive, managing this resource must become more effective and should include users so that they understand emerging constraints and opportunities. For effective water supply planning, development and operation, the resource and its use should be monitored regularly. In addition, regulating water's various uses is important (including for waste disposal). To address these needs, the responsible administration needs a clear and coherent legislative and policy foundation, and the support of appropriate scientific and technological instruments, underpinned by a strong research and development capacity. As the nation's water resources are extensively interconnected – often flowing across political boundaries – oversight of its management and administration should remain national. But, because many issues are locally specific, some decentralisation of responsibilities is required. It is at local level that users can best be involved.

The context in which water resources are managed will change over time, both in terms of physical water availability (including changes associated with short-term droughts, floods and long-term climate change) and as a result of societal pressures from urbanisation and economic growth. Given this reality, it is critical that the management

---

<sup>3</sup> National Planning Commission (2011). *Diagnostic Report*.

approach is regularly reviewed publicly. A statutory process for this already exists, requiring a national water resource strategy to be produced every five years, informed by local catchment management strategies and local government's water services development plans (structured as part of the integrated development plans). If this process is properly implemented, priority areas for intervention will be identified.

Some of these are already evident – there is an urgent need for a coherent plan to ensure the protection of water resources and the broader environment in the Mpumalanga Highveld coal fields, upstream of the Vaal and Loskop dams, as well as in the Lephalale area. Given pressures on the environment and the range of development demands, current water allocations in the Olifants River water management area will also need to be revisited. Local planning should also ensure that groundwater resources are optimally used, before authorities resort to large regional infrastructure projects to supply local needs.

#### *Assure water supplies by investment and reuse*

A structured planning process has already identified the actions necessary to reconcile the water demands of major urban and industrial centres with potential supplies up to 2030. These plans need to be translated into programmes of investment that are implemented at the right time, to avoid a situation where supply constraints negatively affect society and its economy. Large investments in regional systems could be undertaken by a specialised public agency – a national water resources infrastructure agency, perhaps modelled on the South African National Roads Agency Limited. This agency would build on the foundation provided by the Trans-Caledon Tunnel Authority, which is already supporting the implementation of several large projects. However, the national Department of Water Affairs should continue to lead the planning process, reviewing and updating these programmes every five years to ensure coordination with other long-term planning processes in economic and infrastructure sectors.

#### *Conservation and demand management*

Reducing demand, rather than just increasing supply, is important. Current planning assumes that it will be possible to achieve an average reduction in water demand of 15 percent below business-as-usual levels in urban areas over the period leading to 2030. Specific savings estimates can be made in different localities. Achieving demand reductions on this scale will require active programmes to reduce water leakage in distribution networks, and to increase the efficiency of water use by domestic and commercial water users.

Agriculture uses the largest volume of water (albeit at far lower levels of reliability than urban and industrial uses). As a result, the farming sector will have to increase the efficiency of its water use to expand production and allow transfers to other users in water-scarce areas, as well as for expansion in irrigated agriculture. The commission proposes a dedicated national programme to provide support to local and sectoral

---

efforts to reduce water demand and improve water-use efficiency. Water-saving and demand-management projects should be considered as part of the overall range of water supply investment programmes. These can be compared with supply expansion projects, and should be prioritised accordingly, based on their merits.

#### *Water reuse and desalination options to meet local needs*

One strategy to increase the amount of water available for use, while protecting the resource, is to reuse water. There is extensive indirect reuse of water in inland areas, where municipal and industrial wastewater is reintroduced into rivers after treatment. Significant areas and industries are supplied from this source, with the latter including, notably, the platinum mines of the North West Province. There is, however, considerable scope for further water reuse. In coastal areas, for example, significant amounts of wastewater are discharged into the ocean, instead of being reused. Desalination in these areas is also possible, although this option is often more expensive than reuse. The major constraint on both reuse and desalination is that cheaper solutions have been available, but this is changing. Many municipalities lack the technical capacity to build and manage their wastewater treatment systems, resulting in polluted water resources that are unsuitable for use. As a result, a regional approach to wastewater management may be required in certain areas.

*“I have been a blue and green drop assessor for the past three years and visited many treatment plants. One of the biggest problems is lack of routine and preventative maintenance. There is a virtually no preventative maintenance programmes in most small/medium municipalities due to 'lack of funds'. Most maintenance is reactive maintenance on a day-by-day basis. ...I would like to see the South African Local Government Association offer courses to procurement offices on the need for maintenance.” – NPC Jam*

Water supply investment programmes should include projects to treat and reuse water, selected on their merits. Given the limited technical capacity to design, build and operate such projects, or even to commission private service providers, setting up a structured national research, development and operational capacity to support water reuse and desalination would be helpful, perhaps as part of a national water resource infrastructure agency (discussed below).

#### *Institutional arrangements for water resource management*

The institutions that manage and develop water resources should reflect the shared, public nature of water – and the need for users and potential users to understand and respect the limits to its use, while also being involved in decisions about its management and related costs. Although current policy and legislation provides an institutional framework to achieve this, implementation has been slow. This is, in part, because the growing challenges of water constraints, and the need to build institutions to deal with

them, are not fully understood. These institutions are needed to monitor, protect and administer the use of the resource. Institutional development is particularly needed for the Olifants River, Crocodile-west sub-catchments of the Limpopo, the Nkomati River and the upper and middle Vaal sub-catchments, where water supplies have already reached their limit, and where water allocations between users need to be reviewed.

