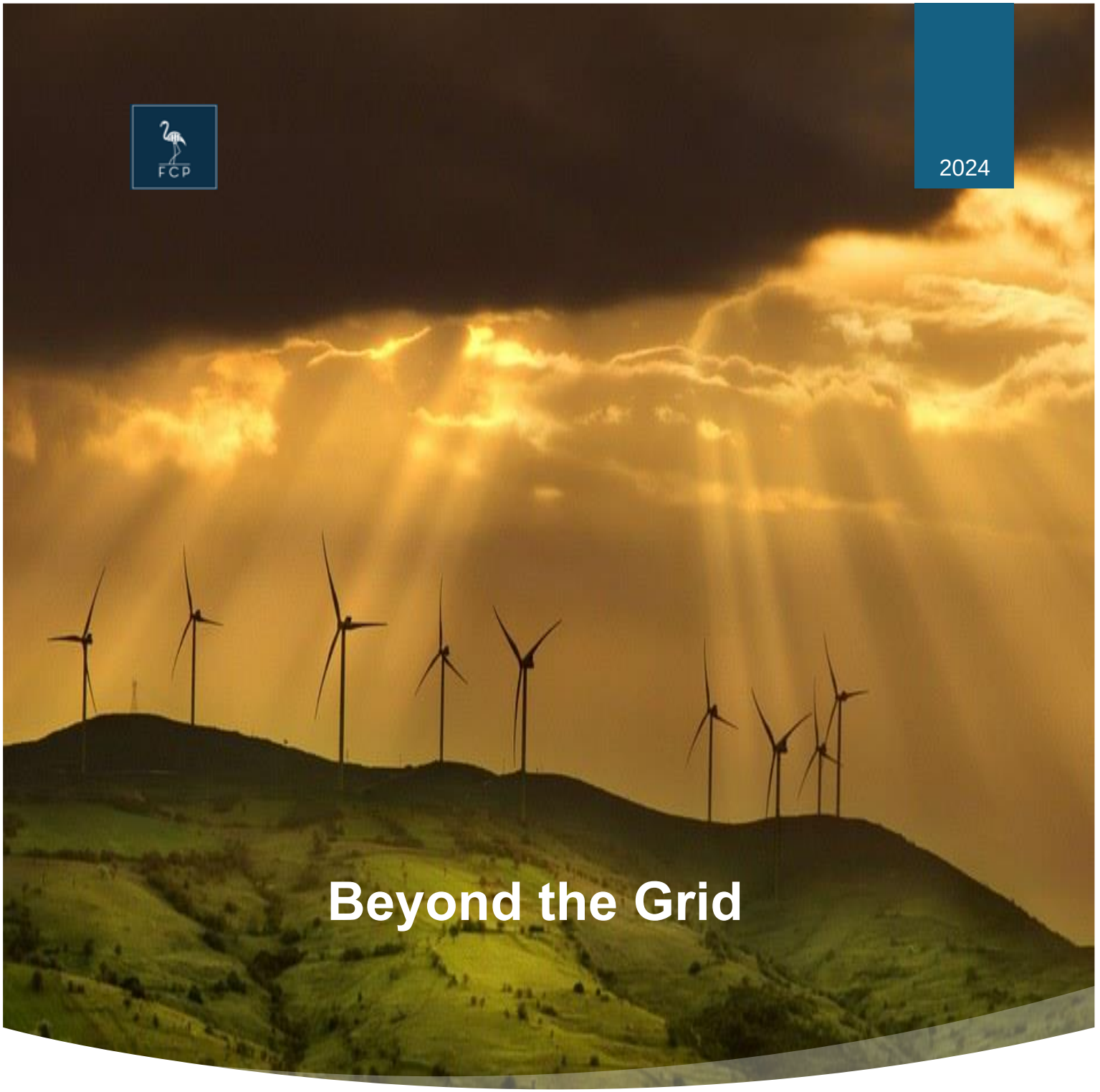


The Opportunities and Future of Energy in South Africa

Summary

The renewable energy market in South Africa is experiencing rapid growth, driven by a critical need to address the country's ongoing energy crisis. South Africa's energy sector, traditionally dominated by coal-fired power, is shifting towards renewable sources, particularly solar and wind energy. Legislative changes in 2023, such as the deregulation of energy projects up to 100 MW, have opened the door for private sector investments. These developments are part of the government's broader strategy to reduce load-shedding and enhance energy security, as well as mitigate South Africa's status as Africa's largest emitter of greenhouse gasses.

