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Ninety One

Investing for a world of change

Securing South Africa's energy future: Strategies and investments up to 2050

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A tale of coal, crisis, and clean potential.

South Africa's electricity story is a fascinating mix of history, challenges, and exciting potential.

It is undeniable that Eskom has played a vital role in powering South Africa's past and present. But its ability to continue powering economic growth hinges on a sustainable future.

Sticking with coal is unsustainable, especially as carbon border adjustment mechanisms become common and will disadvantage South Africa's export. But the shift away from fossil fuels to a more sustainable energy mix and ultimately net-zero by 2050, presents a golden opportunity and implications for institutional investment.

The challenge is twofold:

1. addressing an immediate shortfall in power capacity by 2030 and
2. preparing for future demands from 2031 to 2050.

The integration of private sector players is crucial here and necessitates substantial funding and strategic planning.

Navigating challenges and pathways to 2030

Addressing the current energy deficit

Guiding plans and programmes

NDP: The National Development Plan (NDP) is the blueprint for infrastructure development to 2030.

DMRE: SA's energy policies are primarily driven by the Department of Mineral Resources and Energy (DMRE) and the Integrated Resource Plan (IRP).

IRP: The IRP is DMRE's estimate of electricity demand growth and what energy generation types should be procured to meet that demand, along with the generation capacity, timing, and cost.

REIPPPP: The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) encourages private investment in renewable energy projects, aiming to increase the country's use of clean energy sources.

BESIPPPP: Battery Energy Storage Independent Power Producers Procurement Programme (BESIPPPP) is a DMRE initiative aimed at procuring battery storage capacity from IPPs.

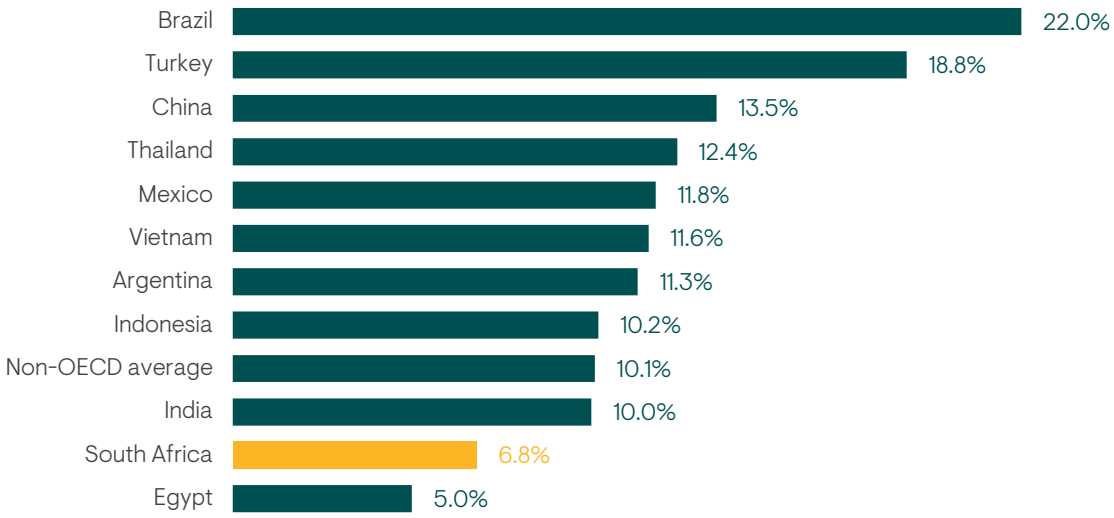
IRP targets a 29,500 MW increase in electricity capacity by 2030, predominantly through renewables, (14,400 MW wind, 6,000 MW solar PV). Fitch Connect predicts that renewables' share of total power generation will grow from 9.3% in 2023 to 17% by 2032, driven by REIPPPP and deregulation that increases private sector engagement.

To date, REIPPPP has procured 6.4 GW from 112 independent power producers (IPPs) over seven bid windows, achieving cost reductions of about 55% for wind and 76% for solar PV, making these options economically competitive with new coal projects.

Boosting renewable capacity

IRP targets an increase in renewable energy's contribution to the energy mix, aiming for 24.7% by 2030. [Relative to the peers, as shown in Figure 1, South Africa is lagging behind].