### *Key policy issues*

The following key policy issues guide appropriate actions to improve the management, use and conservation of South Africa's water resources:

- Investments to support economic uses of water, including urban consumption, should be funded by users through appropriate pricing measures, which will include arrangements to ensure that all people can afford access to basic water services. However, it is likely that investments to support rural development (including agriculture and rural settlements) will require large amounts of public funding. Policy is needed to guide such investments.
- Enhanced management capacity will be needed to address the increasing pressures on water resources. This capacity is in decline, partly due to institutional uncertainty. New institutional arrangements should acknowledge limited human resource capacity – and the need to develop it.
- Institutional arrangements need to be finalised, specifically on the number of water management areas to be established, and the mechanisms through which users will be involved in the work of regional institutions.
- A review of existing allocations is needed in areas where water use already exceeds reliable availability and the amounts necessary to secure protection of the environment. If this is not undertaken, illegal use of the resource will rise – and it may be over-allocated (formally or informally). This will lead to reduced supply reliability, which will jeopardise existing social and economic uses, while damaging the environment.
- Because water resource availability and demand varies widely, with many complex external factors, it is not possible to establish a standard economic framework for water resource management. This limits the usefulness of pricing as an instrument of allocation and control, and increases price-setting complexities. The need for an independent economic regulator should be assessed – with potential benefits and drawbacks considered in relation to the current arrangements for rule-based pricing, with stakeholder oversight. This assessment could take place within the proposed cross-sectoral review of infrastructure regulators.
- To guide water management approaches in a number of areas, strategic planning decisions on general economic and social development are needed, as well as environmental protection. Geographic areas where this is needed include:
  - Mpumalanga Highveld coal fields – a balance between environmental protection, agriculture, energy requirements and water resources.

- Lephalale and surrounds – water requirements and sources for mining and energy investments.
- Olifants River (Limpopo/Mpumalanga) – careful consideration of the balance between mining, agriculture and nature conservation.
- The norms and standards for basic water supply and sanitation services should guide the allocation of funds. However, in many jurisdictions, new investments routinely exceed these defined norms and standards, resulting in service provision that is financially unsustainable. An urgent review of the norms and standards, together with the financial provisions to meet these, is required.
- Many small and rural municipalities lack the financial and technical capacity to manage water services adequately. Regional utilities could provide these services, with arrangements to ensure that municipalities retain their role as the political authority responsible for service oversight.

### *Trade-offs*

In finalising the steps to be taken, the following trade-offs and issues emerge:

- The costs associated with environmental protection objectives (for example, those associated with enforcement of pollution standards and abstraction restrictions) should be set against social and economic needs. Current legislation allows for different levels of protection, but in many cases water reserved for the environment is already used for other purposes.
- A balance has to be achieved between allocating water for productive needs (industry and urban development) and less productive uses in agriculture and conservation, which have strong social and environmental values.
- Greater water-use efficiency in agriculture tends to be capital and skills intensive, but may in turn support job creation. These gains could be difficult for new entrants to achieve without substantial support.
- Any review of norms and standards for basic water supply and sanitation services should also consider how public service provision takes place outside formal settlement areas, given the high costs associated with serving scattered communities. Household grants for self-supply may be considered in these areas.
- At municipal level, it is important to balance the political autonomy and exclusive service-delivery mandate granted by the Constitution with the realities of limited financial and human resources capacity. An institutional model could allow continued political oversight of local service provision, while taking advantage of the economies of scale that using regional service providers would make possible.
- A balance is needed between allocating financial resources to support investments in higher levels of service, providing services to underserved households, while also maintaining and periodically refurbishing existing infrastructure.

- In some rural areas (for example, around Sekhukhune and Bushbuckridge), water can be made available only through large and costly distribution works. Decisions about such schemes need to be taken in the context of the future of these settlements, given that they are unlikely to be viable without substantial ongoing operating subsidies.

### *Phasing*

Between 2011 and 2015, the following actions are required to achieve the 2030 goals:

- The national water resource strategy should be reviewed by mid-2012, and approved as a roadmap to guide the development of the sector. It should then be reviewed, along with the water resource investment programme, every five years to ensure that it adapts to changing environmental, social and economic circumstances.
- Future institutional arrangements for water resource management will be defined by mid-2012, with implementation by 2015 at the latest, if institutional memory is to be retained and continuity in management ensured. The institutional arrangements could include:
  - A national water resource infrastructure agency (by 2013) that will develop and manage large economic infrastructure systems.
  - National capacity to support research, development and operation of water reuse and desalination facilities by 2013.
  - A dedicated national water conservation and demand management programme by 2012, with clear national and local targets for 2017 and 2022, and sub-programmes focused on municipalities, industry and agriculture.
- A comprehensive investment programme for water resource development, bulk water supply and wastewater management established for major centres by early 2012, with reviews every five years. This programme will include the following major investment projects, with clear target completion dates confirmed and responsibilities for financing and implementation clearly allocated:
  - Complete the Lesotho Highlands Project Phase 2 by 2020 to supply the Vaal system.
  - Augment supplies to the KwaZulu-Natal Midlands region (eThekweni and Msunduzi municipalities and surrounds) by completing the Springrove dam, followed by investments in reuse and the raising of Hazelmere dam on the Mdloti River.
  - Decide on the next major augmentation, either through desalination, reuse or developing a new dam on the Mkomazi River, in time for water to be available in 2022.
  - Complete Western Cape water reuse and ground water projects by 2017.



- Define regional water resource investment programmes (for example, raising Clanwilliam dam in the Western Cape) by 2012, supported by clear implementation targets.
- Cost regional bulk water distribution programmes by early 2012 – and submit for budgetary consideration and evaluation by 2012, so that investment programmes with clear implementation targets can be established and implemented from 2012.
- Create regional water and wastewater utilities, including expanding mandates of existing water boards (between 2012 and 2017).

## Transport

### Vision

By 2030, investments in the transport sector will ensure that it serves as a key driver in empowering South Africa and its people, enabling:

- Improved access to economic opportunities, social spaces and services by bridging geographic distances affordably, reliably and safely.
- Economic development, by supporting the movement of goods from points of production to where they are consumed, facilitating regional and international trade.
- Greater mobility of people and goods through transport alternatives that support minimised environmental harm.

The state will function as capable navigator. It will oversee a transport system that serves the interests of society; establish a holistic view of national transport realities; and prioritise, plan and provide basic infrastructure where needed. Government should recognise where competing service providers would best meet transport needs, and enable licensing where appropriate, all within a framework of strong, effective regulation of public and private transport.