South Africa's installed renewable energy capacity is projected to reach between 35 GW and 45GW[i,ii,iii] by 2030, with continued investment opportunities across various sectors. Private procurement, especially through power purchase agreements (PPAs) with private offtakers, represents a significant area of growth. The mining sector is a notable contributor, investing heavily in renewable energy projects. Furthermore, wheeling agreements, particularly virtual wheeling, will enhance the ability of renewable energy producers to sell power to multiple smaller offtakers, diversifying their revenue streams.

The renewable energy market's growth is not without challenges. Transmission infrastructure is a major bottleneck, with the existing grid designed primarily for coal-based generation. To accommodate the new generation capacity, particularly from intermittent renewable sources, South Africa needs to rapidly expand its transmission network. The government, in collaboration with the International Finance Corporation, is exploring financing options to accelerate private-sector investment in transmission infrastructure.

Public procurement also plays a vital role, with the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) driving growth. The latest bid windows are expected to add substantial new capacity, and the government's focus on battery energy storage systems (BESS) is also gaining traction, supporting the integration of renewables into the grid.

Local manufacturing presents additional opportunities, with South Africa's renewable energy sector benefitting from local content requirements aimed at strengthening the domestic manufacturing industry. Solar rooftop generation, in particular, has seen significant growth and is expected to continue rising as businesses and households seek to mitigate the effects of load-shedding.

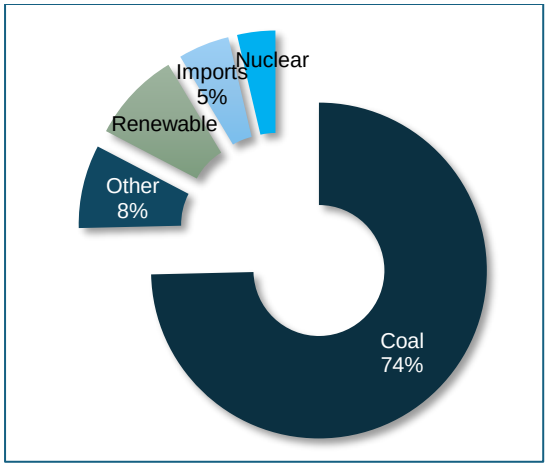
In summary, South Africa's renewable energy market is positioned for significant growth despite the challenges of grid capacity and transmission infrastructure. Investors have opportunities across private procurement, public procurement, and local manufacturing, driven by the country's urgent need for energy security and its commitment to transitioning to a low-carbon economy.

Renewable Energy in South Africa

1.1 Background

South Africa's energy sector is undergoing rapid transformation, driven by legislative changes that have made private procurement the primary source of new renewable energy projects in 2023, especially solar PV. However, transmission constraints are becoming a major challenge, emphasizing the need for transmission development to support renewable energy expansion. The demand for renewables is rising quickly, with total installed capacity projected to reach between 35GW and 45GWby 2030. Additionally, wheeling agreements and the success of the virtual wheeling pilot will enable offsite power purchase agreements, stabilizing the market for large-scale renewables and reducing reliance on volatile public procurement cycles.

