BUSINESS DECISION-MAKERS GUIDE:

RENEWABLE ENERGY IN SOUTH AFRICA

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Executive summary

In the evolving landscape of South Africa's energy sector, businesses are increasingly turning to renewable energy solutions to address their power needs. This comprehensive guide offers insights into the compelling business case for renewable energy adoption, the various implementation options available, and the critical factors to consider along the way.

The rationale for embracing renewable energy in South Africa is multifaceted. Businesses stand to benefit from significant cost savings and greater price stability in their electricity spend. Moreover, implementing renewable energy solutions enhances supply security and infrastructure resilience, providing a buffer against the country's recent power challenges. The improved power quality that comes with renewable energy systems can also boost operational efficiency. As global and local carbon regulations tighten, renewable energy adoption positions businesses favourably for compliance and aligns them with the expectations of international supply chains.

This guide outlines two primary implementation paths: Embedded generation, where businesses generate renewable energy on-site, and wheeling, which allows for off-site generation with power transmitted over the grid. It also explores various procurement models, including outright purchase, power purchase agreements, leasing, and debt financing, each offering unique advantages depending on a business' financial strategy and operational needs.

To help businesses navigate this transition, this guide presents a structured five-step process for enhancing energy resilience. This approach begins with a thorough assessment of current energy use, progresses through the development of a tailored energy management plan and investment in energy efficiency and renewable energy, and culminates in the construction of robust energy infrastructure. The final step emphasises the importance of ongoing monitoring and adaptation to ensure long-term success.

This guide provides detailed information on price benchmarks for different system sizes and procurement options, explores various types of solar PV and wind systems, and discusses crucial considerations for backup power. It also outlines available incentives and tax benefits, as well as typical project timelines, to aid in decision-making and planning.

The path to renewable energy adoption is not without its challenges. This guide candidly addresses the hurdles companies may face, including grid capacity constraints, regulatory and policy uncertainties, limited availability of wheeling models, land acquisition difficulties, and information asymmetry in the market. By highlighting these potential obstacles, the guide aims to prepare businesses for a smoother transition.

Real-world case studies illustrate successful implementations throughout this guide, offering practical insights and inspiration. This comprehensive resource is designed to empower decision-makers with the knowledge and tools needed to successfully implement renewable energy solutions, ultimately enhancing their business's energy resilience and sustainability in South Africa's dynamic energy landscape.

In this guide

As South Africa faces energy security challenges and aligns with global sustainability efforts, understanding the renewable energy landscape is essential for informed decision-making.
This guide provides an overview of the business case for adopting renewable energy, the current South African electricity market, and the expanding renewable energy sector. It will assist decision-makers to align their businesses' energy needs with renewable supply, navigate relevant policies, and contribute to sustainable development goals (SDGs). It provides readers with a clear understanding of the opportunities, challenges, and considerations involved in transitioning to renewable energy in South Africa.

FACT

South Africa's energy crisis, marked by frequent loadshedding and ageing infrastructure, severely disrupts businesses, increasing operational costs and reducing productivity.This instability hampers economic growth and presents significant challenges for business operations.

ACT

To ensure an energy-secure future, collective action is required from all stakeholders, including government, citizens and businesses.

IMPACT

By adopting renewable energy projects, businesses can achieve cost savings, enhance energy security, and improve power quality. These benefits not only address immediate operational needs but also align with international carbon regulations and sustainability trends,ensuring continued competitiveness and market access.

This decision-maker guide has the following sections:

Section one: Becoming energy resilient.
Section two: The business case for renewable energy in SA.
Section three: Renewable energy implementation options for businesses in South Africa.
Section four: Hurdles to anticipate when implementing renewable energy in SA.
Section five: Implementing renewable energy in the context of South Africa's electricity landscape.
Section six: Key renewable energy role players in SA: Who's who and what do they do?
Section seven: Resources and contacts.
Section eight: A call to action.

01 Becoming energy resilient

Being energy resilient means having reliable power and avoiding disruptions that can halt operations, cost money, and harm brand reputation. The 5-step approach below will help businesses ensure a stable, reliable power supply. Additionally, businesses that are committed to energy resilience often attract investors who are interested in sustainability. Overall, being energy resilient helps businesses stay competitive, reduce risks, and support a sustainable future.

