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Contents	<i>Page</i>
1. Dispersion of Inflation Expectations <i>Shakill Hassan and Siobhan Redford</i>	1
2. The end of global reserve accumulation and its implications <i>Jean-François Mercier</i>	13
3. Sacrifice Ratio Based on the Time-Varying Phillips Curve for South Africa Alain Kabundi.....	22
4. To zero and beyond? Estimating South Africa’s structural trade balance <i>Theo Janse van Rensburg and Erik Visser</i>	27
5. Going green is good for private fixed investment <i>Nkhetheni Nesengani</i>	40

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Going green is good for private fixed investment - April 2017

Nkheteni Nesengani

Abstract

South Africa's 2008 electricity supply crisis, and the ensuing load shedding episodes that sporadically took place until 2015, necessitated a structured plan that could help to alleviate future electricity constraints in the sector while acting as a catalyst for gross fixed capital spending in other sectors of the economy as well. The private sector's contribution to energy investment was hardly noticeable until the Renewable Energy Independent Power Producer Procurement Programme (REIPPP) commenced in 2013. This note shows that the REIPPP's direct contribution to real GDP and private sector fixed investment averaged 0.52% and 4.0% respectively, between 2013 and 2016. It was a substantial improvement from 0.04% and 0.32%, recorded from 2009 to 2012. The note also shows that a 1% shock to private fixed investment (about R25 billion injected to REIPPP) would directly contribute 0.6% to total fixed investment, while indirectly adding a 0.1% to real GDP.

1 Introduction¹

Electricity supply shortages caused a substantial drag on growth, as evident from South Africa's weak growth outcomes between 2008 and 2015². Electricity constraints far exceeded threats from other infrastructure bottlenecks such as roads and rail. Since 2011, capital spending by private business in the electricity sub-sector has resulted in a significant contribution by the private sector to overall fixed investment.

The rise of independent power producers (IPP) in the energy sector has helped alleviate some of the supply constraints in this sector. This occurred quite rapidly and highlights the important role of the private sector in providing electricity for the South African economy.

The private sector's contribution to energy investment was hardly noticeable until 2013. The change came about through the Renewable Energy Independent Power Producer Procurement Programme (REIPPP)³. This note shows how the stagnation in the rate of investment in electricity by public corporations led to the REIPPP raising private sector investment and hence, total fixed investment. It highlights the significance of renewable energy as a faster way to help address the electricity supply constraints that South Africa encountered in 2008. The note indicates that REIPP contributes significantly to real fixed investment by the private sector, and hence to GDP growth. Keeping the policy on independent power producers open helps to encourage investment in electricity by private businesses, and in the process stimulates both growth and employment.

¹ Many thanks to Mr. Rowan Walter, Ms. Dineo Lekgeu, Mr. Pieter Pienaar, Ms. Pamela Mjandana, and Mr. Shaun De Jager for their valuable comments.

² The advent of blackouts in 2008 coincided with the global financial crisis that had a significant economic impact on South Africa's growth. Production and consumption were constrained by both domestic and global factors.

³ <http://www.energy.gov.za/IPP/Electricity-Infrastructure-Industry-Transformation-23September2014.pdf>