Crucially, in national, provincial and local government, those responsible for fulfilling mandates in the transport sector must have the competence and the necessary leadership to achieve these goals.

### The transport reality

South Africa's modes of transport include road, rail, air, sea (ports) and pipeline. While the country has worked hard since 1994 to overcome its transport problems, its economic geography presents many transport challenges. As a transport-intensive country, the transport component per unit of output is above the global average. About 34 percent of the country's gross value-add is concentrated in Gauteng, far from the ports and end markets. A significant proportion of gross value-add is also concentrated in mineral deposits in the interior, at the end of long corridors that lead to ports. Effective, reliable, economical and smooth-flowing transport corridors are needed.

---

Existing corridors are serviced by outdated railway technology (prone to operating failures), poor inter-modal linkages,<sup>4</sup> and ports characterised by high costs and substandard productivity relative to global performance. About 96 percent of South Africa's bulk commodity exports are transported by sea.

Although rail is the ideal mode of transport for large, uniform freight travelling further than 400 kilometres, about 89 percent of all freight (measured by total tonnes) is conveyed by road. This strains a road network suffering significant maintenance backlogs. Poor road safety adds a huge cost to society. South Africa suffers from a high accident rate, with high incidence of death and injury and damaged and lost cargo. Education, proactive enforcement and a change in behaviour are an important part of the solution.

Social and economic exclusion caused by the country's apartheid legacy is evident in the long distances many people travel from where they live to where they work. Providing suitable means for people and goods to move as efficiently, safely and cost effectively as possible is important. Mobility broadens social and economic access, alleviating poverty.

A strong infrastructural network supports air travel. Significant investments to date will provide the capacity to handle passenger volumes to 2030. Air transport, however, poses challenges for wider development. Transport costs to destinations within Africa are prohibitive, in contrast to travel beyond the continent, where network density and cross-subsidisation of intercontinental flights keep prices down. In future, the significant levels of carbon emissions resulting from air travel may substantially reduce travel for business and leisure, and may negatively affect the tourism sector.

---

<sup>4</sup> The facilities where people or goods transfer from one mode of transport to another that is best suited to the needs of that leg of a journey (for example the transfer – from rail to truck – of containers, following their transport by rail for long-distance travel, and by truck, for the short distance to the final delivery destination).

---

## Storylines

The movement from where South Africa is to where it wants to be in 2030 is guided by three considerations:

### *Not all transport dreams can be fulfilled: priorities are key*

Transport decisions involving large long-life systems usually have high costs. Infrastructure investments can lock-in decision-makers and investors, limiting future options. Although many transport priorities exist, careful ranking against clear criteria is necessary. Focus should be placed on reasonable choices that allow safe, affordable and effective transport, rather than trying to achieve all transport dreams, including those unduly influenced by strong interests outside the formal policy and prioritisation process. Planners and implementers need to guard against adopting transport approaches from other nations that are not aligned with South Africa's priorities.

*“Last but not least, is the issue of a lack of infrastructure maintenance by all society (government, private big business and every individual of South Africa). I see every day and believe that we South Africans do not look after our assets very well; we have a mindset of buying or building new things all the time instead of maintaining what we have. We must change this mentality, whereby we see government, private business and every individual adopting a renewed mindset in looking after the infrastructure we currently have.” – NPC Jam*

### *Transport as an enabler: getting South Africa to work*

Moving towards 2030, South Africa's transport system will support economic development, job creation and growth, providing equitable access to opportunities and services for all and reducing poverty. Instead of focusing on the transport mode and categorical positions such as “rail is the future”, emphasis will be placed on total system efficiency to maximise the strengths of different modes, cut inefficiencies and reduce disparities, with the least environmental, social and economic cost.

The options identified, particularly public transport and non-motorised modes, may foster a different culture. Modes and infrastructure that encourage social interaction, healthy practices and street-level movement create a sense of space and social inclusion that South Africa needs.

In addition, options may go beyond transport solutions alone. Changes to the spatial economy could provide solutions, for example, establishing more economic opportunities where people live, or creating new settlements close to centres of work.

### *A modal shift from private transport in the long term*

Behavioural change is critical in reducing environmental, social and economic cost, by shifting user and supplier decisions about movement, travel modes and sources of

---

energy. While some forms of private transport, such as the car, will still be used in 2030, a marked change to public transport will emerge through concerted effort, strong leadership, consistent messages and actions, and public system alternatives that work. By 2030, public transport will be user-friendly, less environmentally damaging, cheaper and integrated or seamless. Better monitoring of emissions – and apportioning cost to origin – is also likely to be a major contributor in moving to a low-carbon future.

### **Key policy and planning priorities**

#### *Create workable urban transit solutions with public and private components*

Significant investment in the public transport system is needed to extend bus services, refurbish commuter rail, link high-volume corridor services and integrate all these into an effective service. Government needs to lead changes to the transport system if economies of scale and the environmental and efficiency benefits of public transport are to be maximised.

Private cars provide independence at the cost of congestion and pollution. Workable urban transit combines public and private components. Urban transit solutions in South Africa face major challenges: low-density cities, apartheid geography, and public transport serving commuters who do not have reasonable alternatives or enough income to own a private car. The solutions should extend services to captive transport users, while winning custom from those who do have choice.

It is important to cut through the fragmented and conflicting interests of multiple transport authorities and public and private service providers – each with separate funding sources and mandates. Transport benefits from subsidiarities, where the lowest level of government capable of effective delivery is given authority and aligned funding. Government policy to devolve transport management to local government will succeed if there is a simultaneous strengthening of institutions and alignment of legislation, policy and practice. Where metropolitan municipalities are adjacent, a regional transport authority may be appropriate to support integration.