The 5-step process outlines what businesses can do to improve their energy resilience.

STEP 1 | ASSESS CURRENT ENERGY USE

EVALUATE	ANALYSE
Perform energy audits on current energy demand and supply profiles.	Assess energy audits to identify inefficiencies and vulnerabilities across the operations, highlighting areas where improvements can be made.

STEP 2 | DEVELOP AN ENERGY MANAGEMENT PLAN

SET GOALS	CREATE A STRATEGY
Establish clear objectives for reducing energy use and improving efficiency. This might include specific targets for energy savings or emissions reductions.	Outline the steps needed to achieve business goals, such as upgrading equipment, optimising processes, or adopting new technologies.

STEP 3 | INVEST IN ENERGY EFFICIENCY AND RENEWABLE ENERGY

UPGRADE	ADOPT RENEWABLES
Implement energy-efficient technologies and practices, like light emitting diode (LED) lighting or high-efficiency heating. ventilation and air conditioning (HVAC) systems, to lower energy consumption.	Consider procuring renewable energy sources, such as solar or wind energy, to diversify energy supply and reduce dependence on traditional sources.

STEP 4 | BUILD ROBUST ENERGY INFRASTURE

ENHANCE RESILIENCE	SECURE SUPPLY
Strengthen energy infrastructure by integrating backup power systems to ensure continuity during outages.	Explore energy procurement strategies and agreements that offer stability and protection against price fluctuations.

STEP 5 | MONITOR, REVIEW, AND ADAPT

TRACK PERFORMANCE	ADJUST PLANS
Continuously monitor energy use and the effectiveness of the energy management plan. Use real-time data to track progress and identify areas for improvement.	Regularly review and update the energy strategy to adapt to changes in technology, energy markets, or business needs.

By following these steps, businesses can enhance their energy resilience, reduce risks, and contribute to a more sustainable future. **This guide will focus on steps 3 and 4 of the resilience process to provide decision-makers with the information they need to invest in renewable energy and build robust energy infrastructure for their businesses.**

02

The business case for renewable energy in South Africa

Investing in the implementation of renewable energy projects in South Africa offers a strategic advantage to businesses by addressing both local energy security and international sustainability pressures. There are five main drivers for the uptake of renewable energy in South Africa. The relevance of each driver will depend on the individual business.

COST SAVINGS AND PRICE STABILITY
Lower and more predictable electricity cost compared to fossil fuels

IMPROVED POWER QUALITY
Better voltage and current quality at the end-user level

GLOBAL SUPPLY CHAIN EXPECTATIONS
Meeting international sustainability standards and carbon regulations

ENHANCED SUPPLY SECURITY
Improved infrastructure and independence from the national grid

SA CARBON REGULATIONS
Compliance with local carbon tax and emissions regulations

Cost savings and electricity price stability: Renewable energy sources, such as solar and wind, often have lower and more predictable operational cost compared to traditional fossil fuels. By generating their own renewable energy, companies can shield themselves from the volatility of electricity prices in the national grid. This cost stability can lead to significant cost savings over time and help businesses manage their budgets more effectively. Figure 1 on the next page provides a comparison of average renewable energy costs (inflation-linked PPA) and the Eskom electricity price between 2015 and 2023.