2 Moderating electricity supply, and/or declining demand: a brief overview

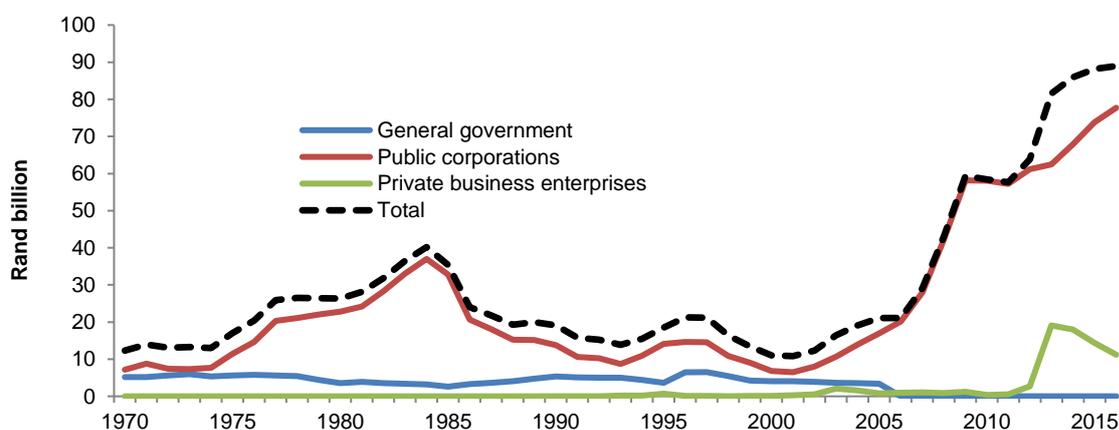
Electricity supply, being a vital cog in the economy, is crucial for underlying confidence in South Africa's future prospects as a stimulus for other investment. Just like infrastructure bottlenecks in roads, rail and air transport can hinder export-led growth; insufficient generation of electricity could have an even bigger negative impact on total fixed investment and economic growth⁴. In the 1970's and 1980's the supply for electricity was mostly greater than the demand⁵. The situation evolved over time culminating in a serious shortage of electricity supply by 2008.

Load-shedding weighed on future business plans⁶. Closing the electricity supply gaps became a challenge following the 2008 electricity disruptions. The effect on the economy could have been even bigger a few years later was it not for planned investments in the sector. Fixed investment projects in the electricity sector that were ongoing at the time of electricity shortages reduced the severity of the slowdown in economic growth. South Africa had to continue prioritising investment in electricity infrastructure so that other sectors (particularly the energy-intensive industries) could find it attractive to invest in the country.

3 Green energy as a supplement to a sector dominated by Eskom

The graphical depiction in figure 3.1a demonstrates a rather meager engagement of the private sector in building capacity for generating electricity from 1970 to 2012. However, a record high participation in capital expenditure in the subsector was recorded in 2013, showing about a 3000% growth rate, albeit from a very low base. Figure 3.1b shows that 2013 stands out as the year where four consecutive quarters contributed in excess of 20% (year on year growth) in electricity infrastructure capital expenditure. That is in line with the bids⁷ where companies had committed to deliver on their projects.

Figure 3.1a Real gross fixed investment in electricity by sector (2010 constant prices)



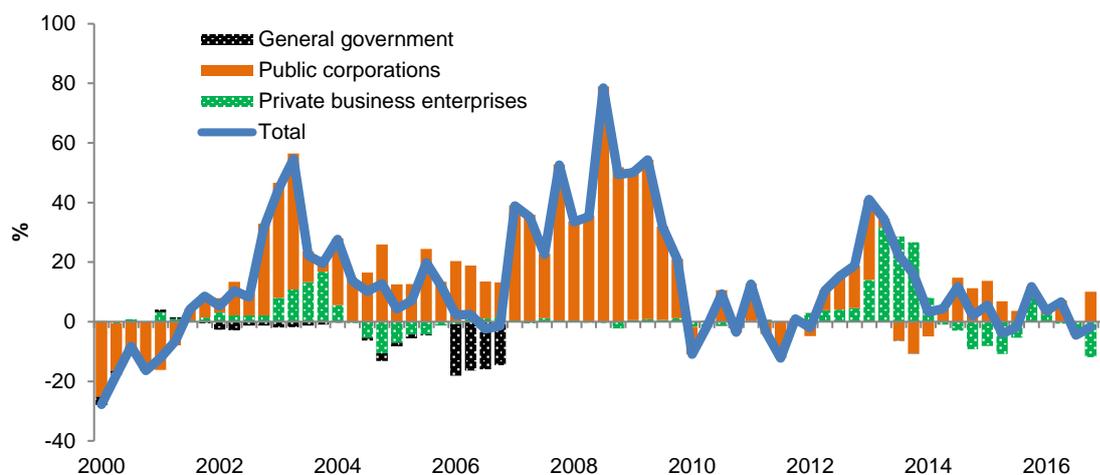
⁴ South Africa's electricity intensity at a higher level, and disruption to electricity supply is likely to affect most sectors of the economy. See http://www.ep.liu.se/ecp/057/vol3/028/ecp57vol3_028.pdf on SA's electricity intensity.