A balance of incentives, both “carrot and stick”, will provide mobility in cities. Public transport subsidies can effectively increase affordability for low-income commuters. Mounting costs for private car users (tolls, higher fees and projected higher fuel costs), alongside prioritising the movement of public transport vehicles on roads, might push car users into second place. This should encourage increased use of public transport.

To be sustainable, public transport services need to provide users with capacity and convenience. Capacity, coverage, frequency and safety performance of public transport must be improved for existing users before commuters with other options will be prepared to switch to public transport. Even with greatly expanded public transport, city dwellers will still have to use cars. Transport authorities will need to plan and invest in road and transport infrastructure construction, maintenance and oversight – and

---

integration with public services – while maximising flow and using technology, such as intelligent traffic signalling.

The commuter rail fleet needs to be renewed. It provides the lowest-cost service in metropolitan areas, but it lacks reliability, punctuality and passenger comfort. The service is precariously placed, with the forced retirement of aged rolling stock forcing the operator to withdraw services, placing more pressure on trains in operation. New technology is needed to achieve a noticeable change in service levels. As this would result in incompatibility with the existing network, a trade-off needs to be made – greater safety, reliability and the separation of commuter and freight networks, with much lumpier investments, or compatibility with the existing network and placing new equipment, when available, at its most vulnerable parts.

The Gautrain has shown public transport is an option for commuters who can afford to use cars. The airport link has been quickly and successfully adopted, although this is not evident on the Pretoria-Johannesburg route, which has a small reach and a weaker link with commuters' departure and destination points. Authorities may need to add additional feeder services to make this link work, increasing the already considerable cost.

The bus rapid transport system has demonstrated the potential of high-quality mass transit systems, while also showing it is critically important to align social interests with technical solutions. The Johannesburg bus rapid transport project incorporated taxi owners – a milestone in formalising the taxi industry as a transport operator. During 2011, however, striking drivers halted this transport system. As public transport must be dependable, authorities will have to create reliable services by placing commuters' interests above the sectarian concerns of transport providers, while also allowing these services to be economically sustainable businesses. Bus rapid transport problems are a priority, given the significant financial and spatial investments made to date and the potential such a system represents for public transport.

Public transport investment increased at 15 percent per year from 2006. In the short term, to harvest these investments, future asset management and increased use of existing assets must be a priority, with a focus on doing more with what the country has. It is crucial to strengthen governance of the sector and operational efficiency.

#### *Strengthen and optimise freight corridors*

The greater part of South Africa's bulk freight moves on the existing national road and rail networks, from mines to ports or processing plants, from farms to cities and from the coast to the Highveld. Planning should prioritise improving the capacity, efficiency and sustainability of these corridors. South Africa is a transport-intensive economy, with comparative advantages in resources rapidly eroded by high transport costs.

---

Increasing the capacity of the main corridors and simultaneously improving the performance of the ports and inland terminals is a priority. Considering the importance of freight corridors, future economic activities must be substantially different, allowing for a reduction in climate impact in particular. In the short term, South Africa's mineral sector has a greater ability to drive higher rates of growth than other sectors in the economy – provided that infrastructure bottlenecks and regulatory uncertainties are removed. Limited capacity on existing rail lines moving mineral commodities, particularly coal, manganese and iron ore, is stifling growth.

Policy and planning priorities need to be informed by actual experience and the performance of Transnet's capacity expansion programmes, which have failed to deliver capacity. The capacity expansion for the Richards Bay coal terminal sits idle, because capacity on the link does not match expansion. Given the magnitude of these capacity constraints, and the huge financial and organisational resources needed to improve corridor performance, a new approach is required to coordinate the efforts and interests of multiple role players. Essentially, this means building effective partnerships between the public and private sector. However, if the terms offered by the incumbent SOE are restrictive, partnerships will be no better than outsourcing agreements by publicly owned monopolies, structured at the expense of users. Competition between providers is therefore a key objective.

The Waterberg coal fields need to expand to transport coal for domestic power generation and to connect to existing export facilities in Richards Bay. Planning priorities will need to take account of Botswana's interest in establishing access to the Atlantic Ocean via the port of Walvis Bay.

By 2030, the Durban-Gauteng freight corridor should be a model for how to strengthen and optimise freight corridors. As the corridor that handles most of the country's high-value freight, it is the first priority. It is also the most strategic corridor to achieve a shift of freight from road to rail by overcoming rail's main drawback – lack of flexibility – by improving the performance of terminals on either end. It could demonstrate that the institutional model needed for corridor improvement rests with aligning the interests of cities with authorities across all tiers of government, as well as the transport operators that connect the intervening space. Transnet and its partners in this project are making progress with this emerging institutional model.

Success factors include unrestricted access into the terminals for freight, removing bottlenecks on the road and rail routes, and expanding terminal capacity. Planning priorities include new access routes into the Port of Durban, allowing for segregation of freight from other traffic, and building new hubs or inland terminals around Gauteng for improved road-rail transfers. At least three new Gauteng hubs will replace existing inner-city hubs as they reach full capacity. Higher rail density and throughput to achieve scale economies will require rail alignment, together with upgraded technology to move and control trains. Transnet has developed plans that will address the capacity of Durban's port. Further container capacity to meet South Africa's needs over the longer

---

term will be provided by constructing a new terminal on the site vacated by moving Durban's airport to La Mercy.

As indicated by the Port Regulator, South African ports perform poorly, operating at levels below comparative operations, with costs that are significantly higher than the global average. These gateways for international trade are hindering the nation's development objectives. Poor performance is largely due to the absence of competition in terminal operations and Transnet's business model, which uses surpluses generated from ports to fund investments elsewhere. The trade-offs obscured within the Transnet group must be addressed if port prices are to be competitive.

#### *Provide long-distance passenger transport options*

Urban mobility gets people to work and helps overcome the historical spatial legacies of race and class segregation. Consideration is needed on how this imperative plays out across the country, and what this means for planning priorities. It is critical to recognise that South Africa does not have the luxury of being able to implement all plans. The guiding principle is to give precedence to solutions that support the flow of people and goods where there is unmet demand. Long-distance transport alternatives include travel by intercity bus, taxi, private transport, air travel and limited intercity passenger trains. In this context, where should scarce public resources be directed?