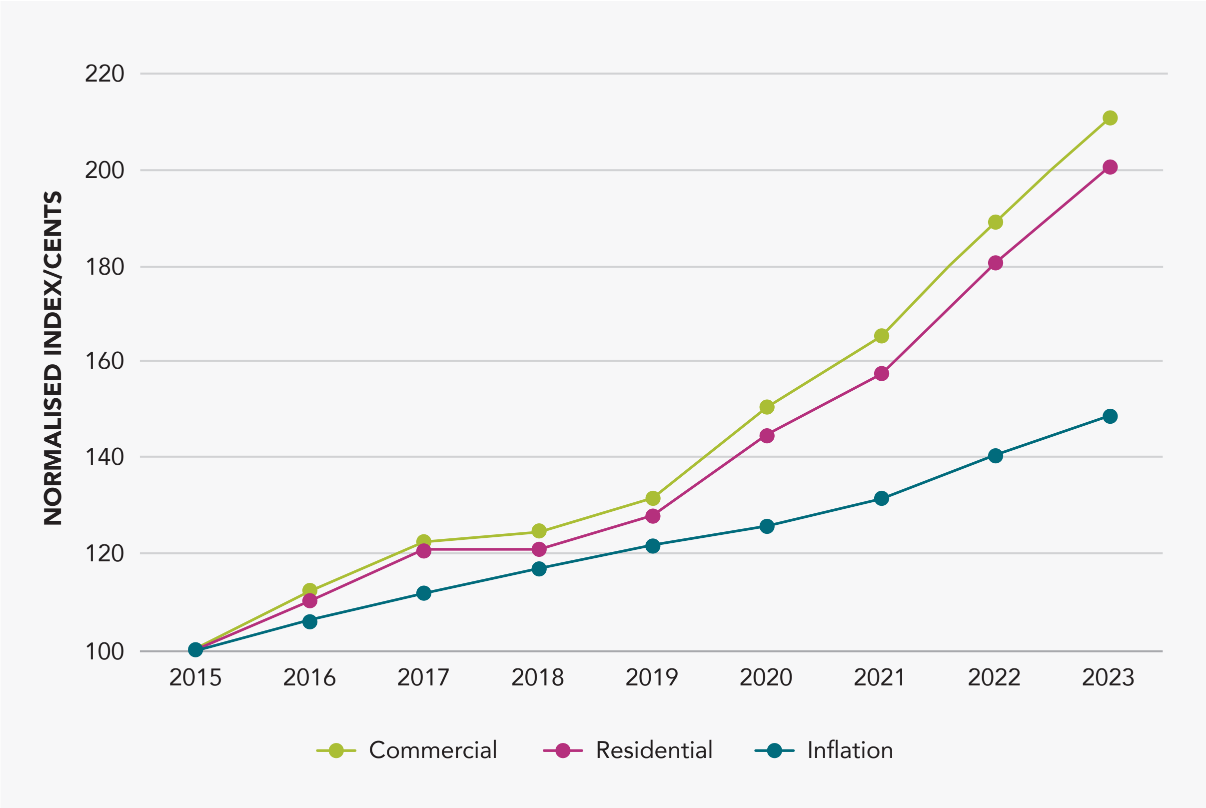


FIGURE 1 Average Eskom tariff vs an inflation-linked renewable energy tariff

The Evander Mines case study below provides a real world example of a large company in South Africa that was able to unlock a R123 000 000 annual saving through ambitious renewable energy targets (30% by 2030 and almost 50% by 2035) and enabled by the relaxing of NERSA licensing requirements.

CASE STUDY: EVANDER GOLD MINE SOLAR PV

Driven by ambitious renewable energy mix targets (30% by 2030 and almost 50% by 2035) and enabled by the relaxing of NERSA licensing requirements, Pan African Resources (PAR) built a 10MW solar PV system to power the Evander Gold Mine in Mpumalanga. The solar plant was built and operated by JUWI Renewable Energies, supplies around 15% of the site's total energy needs and has been designed to accommodate extra capacity and storage to be developed in future.
Having succeeded in reducing their emissions and adding significant value to the company, PAR are in the process of sourcing over 40MW of renewable electricity through PPAs and new developments.

BACKGROUND

- Company/Organisation: Pan African Resources, at Evander Gold Mine.
- Location: Mpumalanga
- Industry: Mining
- Project overview: 10 MW solar PV power project, developed and owned by Pan African Resources. Commissioned in 2022, the ground-mounted 20.1-hectare park utilises a single axis tracking system and comprises 26 640 individual modules; the system produced 24.6 GWh in the financial year ending September 2024.

TECHNOLOGY IMPLEMENTED

- Type of renewable energy: Solar PV
- System Size/Capacity: 10 MW (9.9MW)
- Key components: 26 640 Suntech 445 W PV modules, 50 Sungrow power supply inverters, STI Norland single axis trackers.