⁵ Electricity supply to households could easily outstrip consumption because of the large segment of the society that was previously marginalised. From the 1990's it was the policy of the government to connect even the previously disadvantaged segments of South Africa to the national power grid.

⁶ Real GDP declined in 2009 partly owing to domestic production constraints linked to electricity supply shortages and sluggish global growth. South Africa's potential output was reduced. The IMF indicated that there was a structural break in potential output around 2008Q4/2009Q1. See www.imf.org/external/pubs/ft/dp/2011/afr1102.pdf.

⁷ Bids to provide renewable energy were based on a 70% pricing with the 30% related to issues like black ownership in the projects, ability to create new jobs, and the local content in the production process.

Figure 3.1b Quarterly contributions to growth rates in real gross fixed investment in electricity (2010 constant prices)



Eskom, as represented by the public corporation sector above, has been the main contributor to capital expenditure in electricity over time. In the mid-1980s, its contribution to total electricity capex dwarfed both private business corporations and general government. Between 2000 and 2007 the real growth rate in public corporations’ capital expenditure in the electricity subsector averaged 17.1%, before increasing to 51.1% at the onset of the 2008 electricity power crisis. But, this high rate of investment was not sufficient to spare the country from load shedding. Given ample space to operate, so-called green energy initiatives can provide a necessary challenge to Eskom in terms of raising its level of efficiency and competitiveness.

4 The REIPPP’s role in fixed investment by the private sector

4.1 Fixed investment by private businesses and GDP growth benefit from REIPPP

A role for the private sector in power infrastructure was always going to be accepted with both hands – especially if it proved to be profitable, with minimum risk. The 2008 power crisis reinforced the urgency to increase electricity generating capacity. The department of Energy’s bid windows proved to be a huge success as it increased renewable energy generation capacity.

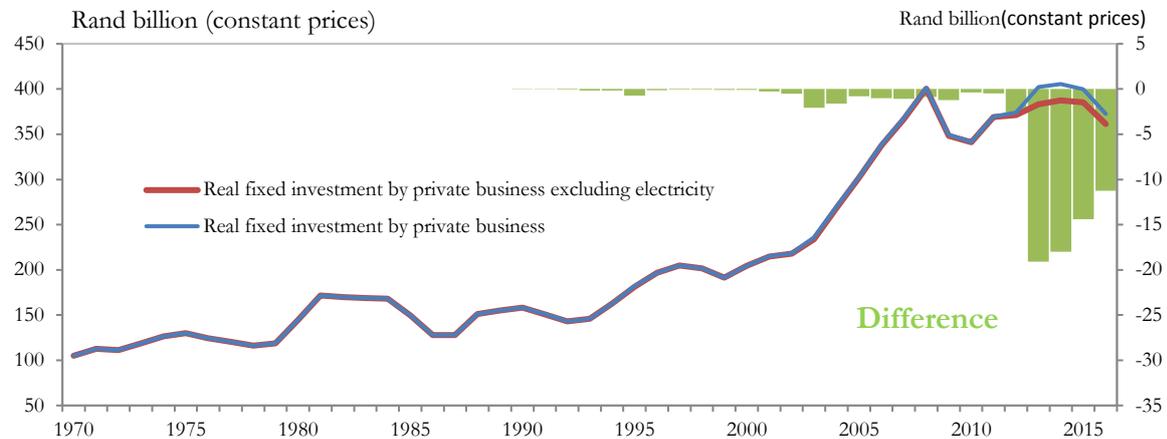
South Africa’s economy is energy-intensive – possibly related to the legacy of decades of very low electricity prices and preferential rates to some companies⁸. Investing in manufacturing industries that rely heavily on electricity was encouraged - examples being aluminum smelters, iron ore and steel mills.⁹ In the absence of load shedding in the country, it is tempting to assume that all electricity demand is met. However, the question remains as to what percentage of economic activities were shelved or even cancelled because of planners’ concerns that there would not be enough electricity to meet their needs. Alternatively, some companies could have chosen to reduce their reliance on Eskom’s power and use alternative sources of energy. As a result, the stagnation in electricity consumption was by no means an indication that demand for electricity had stabilized.