South Africa's largest single public asset is its road network. With a replacement value of R1.7 trillion, preserving it is a top priority. National and provincial roads are the prime means of connecting people and moving cargo from small settlements and secondary towns to the centres of economic activity. In the short term, before expansions are considered, road maintenance campaigns in municipalities and rehabilitating provincial road networks are needed to prevent further deterioration.

While the roads are preserved, institutional capacity should be strengthened to manage road traffic. In addition, a thorough upgrade of road traffic safety is needed, together with enforced compliance with standards by public and private operators, and wide-scale road safety education. Ultimately, success will be evident in road users changing their behaviour.

Over the longer term, and in light of environmental harm caused by many modes of transport, the proposed expansion of passenger rail services will need to be carefully assessed. Rail is costly, and South Africa would have to practically start from scratch due to the age of its long-distance passenger fleet. But, this could be an opportunity for citizens to have a say in transport choices. Focus on the specifics associated with intended users (income and affordability constraints) would be important, together with assessing alternatives, specifically road-based options. This would benefit decision-making on all significant projects requiring public funds or state guarantees, placing the costs and benefits under public scrutiny before finalisation.

### *Rural access and mobility*

To achieve a meaningful level of rural access and mobility, planning should differentiate services according to local requirements. Where population concentrations are located in areas with little productive economic activity, priorities will mostly relate to providing services that enable easy access to basic needs and state support (for example, service points for public health care and grant support). Scheduled public transport services could be provided to ensure access. People tend to move from isolated rural homes, settling at transport nodes or along transport corridors to access services. These movements provide further opportunities for improved economies of scale for public transport. Given limited resources and urban migration, subsidised services should be limited to such places.

### **Phasing**

Leading up to 2030, transport authorities will be challenged to translate the vision for getting South Africa to work into effective transport. Providing sustainable transport services that are efficient and inclusive is inextricably linked to the need for spatial change in South Africa's cities and related transport corridors. Users will adjust to pricing that is supported by greater transparency, with full costs associated with each service, including costs linked to environmental impact. Key themes are discussed below.

#### *2010-2015: Consolidation and selective expansion*

Greater emphasis will be placed on asset management, increased use of existing assets, extending economic infrastructure through joint private and public projects and expanding public commuter rail transit services. Given scarce resources, some needs will have to be deferred. The state will need to maintain public confidence that improvements will spread by achieving excellence in meeting priority needs. Decisions on project selection will be driven by tightly focused criteria. Priorities include:

- Improve streamlining of assets and institutional arrangements for public transport (including the powers and functions of role players). Use of assets needs to be consolidated and rationalised, and existing assets should be used better. First, public transport and infrastructure must be managed better by removing duplicated functions, refining powers and functions, imposing accountability and enhancing governance and decision-making processes. Thereafter, streamlining institutional arrangements in metropolitan areas can be achieved by setting up regional transit authorities. It is crucial to ensure that all parts of the existing road-based commuter services function properly, as many commuters depend on bus and minibus taxi services. Large public investments have been made, offering a glimpse of how better performing public transport can improve people's commute. Transport authorities should focus on enforcing sector-wide compliance and encouraging contracted operators and independent



service providers to invest and provide a more commuter-friendly experience.

- Renew the commuter rail fleet, with a region-by-region shift to current generation high-capacity rolling stock, supported by station upgrades and improved facilities to enhance links with road-based services. Stabilising existing services is crucial, because complete fleet renewal could take up to 15 years.
- Expand capacity for mineral exports through targeted focus on metal ores and coal, and strategic freight corridors for southern African and international trade. Private-sector partnerships (primarily with Transnet and the South African National Roads Agency Limited) are essential to upgrade corridors. Where SOEs are unable to meet demand for freight services, the state should vigorously encourage private-sector involvement. The National Ports Act (2005), which stipulates that all new developments should be concessioned, needs to be more stringently enforced so that all operators (public or private) perform or are replaced. Intensive application of information technology to transport systems will increase use and flow rates through new railway signalling and highway traffic control systems. These are strategic investments that can be deployed more rapidly than building new fleets or roads to boost the use of existing infrastructure.

#### *2016-2020: In step with evolving land-use changes*

Guided by plans for the urban form, actions will focus on achieving the mutually reinforcing effect of transit-led growth. This will help increase concentration in urban settlements, while improving the economic scale for transport modes. Once the instructional reforms for public transport have been completed, regional transit authorities should be established.

#### *2021-2025: Energy efficiency*

Emphasis will be on increasing energy efficiency and the resilience of transport networks, drawing on progress in establishing renewable energy resources.

Use of lightweight materials in freight and passenger vehicles should be increasingly preferred, because of their lower lifecycle energy requirements and greater load-carrying capacity.

#### *2026-2030: Mid-life upgrades*

Reviewing real progress towards the 2030 vision should guide the tactical adjustments that stakeholders will need to make to overcome problems. Planning should provide for refits to transport systems to incorporate technological improvements.

---

## Information and communications infrastructure

### Vision

By 2030, ICT will underpin the development of a dynamic information society and knowledge economy that is more inclusive and prosperous. A seamless information infrastructure will meet the needs of citizens, business and the public sector, providing access to the wide range of services required for effective economic and social participation – at a cost and quality at least equal to South Africa’s competitors.

Within this vision, the underlying ICT infrastructure and institutions (an “infostructure”) will represent the core of a widespread digital communications system. This ecosystem of networks, services, applications, content and innovation will support economic growth, development and competitiveness; create decent work, nation-building and social cohesion; and local, national and regional integration. Public services and educational and information products will be accessible to all, and will build on the information, education and entertainment role envisaged for public broadcasting. The human development on which this is premised will have created an e-literate (online) public to take advantage of these technological advances and drive demand for services.