RESULTS

- Energy production: 24.6 GWh/year
- Cost savings: R41m/year (FY2024) and cumulative saving of R81m from May 2022
- Environmental impact: offset 26,000t CO_2 emissions

CONCLUSION

Following the success of the 10MW plant, PAR has announced that a feasibility study for its expansion is being conducted.
A second, 8.75MW, plant has been constructed at their Barberton site and the commissioning began in July 2024.
To further create beneficial impacts and improve their energy supply mix they have provisionally signed a PPA for 40MW of wheeled energy from Sturdee Energy's Bela Bela plant, expected to begin construction in 2025.

> **The solar plant, developed, built and operated by JUWI Renewable Energies, supplies around 15% of the site's total energy needs and has been designed to accommodate extra capacity and storage to be developed in future.**

Enhanced supply and infrastructure security: Dependence on the national grid, which has faced issues like power quality issues, loadshedding and capacity constraints, can disrupt operations. Renewable energy projects enable companies to produce their own power, reducing reliance on an unstable grid. This self-sufficiency improves supply security, ensuring that companies have a reliable and consistent energy source even during grid outages or fluctuations.

Improved energy quality: Renewable energy systems, particularly when combined with energy storage solutions, can enhance the quality of power supply. Electrical power quality (PQ) refers to voltage and current quality at the end-user of electricity. Most production processes and business models rely on electricity; if the quality of the electricity is insufficient various problems may arise. An example of such problems is the well-known operational risk of a voltage dip event that can stop a production line when only one piece of equipment in a serial processing plant is affected. Renewable energy systems combined with onsite storage can help stabilize voltage and frequency, reducing the risk of power quality issues (see Figure 2 below) that can damage equipment or disrupt operations.

FIGURE 2 Electrical quality of supply issue

The figure above illustrates an electrical power quality issue over time, showing fluctuations in both load (green line) and grid power (red line). It demonstrates how grid power varies throughout the day, with periods of stability and sudden drops, which exemplifies the potential for voltage dips that can affect production processes and highlights the need for renewable energy systems with storage to stabilize power supply.

CASE STUDY: POWERING PROGRESS THROUGH EASTGATE MALL'S ROOFTOP SOLAR REVOLUTION

Eastgate Mall in Johannesburg has installed South Africa's largest rooftop solar panel system, with over 13 000 panels. This initiative, by owner Liberty 2 Degrees (L2D), aims to reduce operational costs, enhance energy security, and improve environmental sustainability by cutting the mall's reliance on grid electricity and lowering carbon emissions. The solar system is a key step in advancing clean energy and creating a more sustainable future for the shopping centre while also protecting against energy price fluctuations.

BACKGROUND

- Company/Organization: Liberty 2 Degrees
- Location: Eastgate Shopping Centre, 43 Bradford Rd, Bedfordview, Germiston, 2007
- Industry: Retail
- Project overview: 6MW rooftop solar PV installation, covering an area of 2.8 hectares. This installation, guided by SOLINK, marks a key step in the country's renewable energy transition by supplying 35% of the centre's daily energy needs, resulting in significant cost savings and reduced CO_2 emissions. The project demonstrates Eastgate Malls' commitment to sustainability and enhancing the customer experience by providing additional shaded parking and reducing reliance on grid electricity.

TECHNOLOGY IMPLEMENTED

- Type of renewable energy: Solar PV
- System Size/Capacity: 6 MW AC/7.216 MWp DC
- Key components: 13 675 Longi 550 W Solar PV panels, Sungrow Inverters

RESULTS

- Energy production: 35.04% of the energy required to run Eastgate's daily load, generated through solar energy.
- Cost savings: Estimated R1.5–2.5 mil energy cost savings per month
- Environmental impact: 10 900 tonnes of CO_2 emissions per year.

CONCLUSION

The installation of Eastgate Mall's rooftop solar system highlights a significant leap toward energy independence and sustainability. By generating over 35% of its daily energy needs, Eastgate Mall not only enhances energy security but also shields itself from the volatility of grid electricity prices. This proactive approach by Liberty 2 Degrees has resulted in substantial cost savings, improved energy quality, and a considerable reduction in carbon emissions. The project exemplifies how innovative infrastructure can drive both environmental and economic benefits, positioning Eastgate Mall as a leader in South Africa's renewable energy transition.