⁸ Smelters bought electricity from Eskom at lower rates. See <http://www.engineeringnews.co.za/article/aluminum-industry-faces-challenges-2012-09-28>

⁹ University of Cape Town’s Energy Research Centre noted the pattern of increased investments in energy-intensive manufacturers in their report titled “Energy policies for sustainable development in South Africa”. See www.iaea.org.

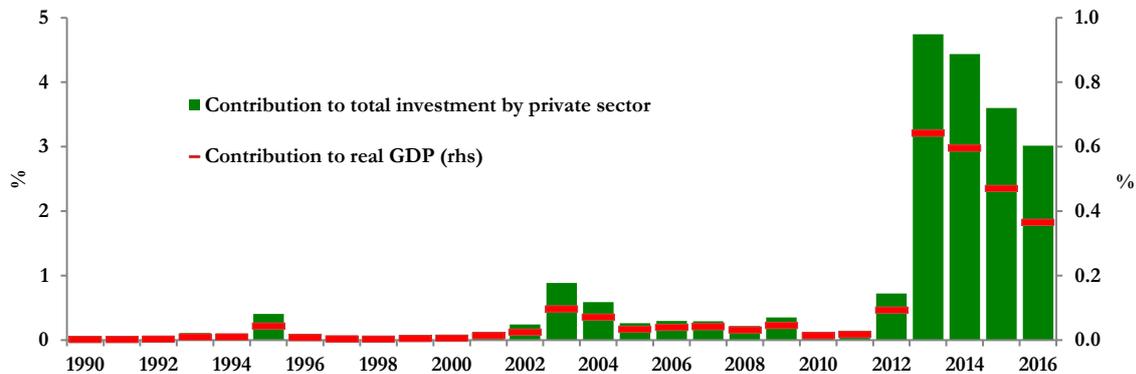
In the midst of the electricity supply constraints, investment in the electricity sub-sector had to gain traction. Expanding electricity capacity would have direct benefits to the economy. Figure 4.1 shows that in 2013, about R19.2 billion (2010 constant prices) came largely from the REIPPP initiatives – contributing 4.7% to total investment.

Figure 4.1 Electricity’s noticeable contribution to fixed investment by private business only in recent years