Figure 1: SA renewables penetration relative to EM peers



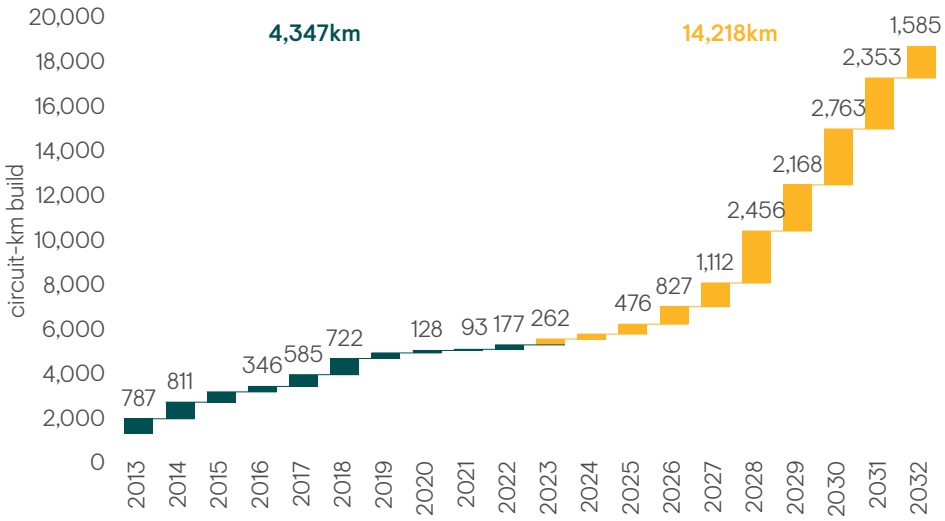
Source: Bloomberg and BP.

Enhancing grid capacity and stability

Transmission and capital expenditure requirements for the grid

To achieve the growth targets, Eskom requires a c.325% increase in transmission infrastructure over the next 10 years - relative to the last 10 years. 53 GW of generation capacity is needed for energy security until the early 2030s. To connect this generation capacity, new transmission infrastructure must be built 8x faster. More new generation is further needed from 2031 to 2050 to meet increasing demand.

Figure 2: Eskom transmission circuit-km build per year



~325% increase in transmission infrastructure in the next 10 years, compared to last 10-year actuals.

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14,218 circuit km is 43% of current 33,000 circuit km total.

Source: Eskom.

Despite progress in expanding renewables, grid constraints remain. Innovative strategies like the proposed Curtailment Framework can help integrate more renewable energy into the grid.

How curtailment works?

This involves connecting more solar PV renewable energy projects than the grid can evacuate at peak production time (midday).

Let's consider a scenario where a power grid has a maximum capacity of 100 MW, and a 100 MW solar photovoltaic (PV) system is connected to it. In the early morning, when solar energy is less intense, the system generates only 30 MW, leaving 70 MW of the grid's capacity unused. As midday approaches and solar intensity reaches its peak, the system fully utilises the grid's 100 MW capacity. After this peak period, as solar energy wanes, the grid capacity is once again underutilised.

To optimise this setup, one could implement a curtailment model. For instance, imagine installing a 333 MW solar PV plant. In the morning, the plant could still supply 100 MW. At peak solar times, the output exceeding the grid's capacity — 233 MW in this case — would be curtailed. After the peak, as solar output declines, curtailment would decrease, allowing the system to maintain a steady output of 100 MW throughout the day.

This example merely simplifies the concept, as real-world system efficiencies are never 100%. However, a significant challenge with this curtailment strategy is the financial model: it must address compensation for the electricity that could have been generated during peak times but was not, due to the need to curtail output to match the grid's capacity.

Battery energy storage

Another innovation in the offing is the battery energy storage system. DMRE's BESIPPPP aims to procure significant storage capacity through a series of bid windows, integrating battery energy storage systems to support the national grid and further enhance energy security.

Financial mechanisms and support

The need for substantial capital investment — c.R235 million for new transmission infrastructure over the next decade — highlights the role of innovative financing models. Independent Transmission Projects (ITPs) offer a promising approach, allowing off-balance sheet financing and attracting international investment, crucial for accelerating infrastructure development.