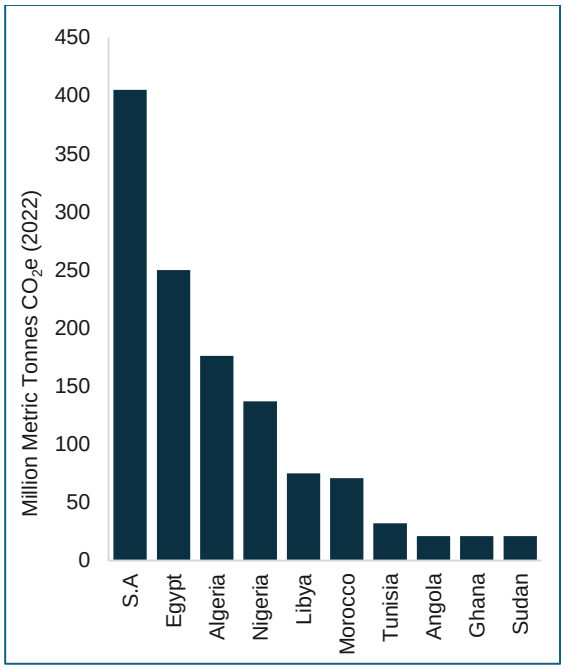
Figure 1: Energy mix in South Africa dominated by coal[1]



Source: The Centre for Renewable and Sustainable Energy Studies (CRSES)

With an energy mix that is still dominated by coal-fired power production at 74%, (figure 1) South Africa remains the greatest greenhouse emitter in Africa (figure 2), yet it is still facing a critical electricity shortfall of approximately 6,000MW, which is anticipated to worsen as demand increases and older power stations are decommissioned.

Figure 2: South Africa is the largest greenhouse emitting country in Africa



Source: Global Carbon Budget (2022)

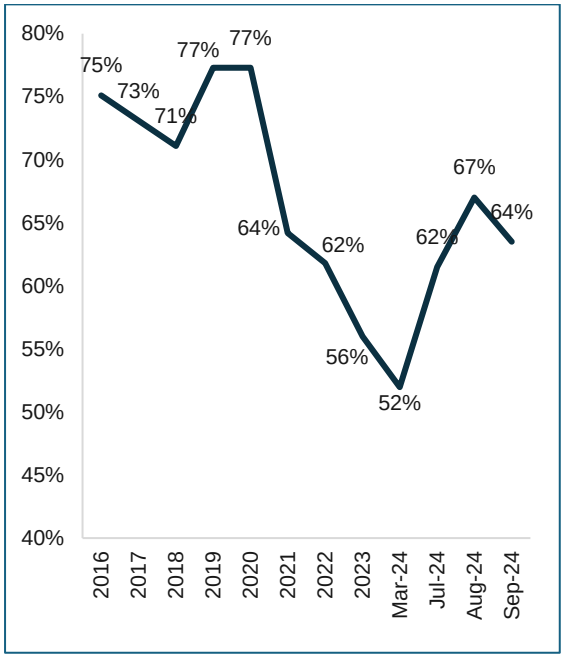
This energy crisis has become a significant barrier to both foreign and domestic investment, with ongoing power outages disrupting operations (figure 4). A CSIR[2] report revealed that load-shedding in South Africa has caused significant economic losses, with 2019 alone costing up to $9 billion and the total impact from 2009 to 2019 reaching $23 billion, while Stage 6 load-shedding in 2022 was estimated to cost up to R4 billion per day.

Rapid and large-scale development of new generation capacity is essential to address this shortfall. Over the past year, South Africa has made notable progress in policy reforms for network industries by amending regulations to allow companies to invest in new generation capacity of up to 100 megawatts without requiring a license from the National Energy Regulator (NERSA).