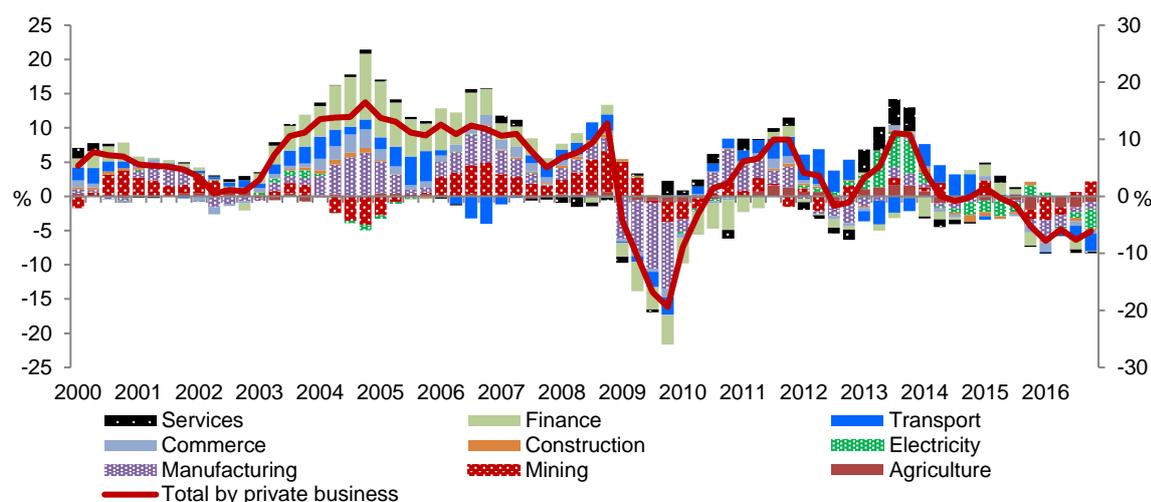
In 2012 and 2013 private sector investment in electricity infrastructure contributed significantly to total fixed investment by the private sector, helping the investment sector to reach its pre-crisis level by the beginning of 2014Q1. However, in 2015 most REIPP projects were winding down, resulting in contraction in capital expenditure in electricity. Nevertheless, a modest recovery became evident in 2015Q4. It is unequivocally clear that once private sector investment starts to accelerate there are significant tangible positive spinoffs to total fixed investment.

Figure 4.2 REIPP’s direct contribution to real GDP and private sector’s real fixed investment



The bid windows related to REIPPP started in 2011, with a meager contribution to real investment noticeable in 2012. In 2013, about 5% of real fixed investment by private business was attributed to expanding electricity infrastructure. That part of fixed investment contributed to about two-thirds of a percent of real GDP in 2013.

Figure 4.3 Green shoots for investment fade with completed REIPPP projects



Although gross fixed capital formation by private business contracted (based on year on year growth rate) from 2015Q2 to 2016Q4, the electricity subsector still contributed positively, albeit from a relatively low base. Given that the private sector remains the main contributor to total fixed investment in South Africa, any further boost to this sector would add significant value to GDP growth prospects.

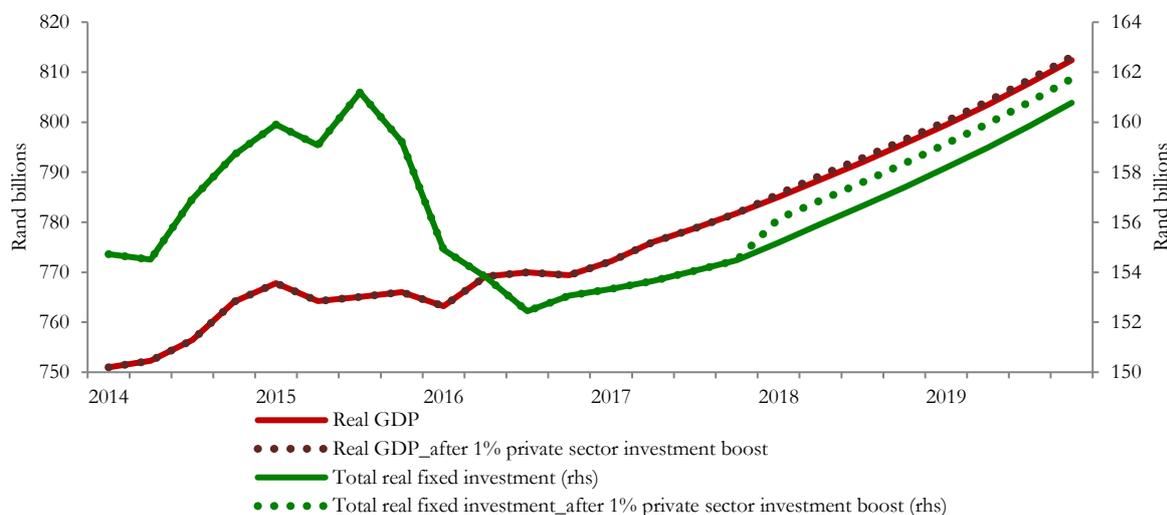
A simulation for a 1% increase to real fixed capital formation by the private sector suggests positive spinoffs to both total investment and GDP growth. The 1% shock to investment is equivalent to R22 870 billion increase in nominal private business expenditure by the electricity sub-sector.