Summary of outcomes of IPTs internationally

IPTs have led to successful results in various countries:

- **Brazil** organised 38 tenders of multiple lots from 1999 to 2015. These resulted in the award of 211 concessions and 69,811 km of transmission lines designed, built, and operated under BOOT contracts.
- **Peru** has organised 18 transmission tenders since 1998. These have resulted in more than 6,000 km of transmission lines (and associated substations) designed, built, and operated by the private sector under BOOT contracts.
- **Chile** has organised 7 tenders since 2006. Ten projects were awarded for a total of almost 1,200 km This includes a recently awarded 140 km, 500 kV line to interconnect their two main systems.
- The Federal Energy Regulatory Commission (FERC) of the **United States** removed automatic rights of incumbent transmission companies in 2011. Since then, over sixty IPTs have been awarded, and more are expected in the coming years.
- **Canada** has awarded 400 km of 230 kV transmission lines, for a total of US$452 million. In 2014, the Alberta Electric System Operator also awarded a 500 km 500 kV transmission line for US$1.4 billion.
- **Australia** recently tendered a contract to upgrade the Heywood Interconnector (a transmission line between South Australia and Victoria) for an estimated cost of close to US$80 million.
- In **India**, the private sector has developed over 21,000 km of lines between 2006 and 2016. This is equivalent to 10.4% of new lines built since the start of the planning period.

Source: Financial Times.

Ninety One, through the Emerging Africa Infrastructure Fund (EAIF), continues to explore project finance structures such as IPTs in other markets such as Uganda and Zambia.

Long-term strategies (2031-2050)

Transitioning to a low-carbon economy

Post-2030 strategies must espouse scaling up renewable energy installations and exploring new technologies such as green hydrogen and bioenergy, which can provide both base-load power and peak-time support.

Bridging the gap with gas?

Natural gas will play a significant role as a transition fuel, balancing the grid as renewable sources are scaled up. DMRE aims to procure 3,126 MW of gas power by 2025.

Figure 3: Emerging plan from Horizon One Analysis

	Coal	Gas – IPP Programme	Gas – Eskom	Dispatchable capacity	Nuclear	Hydro	Pumped storage	CSP	Solar PV	Wind	Hybrid IPP Programme	Distributed Generation	BESS - IPP Programme	BESS - Eskom	Unserved Energy (TWh)
Current base (MW)	38,800	1,005	2,825	-	1,860	1,600	2,732	500	2,287	3,443	-	5,000	-	20	
2024	720							100			150	900		199	13.06
2025	720	1,220							2,115	644	476	900	513	141	7.63
2026										140		900			7.66
2027		1,000								684		900	2,000	615	4.55
2028		1,000	3,000						500			900	615		0.22
2029									500	1,500		900			0.25
2030		1,000		1,376					500	1,500		900			0.27
Additional new capacity (MW)	1,440	4,220	3,000	1,376				100	3,615	4,468	626	6,300	3,743	360	

Installed capacity ■ Capacity under construction ■ Capacity procured ■ New capacity
■ Distributed generation capacity for own use ■ Unserved energy, preferred as low as possible

Source: DMRE.

The IRP envisages adding 3,000 MW of gas power via the IPP programme and 3,000 MW of gas power from Eskom.

Through EAIF, Ninety One has played a significant role in financing gas-fired power stations on the continent. Examples include:

Côte D'Ivoire

Expansion of the Azito Energie gas-fired power station with an additional 253 MW capacity, representing 30% of Cote D'Ivoire's installed generating capacity.

Mozambique

In Mozambique, US$38.25 million of debt was used to finance the development, construction and operation of a 450 MW gas-fired power plant.

Strengthening regulatory and policy frameworks

The recent passing of the Electricity Regulation Amendment Bill by the National Assembly heralds an important step forward in transforming South Africa's energy infrastructure and paves the way for SA's transition to a multi-market model for electricity trading. The amendments detailed in the bill aim to establish a legal structure for the National Transmission Company of South Africa (NTCSA) and the Transmission System Operator (TSO). This new framework is designed to liberalise the electricity market by creating a competitive environment and reducing Eskom's monopoly over electricity transmission.

Opportunities for institutional investors loom

Based on research by BMI, non-hydropower renewables will be the fastest growing source of electricity generation in South Africa between 2019 and 2028.

Institutional investors can play a crucial role in financing South Africa's energy transition. Through vehicles like Ninety One, substantial capital is directed towards renewable energy projects. These entities not only provide the necessary financial backing but also bring expertise in navigating the complexities of large-scale infrastructure projects in emerging markets.

For institutional clients, South Africa's energy sector presents both opportunities and challenges. Investing in this sector requires a deep understanding of the historical, political, and economic contexts that shape its landscape.

Allocations to alternative investment in South Africa, including infrastructure, are up 21% in 25 years, and asset owners are starting to recognise the benefits that investment in infrastructure offers, such as predictable steady cash flow with low volatility.

While banks will remain an important source of finance, institutional funding is also required given the sheer size of the demand in funding.

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