South African carbon regulations: South Africa introduced its Carbon Tax in June 2019 to reduce greenhouse gas emissions. The tax applies to businesses exceeding specific emissions thresholds, such as those generating more than 10 MW of thermal energy capacity. The current tax rate is R190 per ton of CO_2 emitted. Several tax-free allowances, ranging from 60% to 95%, are available to ease the burden, particularly during the first phase (2019–2025). These allowances will gradually decrease in the coming years.

Companies subject to the carbon tax face growing pressure to reduce their emissions as the allowances shrink and the tax burden increases. Adopting renewable energy solutions can significantly lower emissions, helping businesses to reduce their tax liability and improve their sustainability practices. The South African government has announced plans to raise the carbon tax rate progressively, with the tax expected to reach R600 per ton by 2030. The second phase of the carbon tax (starting in 2026) will see a reduction in tax-free allowances, stricter emissions thresholds, and increased reporting requirements. Companies must plan for these changes by adopting renewable energy and energy-efficient technologies to remain compliant and mitigate future tax increases.

CARBON CREDITS AND TRADABLE RENEWABLE ENERGY CERTIFICATES

The South African carbon credit market is an emerging platform aimed at reducing greenhouse gas emissions and promoting sustainable development. Established under the framework of national and international climate agreements, this market allows companies to earn carbon credits by implementing projects that capture or reduce emissions, such as reforestation and energy efficiency programs. These credits can then be sold to businesses seeking to offset their carbon footprint, creating a financial incentive for environmentally friendly practices.

However, it's important to note that renewable energy projects do not qualify for carbon credits on the voluntary market, as they are not seen as value addition within the existing regulatory framework. As South Africa transitions to a low-carbon economy, the carbon credit market may play a crucial role in attracting investment, fostering innovation, and supporting the country's commitment to meet climate targets while driving economic growth. **However, currently it is not a major driver for the uptake of renewable energy.**

Similar to carbon credtis, Renewable Energy Certificates (RECs) exist in South Africa as a way to certify and track the environmental benefits of renewable energy production, but the trading and market mechanisms for RECs remain underdeveloped. While a REC certifies that one megawatt-hour (MWh) of electricity has been generated from a renewable source, the domestic market lacks the regulatory framework and market liquidity to support large-scale trading of these certificates. As a result, RECs are not driving increased renewable energy adoption in the same way that more mature markets, such as those in Europe and the United States, are doing. Instead, the local REC market primarily caters to voluntary corporate buyers who want to demonstrate their commitment to sustainability. **Therefore, the primary role of RECs in South Africa is to serve as a certification tool that provides assurance of renewable energy use, rather than acting as a financial mechanism to incentivise further renewable deployment.**

Global supply chain expectations and international carbon regulations: As global carbon regulations tighten, businesses are facing increasing pressure to reduce their carbon footprint and adopt more sustainable practices. Around 30% of South Africa's GDP comes from exports, including goods like minerals, machinery, automotive products, and agricultural exports such as fruits and wine. The EU, China, the U.S., and Japan are South Africa's major export markets, with the EU alone accounting for over $25 billion in annual trade.

International policies like the EU's Carbon Border Adjustment Mechanism (CBAM), the Emissions Trading System (ETS), and the U.S. Inflation Reduction Act (IRA) are reshaping the business landscape, pushing companies to decarbonise and adopt renewable energy to remain competitive in these key markets. For South African businesses, staying competitive means understanding and adapting to these regulations a few of which are captured in Table 1.

INTERNATIONAL CARBON REGULATIONS	CURRENT STATUS	IMPACT ON SOUTH AFRICAN BUSINESSES
Carbon Border Adjustment Mechanism (CBAM)	The EU's CBAM imposes a carbon price on imports from countries with less ambitious climate policies, targeting carbon-intensive goods like steel, cement, and aluminium.	Exporters to the EU could face higher costs due to carbon pricing. Renewable energy can help reduce carbon emissions, potentially lowering or avoiding these additional charges and improving cost competitiveness.
EU Emissions Trading System (ETS)	The EU ETS caps carbon emissions for large industrial sectors and requires companies to buy allowances for their emissions.	While primarily affecting EU-based companies, South African exporters may experience indirect cost increases. Reducing emissions through renewable energy can mitigate these costs.
Global Sustainability Standards	International buyers and investors are increasingly demanding lower carbon footprints and sustainable practices from their suppliers.	Failure to meet these standards can result in lost business opportunities or decreased investor confidence. Implementing renewable energy helps companies align with these standards and maintain their market position.
US Inflation Reduction Act (IRA)	The IRA offers significant tax incentives, subsidies, and funding for renewable energy projects and green technologies in the U.S. It encourages decarbonisation across industries and aims to reduce emissions by providing financial support for clean energy.	Although a U.S.-focused policy, the IRA will drive global demand for low-carbon products and services. South African companies can benefit by positioning themselves as sustainable suppliers to U.S. businesses and international partners looking for green products. Investing in renewable energy will align them with the global shift towards decarbonisation and green supply chains.