Multicasting and instant online translation, digitisation and ICT applications will make it easier for people to communicate and obtain information using different languages. Mobile government (m-government) services, delivered through mobile devices, will grow and converge with more traditional e-government services. Organisations will have immediate access to data for performance monitoring and improvement, while instant long-distance communication will be as easy as meeting in person. ICT will continue to reduce spatial exclusion, enabling seamless participation by the majority in the global ICT system, not simply as users but as developers of content and applications, business process outsourcing and innovators.

### The ICT reality

ICT has changed radically over the past two decades. In 1993, mobile phones had only just entered the general market and computers sat on desks. In contrast, a range of surveys published around 2010<sup>5</sup> suggests a mobile phone penetration rate of about 70 percent, accounting for multiple SIM cards held by individuals. These figures highlight a reality: “More South Africans – 29 million – use mobile phones than radio

*“ICT can be used as a tool to fight poverty, increase employment, education and entrepreneurship. People use broadband for different reasons, but mainly for communication, work and research ... With universal access people will not need to call their municipality, go to home affairs or social welfare, they can do everything online.”*  
– NPC Jam

---

<sup>5</sup> ICT Africa household survey indicated a SIM-card penetration rate of close to 65 percent of the population, with at least 10 percent of respondents indicating they had multiple SIM cards (Esselaar et al, 2010). A 2010 survey indicated a mobile phone penetration of 75 percent (Hutton, 2011).

---

(28 million), TV (27 million) or personal computers (6 million). Only 5 million South Africans use landline phones.”<sup>6</sup>

Despite the uptake of mobile phones, growth in South Africa’s ICT sector has not brought affordable, universal access to a full range of communications services. According to the Department of Communication, interventions to address ICT gaps since 1994 have included establishing tele-centres (providing access to training, equipment and services) in rural areas, providing Internet kiosks at Post Office centres, funding training for schools, setting up cyber-laboratories at schools, and other related measures. However, the performance of most state interventions in the ICT sector has been disappointing. South Africa has lost its status as continental leader in Internet and broadband connectivity.<sup>7</sup> Pricing of services and equipment remains a significant barrier to the expanded use of mobile phones and fixed lines, with limited network competition further increasing costs. Policy constraints, weaknesses in institutional arrangements, conflicting policies between responsible departments, regulatory failure and limited competition all contribute to this issue. The ability of the regulator, the Independent Communications Authority of South Africa, to enable a more open market has been hampered by legal bottlenecks, limited capacity and expertise.<sup>8</sup> The last comprehensive policy review was in 1996.<sup>9</sup>

### Storylines

ICT developments will continue to transform economic and social activities, and how individuals and communities communicate and function. Its impact on each sector of society and each area of service delivery will depend on how uptake is addressed. A single cohesive strategy is essential to ensure the diffusion of ICTs in all areas of society and the economy. Like energy and transport, ICT is an enabler – it can speed up delivery, support analysis, build intelligence, and create new ways to share, learn and engage.

In future, the state’s primary role in the ICT sector will be to facilitate competition and private investment and to ensure effective regulation where market failure is apparent. Direct involvement will be limited to interventions needed to ensure universal access, such as the introduction of “smart subsidies” (discussed below), and to help marginalised communities develop the capacity to use ICTs effectively.

<sup>6</sup> Development Bank of South Africa (2011). Communications Infrastructure. Paper commissioned by the National Planning Commission, 4 April 2011. Pretoria: Development Bank of South Africa.

<sup>7</sup> Esselaar S, Gillwald A, Moyo M and Naidoo K (2010). Towards Evidence-based ICT Policy and Regulation. South African ICT Sector Performance Review 2009/10, Volume 2, Policy Paper 6. Available at: [http://www.researchictafrica.net/publications/ICT\\_Sector\\_Performance\\_Reviews\\_2010/South\\_Africa\\_ICT\\_Sector\\_Performance\\_Review\\_percent20\\_2010\\_-\\_Vol\\_2\\_Paper\\_6.pdf](http://www.researchictafrica.net/publications/ICT_Sector_Performance_Reviews_2010/South_Africa_ICT_Sector_Performance_Review_percent20_2010_-_Vol_2_Paper_6.pdf).

<sup>8</sup> Gillwald A (2011). SA Telecoms – still a way to go. *Engineer IT, January 2011*. Available at: <http://eepublishers.co.za/article/research-act-africa.html>.

## Policies and planning priorities

### *Implement an enabling, coordinated and integrated e-strategy*

The vision will be realised only if it is supported by a coordinated, enabling ICT strategy and plan. A national e-strategy will cut across government departments and sectors. It will aim to create sector growth and innovation through policy coordination that drives public and private investments in areas such as network upgrade and extension, particularly in broadband, service delivery and application development, and local content development. This will require a review of the market structure, and analysis of the benefits and costs of infrastructure duplication, facilities or service-based competition, and options for infrastructure sharing. It will also need a common carrier network, with possibilities of structural separation of the vertically integrated incumbent backbone operator. Carefully applied open-access policies can incentivise sharing and common use of certain layers of the network, without discouraging private long-term investment. It will also require targeted public investment, possibly through public-private partnerships.

The strategy will include plans to develop the specialised institutional capacity required for the policy responsiveness and effective regulation of the sector. In addition, it will focus on demand-side stimulation (by promoting e-literacy, education and training, and examining ICT rebates and incentives, and the needs of key development sectors such as health and education), as well as the supply-side of infrastructure and institutions. The national e-strategy will also ensure that South Africa engages effectively and coherently on issues of regional integration and harmonisation – interacting with various institutions, including global ICT governance agencies, such as the International Telecommunications Union and the World Trade Organisation.