[1] Renewable energy includes Solar PV, wind, hydro and CSP

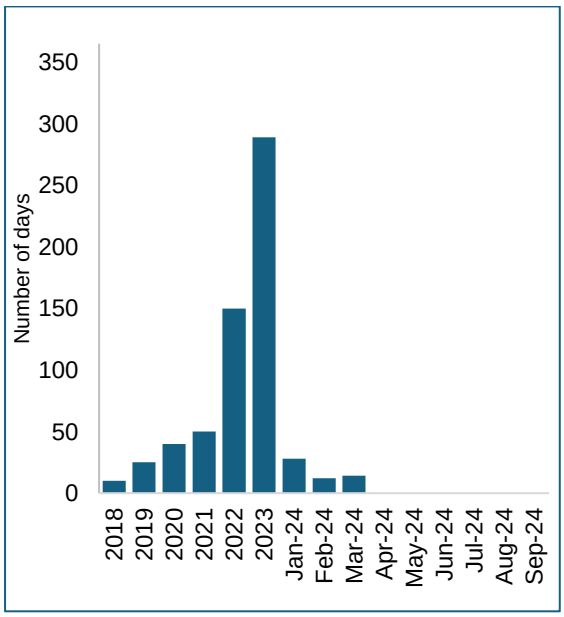
[2] Council for Scientific and Industrial Research

Figure 3: Energy Availability Factors (EAFs)



Source: Eskom

Figure 4: Days of load shedding from 2018 – May 2024



Source: Eskom

Figures 3 and 4 illustrate that Eskom has been making significant progress in alleviating loadshedding, reaching a milestone of more than 100 days without loadshedding from April 2024 onwards (4 years since a streak this long had been experienced), whilst showing a decided up-tick in EAFs. This progress can be ascribed to the multi-dimensional Generation Operational Recovery Plan, initiated in March 2023, and aggressive planned maintenance, both of which were made possible by financial support from the National Treasury Eskom debt relief scheme.

However, with coal-fired generation infrastructure aging at a rapid pace, and all but two plants being older than 10 years (the oldest plant being 55 years in age), the declaration that South Africa is planning to decommission 11GW worth of coal-fired power stations by 2030, coupled with many global investors announcing plans to divest from coal, leaves a demand gap that can readily be filled by renewable energy sources.

On July 25, 2022, President Cyril Ramaphosa announced an unprecedented set of interventions aimed at ending load-shedding and achieving energy security. The short-term goal is to reduce the severity and frequency of load-shedding through immediate measures to stabilize the energy system, while the long-term goal is to eliminate load-shedding altogether.

In his July 2024 Opening of Parliament Address, President Cyril Ramaphosa outlined the Government of National Unity's (GNU) energy priorities for the next five years. He emphasized the successes of the Energy Action Plan launched in 2022, which focuses on five key areas: fixing Eskom, boosting private energy investments, speeding up new generation capacity procurement, promoting rooftop solar adoption, and transforming the electricity sector.

Central to this plan is the Electricity Regulation Amendment (ERA) Bill [B23-2023], which has passed Parliament and was signed into law in August 2024. The ERA Bill will provide a legal framework to implement these initiatives, including the unbundling of Eskom into separate entities for generation, transmission, and distribution, as well as encouraging private sector participation in energy generation.

President Ramaphosa highlighted the country's renewable energy revolution, which is poised to drive growth and job creation over the next decade. To this end, the government will primarily focus on:

1. **Improving the performance of Eskom's existing power stations.**
2. **Enabling private sector transmission.**
3. **Enabling new generation capacity in the shortest available timeframe through private sector investment.**

It is this third point that is the most intriguing for potential investors in the South African economy. If South Africa is to indeed put an end to loadshedding, there can be an expected influx of investments in addition to the large-scale renewable energy projects.

1.2 Market Size and Market Growth

The South African renewable energy market demonstrated resilience and steady growth throughout 2023, despite an economy fraught with policy uncertainty, some unfavorable policy conditions, and a business environment that has long been earmarked as less investor friendly.

Several factors are driving expectations that South Africa's renewable energy market, still in its infancy, will steadily grow and erode coal's long-standing dominance. These include the country's reliance on coal-based public infrastructure, its commitment to the Paris Accord, and the launch of the Just Energy Transition Partnership (JETP) to support decarbonization and a low-carbon economy.