TABLE 1 Relevant international Carbon regulations

The Sibanye Stillwater case study below provides a real world example of how Sibanye Stillwater is responding to local and global carbon reduction pressures. Sibanye has set itself the goal of carbon neutrality by 2040, as well as the commitment to being net zero by 2050. With its current renewable energy rollout it is expecting to offset 1 450 00t CO_2 emissions per annum from 2027 onwards.

CASE STUDY: SIBANYE STILLWATER POWER PURCHASE AGREEMENTS (PPAS)

Sibanye Stillwater has set itself the goal of carbon neutrality by 2040, as well as the commitment to be net zero by 2050. They have announced four separate PPA agreements with various developers, using a combination of solar PV and wind in different PPAs (see Table 2). The deals are also different in that some are being developed solely to supply Sibanye-Stillwater, whilst one of them is a multi-buyer deal wherein they only represent half of the plant off-take. The projects signed represent a total of 407 MW of renewable energy that will be delivered to the company's operations, making use of wheeling agreements with Eskom to use their transmission grids.

BACKGROUND

- Company/Organization: Sibanye Stillwater
- Location: Multiple locations in South Africa & 1 in Zimbabwe
- Industry: Copper, gold and PGM Mining

SIZE	TECHNOLOGY	LENGTH OF PPA	TYPE OF PPA DEAL	DEVELOPER/PARTNER	LOCATION
89 MW	Wind	15-year	Single off-taker, wheeling	African Clean Energy Developments (ACED) Reatile Renewables	Castle Wind Farm, De Aar
103 MW	Wind	15-year	Single off-taker, wheeling	Red Rocket	Maitjiesfontein, WC
75 MW (of 150 MWas	Solar PV	10-year	Multi-buyer deal, wheeling	SOLA Group	Free State
140 MW	Wind	20-year	Single off-taker, wheeling	ACED, Energy infrastructure management services (EIMS), Reatile renewables	Umsinde Emoyeni Wind Farm

TABLE 2 Sibanye Stillwater Power Purchase Agreements

ANTICIPATED RESULTS

Environmental Impact: offset 145 000 tonnes per year CO_2 emissions per annum from 2027

CONCLUSION

Sibanye Stillwater has pioneered large-scale PPA agreements, accounting for some of the largest renewable energy developments within South Africa. They plan to continue their efforts to decarbonise and target further agreements in future. The four projects are all currently under construction and expected to begin supplying operations in 2027. They have also focussed on optimising their operations to reduce their emissions.

03

Renewable energy implementation options for businesses in South Africa

In South Africa, two dominant renewable energy technologies have emerged as leaders in the market: Solar photovoltaic (solar PV) and onshore wind. Solar PV, harnessing the country's high solar irradiance, is ideal for regions with long sunny days, such as the Northern Cape and parts of the Western Cape, making it a prime choice for daytime electricity generation and peak shaving. Onshore wind, on the other hand, is better suited for coastal areas like the Eastern Cape and KwaZulu-Natal, where wind speeds are consistently high, providing steady energy production even during cloudy periods.

When deciding between these technologies, the key considerations should be location and resource availability. Solar PV is preferred for areas with high sunlight exposure and where daytime energy demand is high, whereas wind energy is optimal in windy regions with consistent wind flow, helping balance supply when solar production drops at night or during overcast days.