### *An ICT sector that enables economic activity*

ICT is a critical enabler of economic activity in an increasingly networked world. As a sector, ICTs may provide important direct opportunities for manufacturing, service provision and job creation, but their main contribution to economic development is to enhance communication and information flows that improve productivity and efficiency. For this reason, a country that seeks to be globally competitive must have an effective ICT system, as this infrastructure provides the backbone to a modern economy. An immediate policy goal is to ensure that national ICTs adequately support the needs of the economy, allowing the participation of parties beyond the public sector. At present, there are effective duopolies in the mobile phone market and the overwhelming dominance of Telkom, the historical incumbent in the backbone and local access markets. This dominance has been relatively ineffectually regulated, and has resulted in very high input costs for business, increasing the costs of services. It has also inhibited investment in growth areas within ICT, such as business process outsourcing and offshore information technology-enabled services.

---

### *Affordable, widely available broadband for economic and social development*

The inherent efficiency of ICTs – and their ability to circumvent blockages in inefficient systems – already ensures that they are widely used, even under less than ideal conditions, by businesses or individuals that can afford them. If ICTs are also to perform a developmental function, an adequate range of infrastructures, services and content must be available at the lowest cost and highest quality to the wider community. This is not simply a social intervention – it is a necessary condition to grow and stabilise the national economy, given that the link between ICT penetrations with economic growth only takes effect when a critical mass, estimated to be 40 percent with voice and 20 percent with broadband, is reached.<sup>10</sup>

The digital divide – the gap between those who have access to services and the demand from those who are excluded by unavailability or prohibitive service costs – has to be narrowed. Past universal access strategies have failed to distinguish between the real access gap and the market efficiency gap. The real access gap refers to households or individuals who can be reached only by providing permanent subsidies or some sort of support. The market efficiency gap refers to the difference between the share of households reached in an efficient market and what is actually achieved under existing conditions. The digital divide can be partially addressed through more competitive (efficient) markets and effective regulation that enable operators to meet the demand for affordable services, reducing the number of households or individuals requiring support. Further strategies that enable access through “smart subsidies”, which require a once-off intervention, should be favoured over strategies requiring permanent subsidies.<sup>11</sup>

The rapidly evolving nature of ICTs means that it is vital that such projects are regularly reviewed and refocused, which will require the state’s investment and support.

### *Demand stimulation and job development*

Improving equitable access to enhanced ICT services will require actions to stimulate demand. At the most fundamental level, strategies need to improve e-literacy through basic and secondary schooling, tertiary, adult education and supplier training. These strategies will support the production of multilingual, relevant and local content for public programming and information services, whether education or entertainment, and develop online and mobile government services and applications. This will increase demand for ICT services, as content and applications become increasingly relevant to the needs and interests of the wider community.

Constructing and maintaining networks will continue to generate a substantial number of lower-level job opportunities, such as digging trenches or spanning cables and

---

<sup>10</sup> World Bank, 2010.

<sup>11</sup> InfoDev Regulatory Toolkit, 2009.

installing basic hardware, as networks and associated facilities expand. For the ICT sector to grow in the longer term, however, it will require significant numbers of differently skilled people to fill the range of specialised job opportunities created. The education system will need to prepare for this. The state will play a central role in developing a forceful supply-side policy through investment in education – critical to the public’s ability to adjust to change brought about by technological innovation and to meet the changing needs of the economy.

#### *The state, market structure and institutional arrangements*

Experience elsewhere has demonstrated that private-sector participation and competition, coupled with effective regulation, have generally delivered lower prices and improved quality and speed of services. South Africa needs to express an unambiguous commitment to intensifying competition. As one element of this, local loop unbundling needs to be speeded up.

Spectrum allocation is perhaps the biggest regulatory bottleneck in the proliferation of rapidly deployable wireless technologies to meet the diverse needs of the society and economy. The spectrum that will become available with the shift from analogue terrestrial broadcasting to digital should be swiftly allocated to ensure services expand with emerging technologies in this band.

Mechanisms for allocating radio frequency spectrum need to be smarter (for example, spectrum auctions and reverse bids for underserved areas), with robust and transparent governance. Spectrum should be fully tradable once allocated. Regulators should not be too restrictive in dictating which technologies should be used with which spectrum, but regulations should be crafted to discourage spectrum hoarding, where licensees buy spectrum and do not use it or exploit it only in certain geographical areas. Spectrum policy should favour competition, but incumbents should not be excluded from gaining access to bands they need to build networks using new technologies. In line with global trends, spectrum licences should be technology neutral, so they can be adapted to meet rapidly changing technological developments within the sector without high regulatory costs.

The state needs to have sufficient institutional agility and competence to deliver in this rapidly changing sector. Government’s primary role will be to ensure public policy promotes market access, and to create effective institutions to ensure competition, and regulate operator behaviour and market failure.

#### *Institutional capacity building and competencies*

Ensuring institutional capacity and individual competencies is one of the critical success factors to ensure positive policy outcomes. To achieve the goals outlined above, establishing an enabling policy and regulatory environment will depend on adequate institutional capacity and competencies to effectively regulate this dynamic and complex

---

sector. It will be important to clarify the institutional arrangements to remove some of the tensions in the sector. Most fundamental is the structural conflict of interest that exists between the state's role as a competitive player in the market (through its majority share in Telkom), and as a policy-maker for itself and its competitors. Better distinction of roles and functions, more coherent approaches and clearer strategies will be required to avoid unintended policy outcomes.

The successful development of the sector will also depend on more skilled policy intervention based on more effective public consultation to deal with the dynamic nature of the sector, and mechanisms to ensure required institutional autonomy of the regulator to implement agreed policies independently of state and industry interference or capture. Accountability will be ensured through transparently applying the administrative justice system and through more specialised parliamentary oversight. Agility in governance and regulation ensures that new forms of ICT connectivity can be made available – securing optimal knowledge sharing, communication, and social and economic participation within South Africa and beyond its borders.