All these factors, coupled with the policy and regulatory changes outlined in the background section of this document, creates an environment that is appealing for investors looking to make a return on renewable energy in South Africa. This is particularly true for investors looking to the private sector where higher returns can be achieved through power purchase agreements (PPAs) with private offtakers, either through on-site installations or using wheeling. The private sector's procurement of new generation capacity is driven by several factors, including the removal of capacity limitations on generation licensing exemptions in February 2023, increasing demand for energy security, and the environmental considerations of large energy users.

South Africa already has an abundance of renewable energy projects in various stages of operation. 167 declared projects currently exist, with 99 projects in the solar market, 61 in wind, and 7 in hydro. This amounts to a 20,877MW capacity[iv,v,vi] .

Despite being a nascent industry with regard to technological advances, the renewable energy sector in South Africa is already exhibiting leading players looking to continue their expansion.

Figure 5 illustrates the market share that is enjoyed by the top energy platforms in South Africa. With continued aggressive expansion plans, it is anticipated that these firms will maintain or strengthen their market shares going forward.

Figure 5: Renewable energy platforms market share by operating, preferred bidder and in construction capacity (only platforms with more than 10% share are shown individually)

Company	Market Share
Enel	10-15%
IDEAS	10-15%
Red Rocket	10-15%
Scatec	c. 10%
Infinity	c. 10%
Others	c. 40%

Source: FCP Research

Utilising data compiled from the Global Energy Monitor, amongst projects that have been announced in the public domain, some clear front-runners exist when it comes to the number of renewable energy projects held by each firm[3].

Mainstream lead the pack with involvement in 12 different renewable energy projects, with IDEAS, Enel Green Power, and Scatec in second place with 9 projects each. It is evident from analysis that renewable energy companies are employing one of two approaches; either a firm is trying to entrench themselves fully in one avenue of renewable energy e.g. Scatec has all 9 of its projects committed to solar PV generation; or a firm is trying to establish leadership through accessing various streams of energy, e.g. Mainstream has 50% of its projects committed to solar PV, with the other 50% being committed to wind.

3 Analysis is done by number of projects and not MW as some projects are held jointly, and the share of each project among partners is not necessarily in the public domain.

It is equally apparent that the hydro renewable industry is not highly contested with the main project holders being public entities.

The growth of the renewable energy market in South Africa represents a significant shift towards a more sustainable and diversified energy system. While challenges remain, the country's abundant renewable resources, supportive policies, and increasing investment are driving the transition to a greener future. The continued expansion of solar, wind, hydropower, and biomass energy will not only contribute to reducing carbon emissions but also create jobs, attract investment, and improve the overall resilience and sustainability of South Africa's energy sector. As the global focus on renewable energy intensifies, South Africa is well-positioned to play a leading role in the transition to a low-carbon economy.

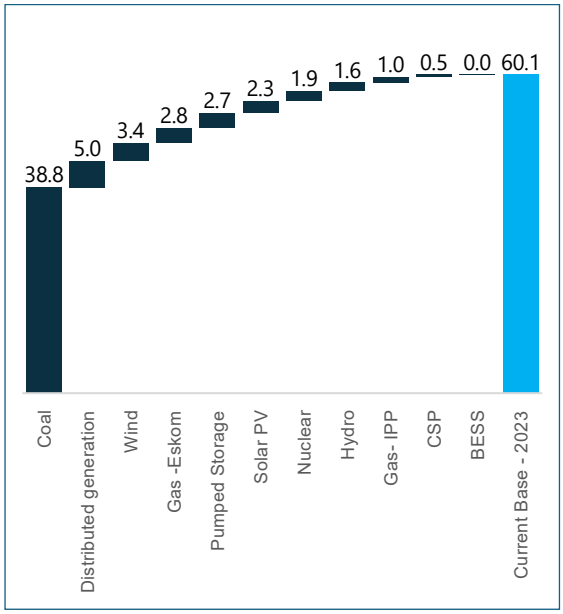
1.3 Key Industry Dynamics

Private Procurement of renewable energy

Large energy users seeking to meet their environmental, social, and governance (ESG) targets, reduce energy costs, or enhance energy security currently represent the primary opportunity for private procurement in the short term. Direct electricity sales are facilitated through wheeling agreements under Eskom's existing regime and will be further expanded with the implementation of a virtual wheeling platform. The mining sector, in particular, is actively contributing to the growth of the renewable energy market, with many companies investing in project development and ownership.