Complementing these technologies, the most commonly used energy storage solution in South Africa is Lithium-Ion batteries. This storage technology is favoured for its high energy density, efficiency, and ability to support the grid during peak demand or outages, making it a reliable partner for both solar and wind energy systems.

For businesses looking to implement renewable energy, two primary implementation options are available: Embedded generation and wheeling.

Embedded generation (EG) refers to generating power on-site, typically through ground-mounted, rooftop solar PV or small-scale wind systems, for direct use in the business's operations. This option offers autonomy and immediate cost savings, as businesses can reduce their reliance on Eskom and municipal grids, while also benefiting from net metering where available.

Wheeling, on the other hand, allows businesses to generate electricity off-site and transmit it over the national grid to different locations. This option is particularly suitable for companies with operations in multiple locations or those that lack sufficient space for on-site generation. Wheeling agreements with Eskom or municipalities enable businesses to balance energy needs across their facilities.

Embedded generation (EG)

EG installations can be ground-mounted, carports or rooftops. The available space and potential yield of solar panels are crucial factors to consider. When battery storage is not feasible, feeding excess electricity back into the grid can be a beneficial option. Adhering to local regulations, and safety standards, and obtaining necessary permits ensures that these solar systems operate safely, efficiently, and within legal boundaries. The implementation of EG systems in South Africa has seen varied success due to inconsistent policy and tariff structure across municipalities and with Eskom.

Feed-in tariffs in South Africa

Municipal feed-in tariffs in South Africa allow businesses to feed excess electricity generated from solar PV systems back into the grid, helping offset costs through credits on electricity bills. Out of the 71 municipalities that permit EG connections, 67 have established formal application procedures for customers to obtain the necessary authorizations for installations. Additionally, 43 municipalities (26%) include EG tariffs in their official tariff books. These tariffs are typically lower than the cost of electricity purchased from the grid, as they are based on the rate municipalities pay for bulk electricity from Eskom. This means the feed-in protion of the tariff ranges from 32c/kWh to 130c/kWh, averaging around 86.9c/kWh.

Businesses considering renewable energy installations should evaluate feed-in tariffs rates and potential savings, and contact their local municipality for detailed requirements and rates before making investment decisions. Table 3 below provides a breakdown of an average embedded generation tariff which can include a feed-in rate for excess electricity fed into the grid.

COMPONENT	DESCRIPTION
Basic service charge	A fixed monthly fee covering connection costs and infrastructure maintenance.
Energy charge	A variable charge based on electricity consumed, is usually lower for customers with embedded generation systems.
Feed-in rate	Payment or credit for excess electricity is fed back into the grid, typically set at a specific rate per kWh.
Time-of-use rates	Optional rates vary based on the time of day, with higher charges during peak demand and lower charges during off-peak hours.
Additional fees	Other potential charges, such as environmental levies or renewable energy development fees, support sustainability initiatives.

TABLE 3 Average embedded generation tariff for a customer in South Africa

Eskom's tariffs are generally geared toward larger commercial and industrial users. They include self-generation tariffs and feed-in tariffs for large customers. Eskom's tariffs for feed-in are less standardised but are often negotiated individually. Generally, large customers can expect varying rates depending on their agreement and usage.

It is the responsibility of the customer to ensure full compliance with all legal and regulatory requirements of their local distribution utility, whether it is their municipality or Eskom. **Customers must register their embedded generation system with the relevant authority and ensure adherence to all Eskom and South African Bureau of Standards (SABS) technical and contractual requirements.** Compliance is essential to guarantee the safety of people, animals, and equipment. Customers must ensure that their systems are installed, operated, and maintained in accordance with these standards to mitigate any risks associated with embedded generation.

Wheeling of electricity

Wheeling allows businesses to generate electricity off-site and transmit it over the national grid to different locations. Traditional wheeling is a credit mechanism involving Eskom, independent power porodučers (IPPs), customers and sometimes trading companies. Consumers sign a PPA whereby they agree to buy the electricity produced by an IPP at a fixed rate (adjusted for inflation only). The IPP then generates power and supplies it to the national grid. The consumer will receive a credit on their Eskom utility bill, based on the amount of electricity purchased from the IPP.