Table 4.1 A one per cent positive shock to private investment (changes from baseline)

	Private business investment	Total investment	GDP
At current prices (R million)	22 870	22 870	17 500
At constant prices (R million)	15 240	15 240	11 660
Per cent (y-o-y real change)	1.0	0.6	0.1

Source: SARB, own calculations

Figure 4.4 Impact of a 1% stimulus to private sector investment (2010 constant prices)



Not all the benefits of a positive shock to investment would be realised in real and nominal GDP growth. This could be due to negative spillovers as various channels linking real investment changes to GDP growth will have different impacts on economic growth. An example here is the associated increase in capital equipment imports used in the renewable energy sector. Ceteris paribus, an increase in South Africa’s imports temporarily lowers the country’s net-export position. Therefore, the “immediate” benefits of increasing investment in the green energy sector do not fully pass through to GDP, i.e., despite the future positive spinoffs related to capacity increases from the raised capital spending in infrastructure. That being said, the long-term benefits are that the increased infrastructure capacity will support future exports, and therefore improve the net export position, and real GDP growth prospects.

4.2 Choosing the right technology mix

Policy makers should choose the right combination of technology options when increasing South Africa’s electricity-generating capacity. Different constraints exist for each option, and a balanced view should be considered for optimising the outcome. There are two key considerations when choosing between the options. First is the urgent need for additional power, while the second relates to the need to go green. Nevertheless, an overall cost/benefits analysis of the projects should be considered.

The global move to cleaner energy resources should encourage South Africa’s efforts to develop cleaner forms of electricity capacity. Related to this, the type of technology will determine the speed at which projects are completed and amount of electricity power generated.

Table 4.2 Available technologies to choose from

<i>Technology</i>	<i>Unit Size</i>	<i>Lead Time¹⁰</i>	<i>Capital Cost/KW</i>	<i>Operating Cost</i>	<i>Fuel Cost</i>	<i>CO₂ Emission</i>
Coal	Large	Long	High	Medium	Medium	High
Nuclear	Very large	Long	High	Medium	Low	Nil
Gas-fired	Medium	Short	Low	Low	High	Medium
Hydro	Very large	Long	Very high	Very low	Nil	Nil
Wind	Small	Short	High	Very low	Nil	Nil
Photovoltaic	Very small	Very short	Very high	Very low	Nil	Nil

Source: International Energy Agency

This table¹¹ shows the benefits as well as the disadvantages of various means of investment in electricity infrastructure. When South Africa was still faced with severe power shortages, it was ideal to prioritise the technologies with a short lead time for maximum effects. From the options shown, solutions to the short-term problem could continue to come either from photovoltaic, gas-fired or wind technology. It could also be any combination of these.

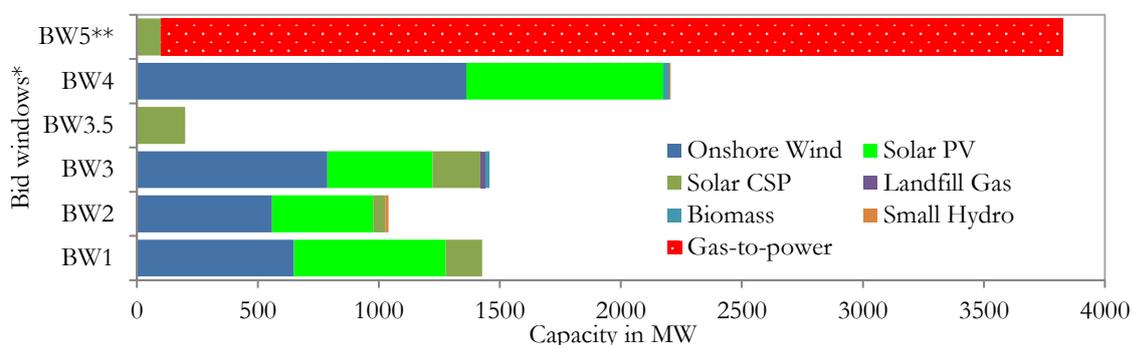
South Africa faces cost constraints and the choice of option also depends on the capital cost per kilowatt that ranges from low (for gas-fired), high (for wind based power) to very high (for photovoltaic). Wind and photovoltaic technologies, although with a higher capital cost per kilowatt, should be encouraged as they are considered renewable sources of energy. Private companies have