Recent regulatory changes have seen the emergence of traders. Notable examples of this would include the NOA Group benefitting from Netcare's R3.2bn energy deal; whilst the Discovery Group has committed to linking renewable generation for business demands – this will stimulate approximately R25bn of investment in the energy infrastructure of South Africa. Electricity traders and virtual wheeling will allow large-scale projects to access multiple smaller private off-takers or low-energy users, diversifying away from single off-taker agreements with large energy users. Eskom has adopted a virtual wheeling policy to facilitate the virtual wheeling pilot, which, once proven, is expected to be available to the market by the end of 2024. Standard Eskom wheeling agreements continue to be used between large off-takers and projects.

Figure 6: IRP 2023 Installed Capacity Current Base in GW



Source: Draft IRP Gazetted 2023 for comments

Determining the market size for private procurement in South Africa's renewable energy sector is challenging and depends on the finalization of the Integrated Resource Plan (IRP) 2023 and clarification regarding future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows. These bid windows are crucial as they define the capacity of power plants allocated to public programs within technical constraints, potentially reserving IRP-designated capacity for REIPPPP and limiting grid connections available for private development.

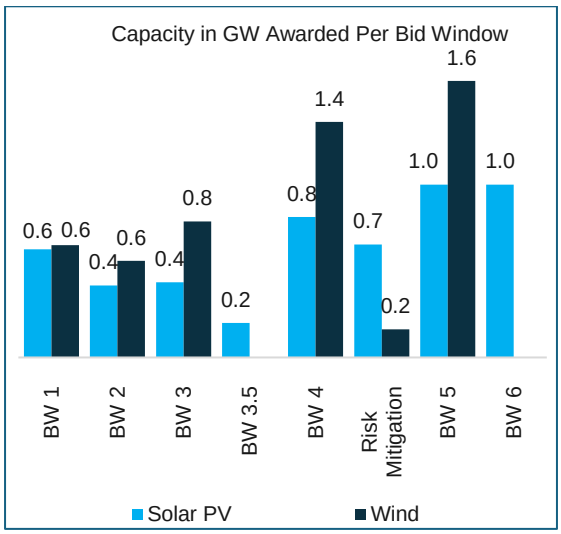
Projected market sizes for private procurement vary by source, with GreenCape indicating a growth of 6 GW for solar PV and 4 GW for wind power by 2030, with corresponding investment values of R116 billion and R98 billion, respectively.

Whilst these estimates vary, they do serve to highlight the significant potential within South Africa's private renewable energy market, though this potential is subject to regulatory and infrastructural developments.

Public Procurement of renewable energy

In December 2023, the Department of Mineral Resources and Energy (DMRE) launched the 7th bid window of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP BW7), which includes allocations of 1,800 MW for solar PV and 3,200 MW for wind power – this is larger than all previous bid windows as shown in figure 7. These allocations also surpass the targets in the draft Integrated Resource Plan 2023 (IRP2023) (figure 8).