### Trade-offs

The following trade-offs and choices apply:

- There is a need to ensure sufficient large-scale investment (through both public and private funds) to allow for extension of ICT infrastructure that supports the economy, society and the objectives of greater inclusivity and sustainability. This must be balanced against the need to ensure that specific strategic goals of access and service provision can be met, even in underserved areas and marginalised communities. Given that the state is capital constrained, with many urgent priorities, willing and capable private investors are needed. Creating a collaborative partnership with defined social responsibilities may be appropriate. Alternatively, where private investment is able to create the connectivity, public investment could focus more on enabling the demand by supporting e-literacy and content delivery or reducing investment risk by becoming the anchor.
- Low thresholds to market entry and competitive markets require less intensive access regulation, which will drive down prices and improve quality and choice for users. But it may threaten the viability of current service providers or SOEs.
- Balancing the effect of greater competition in the sector could reduce prices, but it might constrain surpluses available for services or inhibit new investments.
- Encouraging cost-saving efficiencies in the sector through regulated prices could result in job losses among present service providers. If prices are lowered, however, this could also potentially swell demand and create other jobs elsewhere in the ICT sector and the broader economy.
- Allowing network competition to extend networks and services, with likely duplication of resources and infrastructure in a resource-constrained

environment, needs to be weighed against a single common carrier backbone with fair and open access to the facilities by a competitive services sector. Open Reach and British Telecom are a successful example of structural separation of the incumbent into separate facilities and services components.

- In broadcasting and related information, setting local content quotas that promote local production may also increase costs for information and services provision, and make regulated services unable to compete effectively against content deliverers on unregulated services.
- Making critical spectrum available to operators to deploy new technologies to grow their business, or waiting for a full spectrum audit and conducting comprehensive allocations or auctions of the entire reassigned spectrum with the associated losses that delays bring to growing the economy.

## Phasing

Phasing of priorities for a move to an enabling ICT reality by 2030 is discussed below.

### *Short term: 2012-2015*

There is a clear and urgent need for a full policy review, which has not been done in the ICT sector since 1995. In the next five years, South Africa needs to develop a more comprehensive and integrated e-strategy that reflects the cross-cutting nature of ICTs. This should link policy objectives to specific strategies. It would include plans to allocate a new spectrum that will become available with the switch to digital broadcasting, and would set out a strategy for universal access, with clear targets and monitoring and evaluation indicators. In addition, it would outline demand stimulation interventions such as e-literacy programmes, skills development and institutional capacity-building strategies, and other generic demand-side interventions to promote ICT diffusion requiring interdepartmental and public and private coordination.

For sector policy specifically, evidence suggests that national objectives of affordable access to the array of services necessary for effective citizenship, and globally competitive input prices for business, are best achieved through effectively regulated competitive markets.

The following areas require attention:

- Adjust the market structures and remove legal constraints to enable full competition in services.
  - Fast-track local loop unbundling.
  - Review institutional arrangements to ensure the existence of resourced regulatory agencies able to encourage market entry and fair competition and to regulate market failure.
  - Implement a service and technology-neutral flexible licensing regime to allow flexible use of resources in dynamic and innovative sectors, especially
-



for spectrum that should be made available urgently for next generation services.

- Free spectrum for efficient use, to drive down costs and stimulate innovation.
- Spectrum can be allocated with set asides or obligations to overcome historical legacies and inequalities in the sector, but this should not delay its competitive allocation.
- Ensure access to low-cost high-speed international bandwidth with open access policies.
- Facilitate the development of high bandwidth backbone/backhaul networks.
- Review SOEs to determine if they are fulfilling their purposes, constraining competition, squeezing out private investment or not engaged in efficient expansion.
- Examine the ability of the market to sustain infrastructure (facilities) competition and whether the benefits outweigh the duplication of facilities in a resource-constrained environment.
- Identify alternatives to infrastructure competition through structural separation of the national backbone from the services offered by the historical incumbent to create a common carrier with open access policies to ensure access by service competitors.
- Consider inefficiencies of infrastructure duplication and encourage or prescribe sharing and reduction of expensive trenching by creating common rights of way for competing operators to lay dedicated lines.

The implementation plan derived from this policy review will include a comprehensive short-, medium- and long-term investment strategy based on the needs of the sector:

- Conduct a geographical information assessment of existing networks and future rollout coordination.
- Consider public and private roles.
- Review institutional arrangements to create an environment conducive to investment and to ensure the effective regulation of the sector.

It would also identify the need for specific demand-side strategies in other sectors and identify the institutions responsible for developing and putting them into operation. This will include targeted training to meet South Africa's specific needs, with development of e-workers and e-consumers to grow services and create decent employment, such as business process outsourcing and offshore information technology-enabled services from abroad.

*Medium term: 2015-2020*

The commission supports the target proposed by the Department of Communication – by 2020, there should be 100 percent broadband penetration. All schools, health facilities and similar social institutions will be connected and individual citizens will have affordable access to information and services, as well as voice communication at appropriate points. Broadband is currently defined as a minimum connection speed of 256 kilobytes per second, but it is expected that by 2020 this will be at least 2 megabytes per second.

Because there is substantial uncertainty about the pace of technological development and the level of services that will be available in 2020, it is appropriate to benchmark South Africa's performance against other countries, rather than to set firm numerical targets. By 2020, through strategic investment and regulatory guidance, the costs associated with access to services by the commercial, public and community sectors should place South Africa's relative costs in the upper quartile of country-specific ICT costs worldwide. With both planning and delivery, South Africa should regain its position as the leader in both quality and cost of ICT services in Africa.

*Long term: 2020-2030*

The ongoing implementation and refinement of the e-strategy will ensure that ICT supports, rather than limits, the global competitiveness of South Africa and its economic performers. By 2030, government will make extensive use of ICT to engage with and provide services to citizens. All individuals will be able to use a core of ICT services and enjoy access to a wide range of entertainment, information and educational services.

By 2030, the e-strategy collaborations between state, industry and academia will also create innovation systems, including software and applications incubators, local content and multimedia hubs and research and development networks. These systems will be used to plan for and respond to the wider needs of the global ICT ecosystem, of which South Africa will be an integral part.