¹⁰ Lead time is the amount of time needed to build a given type of power plant varies by technology. Projects with longer lead times increase financing costs. Each year of construction represents a year of additional interest charges before the plant is placed in service and starts generating revenue (http://www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf).

¹¹ This table is extracted from IEA: (http://www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf)

thus far focused on these three since 2013 as they can be carried-out by different companies at the same time, but in different locations.

Figure 4.5 South Africa’s choice of technology mix: REIPPP’s experience



* The bid windows (BW1 to BW4) are for the period between 2011 and 2015.

** BW5 is the expected bid window based on South Africa's intention to procure 3726MW of power

The future is in clean energy, and South Africa needs to position itself for that. Bloomberg noted¹² that:

“Cheaper coal and cheaper gas will not derail the transformation and decarbonisation of the world’s power systems. By 2040, zero-emission energy sources will make up 60% of installed capacity. Wind and solar will account for 64% of the 8.6TW of new power generating capacity added worldwide over the next 25 years, and for almost 60% of the \$11.4 trillion invested.”

In 2016 the SA government published the “Integrated Energy Plan (IEP) and the Integrated Resource Plan (IRP) for public comment”¹³. Renewable energy is very much a part of the country’s IEP.

The coal-fired Medupi and Kusile power stations are the recent mega fossil fuel power stations to be built in South Africa, and both (even before they are fully commissioned) have significantly alleviated domestic electricity supply constraints. But as the country moves with the global trends of increasing cleaner energy, going green seems to be the future for energy generation.

5. Summary and recommendations

REIPPP, as a policy, benefits fixed infrastructure investment, as well as economic growth within a fairly short space of time. The small unit sizes and short lead time mean that several projects can go on simultaneously, and be managed by different companies, resulting in a greater deal of success to complete the projects. The benefits are generally realised quickly and demonstrates how a successful program like this could attract significant private sector investment into a previously closed sector. Enhanced capital expenditure on green energy could have positive knock-on effects on GDP growth.

¹² Bloomberg’s New Energy Outlook 2016 (<http://www.bloomberg.com/company/new-energy-outlook>)

¹³ See www.gov.za/speeches/minister-tina-joemat-pettersson-media-briefing-integrated-energy-plan-and-integrated for details.

Initiatives to attract private business entrepreneurs to the renewable energy sector encourages competition amongst bidding companies. The 2008-type electricity crisis and the ensuing load shedding episodes that sporadically took place until 2015, necessitated a structured plan that could help to alleviate future constraints in the electricity sector and act as a catalyst for gross fixed capital spending in other sectors of the economy.

The right combination of technology should be chosen to address the short-term as well as the long-term needs. Although it is still at a very small scale, the REIPPP policy could play a significant role in terms of diversifying the sources of electricity generating capacity. Continuing with the REIPPP policy would help to raise capacity, and to further deepen the technological skills in the sector.

The study shows that renewable energy projects have the potential to directly contribute 4% to total fixed investment in the near term. However, the impact of the increase in energy related capital expenditure annually does not fully contribute to GDP growth as it raises imports without immediately increasing exports. Nevertheless, over the long term the increased infrastructure capacity could benefit exports, thereby improving SA's net-export position. Moreover, there are other developments in new energy technologies and possibly some employment gains associated with the REIPPP initiatives that could benefit GDP growth and employment.