Figure 7: REIPPP driving the growth in renewables



Source: Department of Mineral Resources and Energy (DMRE)

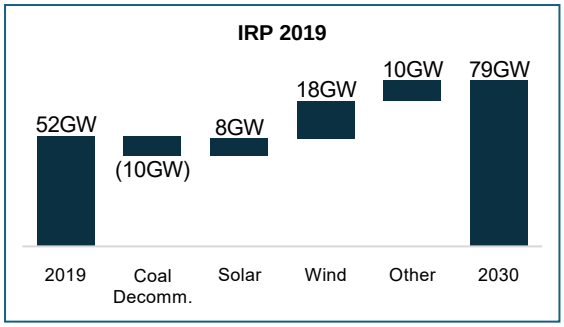
The Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), initiated in 2020 as an emergency measure to address energy shortages and reduce reliance on diesel-powered peaking open-cycle gas turbines, did not specify a particular technology. The low cost and rapid deployment of renewable energy with battery storage demonstrated the technology's ability to compete on both cost and time bases.

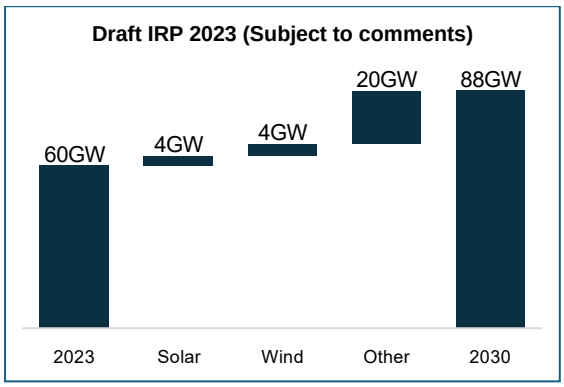
In December 2023, the second bid window for the Battery Energy Storage Independent Power Producer Procurement Programme (BESIPPPP) was announced, aiming to secure 615 MW or 2,460 MWh of new battery capacity and ancillary services. This new bid window calls for battery energy storage systems (BESS) to be developed at eight Eskom substations, with the first bidder's conference held in January 2024.

Currently, grid constraints limit government or private project developments, necessitating the location of these projects at substations with sufficient capacity to accommodate additional large-scale projects. The provinces of Mpumalanga, Limpopo, Gauteng, and KwaZulu-Natal have the highest capacity availability. To address grid constraints, the IPPO launched BESIPPPP, independent of Eskom's BESS program, to provide capacity, energy, and ancillary services to Eskom.

Municipalities in good financial standing with feasible project proposals can procure electricity from private companies if they comply with relevant regulations, such as the Municipal Financial Management Act (MFMA). Many municipal requests for proposals include gas-to-power projects, but an estimated 0.6 GW to 2.2 GW of renewable energy projects, mostly solar PV, could materialize. The Department of Public Works & Infrastructure, the largest landlord and facilities manager in the country, released a request for information for the Integrated Renewable Energy and Resource Efficiency Programme. Announcements are expected soon for a request for proposals focusing on embedded generation rather than large-scale renewable energy (DPWI 2021).

Figure 8: IRP 2019 vs IRP 2023 View (GW)





Source: Department of mineral resources and energy

The uncertainty surrounding revisions to the IRP poses a challenge for estimating the market size. However, the launch of REIPPPP BW7 and a comparison with the draft IRP2023 capacity plans suggest that only BW7 will be implemented by 2030 as part of the REIPPPP. The increasing focus on solar PV projects by municipalities and the announcement of battery energy storage programs by both the IPPO and Eskom indicate a growing trend toward solar PV and battery energy storage for public programs.

Current public procurement market is expected to be limited to BW7, energy storage, and municipal solar PV projects. By 2030, the public procurement market is projected to include 2.6 GW of solar PV, 3.2 GW of wind power, and 3.7 GW of battery energy storage systems .The investment value is estimated at R50 billion for solar PV, R79 billion for wind power, and R83 billion for battery energy storage systems, totaling R212 billion by 2030, or approximately R35 billion per year[ii].

Local manufacturing

The expanding renewable energy market and local content targets in South Africa offer significant opportunities for local manufacturing of renewable energy components. These local content requirements, which are designed to strengthen the South African manufacturing sector, vary for large-scale projects depending on the offtaker's obligations under regulations such as the Preferential Procurement Regulations (2022), the upcoming Public Procurement Bill, and the Mining Charter. There is potential for local manufacturing across both utility-scale and small-scale renewable energy projects, including components like balance of plant or system parts. Smaller-scale projects help create consistent demand, reducing manufacturers' exposure to fluctuations in large-scale projects and achieving cost savings through economies of scale. In 2023, the import market for key solar PV components reached R36 billion, and international agreements present opportunities for South African-manufactured components to be exported to other African countries, the EU, and the USA.

IPPs have demonstrated that high local content levels are achievable in private projects as well, offering advantages like cost savings and reduced uncertainties related to international shipping. Assuming services are sourced locally, the potential for local equipment expenditure in wind and solar PV projects is significant. While key components for battery energy storage systems, like inverters and battery cabinets, will likely still need to be imported, the total domestic market size for renewable energy component manufacturing is estimated to reach R42 billion by 2030.

Rooftop Solar

This production is not limited to sale to large-scale operators, or the export market, but also to small-scale generators i.e. households and businesses which have embedded solar rooftop generation to combat the effects of loadshedding.

2023 already showed an all time high in terms of solar rooftop capacity, and Eskom predicts that this growth will continue to steadily climb in the coming years – growing from 3000MW in 2023 to an estimated 7500MW in 2028.

Transmission

Despite the evident growth potential, one of the key bottlenecks that remains for South Africa's energy landscape is the lack of transmission capability on the grid. South Africa's transmission infrastructure is primarily designed for base-load coal-fired power generation. To accommodate new generation capacity, which will predominantly come from renewables, the country must rapidly expand its transmission infrastructure (including transmission lines, transformer capacity, and energy storage) to handle variable loads and ensure grid stability.

> "*One of the main constraining factors to growth of the sector is grid availability*." James Cumming, ACED.

The managing director of Eskom's new Transmission Company, Mr. Segomoco Scheppers, stated that the country needs to add over 1,500 km of new transmission lines annually over the next decade. This expansion is necessary to provide transmission capacity for over 50 GW of new generation power, mainly from intermittent renewable energy sources such as wind and solar projects.

Currently, Eskom's transmission division is adding 300 km of new power lines annually.

Scheppers confirmed that in the past ten years, only 4,347 km of new power lines have been added.

In February 2024, The National Treasury confirmed that the government is collaborating with the International Finance Corporation to explore short-term off-balance-sheet financing options to accelerate private-sector investment in transmission without negatively impacting Eskom's balance sheet and the national budget.

According to the Budget Review, "A pilot project will be implemented to test the market appetite for the proposed option.

Electricity Minister Kgosientsho Ramokgopa previously announced that the government plans to establish an independent transmission project office, potentially located at the Development Bank of Southern Africa or the Industrial Development Corporation. This office will procure new transmission capacity using a build, operate, and transfer model.

Figure 9: Electricity Transmission Infrastructure largely available in the top of the country

Source: Eskom Generation Connection Capacity Assessment 2025

Ramokgopa has emphasized that Eskom requires support to expedite its Transmission Development Plan, which includes building 14,000 km of new powerlines by 2032, installing 170 transformers with a capacity of 105,865 MVA, and adding 40 capacitors and 52 reactors.

> *"In common with many countries, grid availability is a huge challenge to address. Certainty going forward in terms of the regulatory environment and the rate and extent of liberalisation of the South African energy market will also be key."* Tim Hill, Energy Partners

However, much of this investment is scheduled for after 2027, with only 3,400 km of powerlines expected to be installed between the current financial year and 2028. This delayed investment has been heavily criticized by powerline and substation suppliers, who warn they may not survive the current downturn to participate in the future investment surge. Some key suppliers and construction companies have already entered business rescue.

With this pilot project having been announced to include private participation in the transmission space, this presents a new opportunity for investors and developers to further entrench their positions within South Africa's renewable energy market.

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