A depiction of traditional wheeling is shown in Figure 3. Eskom has existing wheeling frameworks in place for medium voltage (MV) customers on its network. However, traditional wheeling requires municipalities to have wheeling frameworks and the internal capacity to allocate the credits to customers. This limits wheeling to Eskom customers and a limited few municipal customers. Specific rates for wheeling are often negotiated individually and can be complex. However, indicative rates for wheeling can range from R0.50 to R1.50 per kWh, depending on various factors.

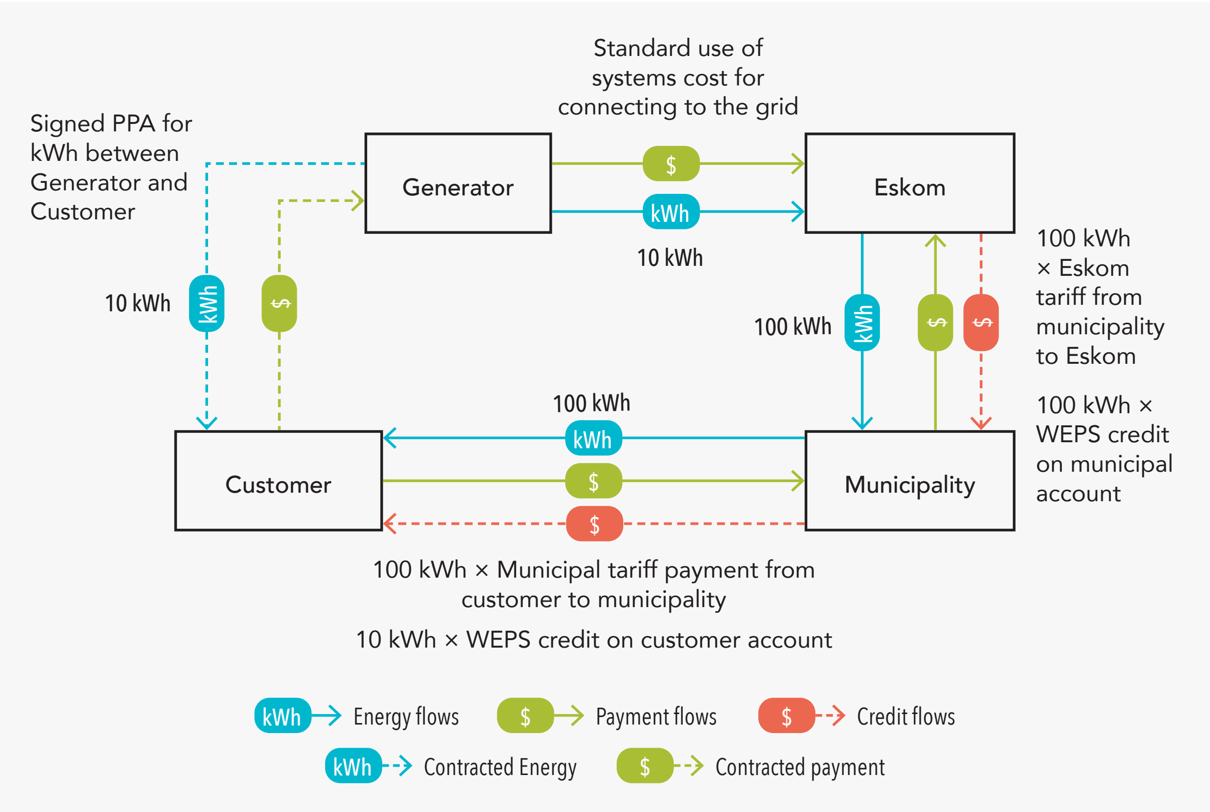


FIGURE 3 Traditional wheeling

To address the limitations of conventional wheeling, Eskom is experimenting with virtual wheeling in collaboration with Vodacom, a leading telecommunications company. Virtual wheeling is currently not a widespread option in South Africa. With virtual wheeling, the credit is replaced by a rebate directly allocated to the customer. A simplified virtual wheeling diagram is shown in Figure 4 below. Virtual wheeling simplifies wheeling transactions, where Eskom directly rebate the customer, thus removing the need for municipalities to have their wheeling frameworks, tariffs and processes to enable the transactions. Municipalities can continue their service delivery mandate and recuperate their full cost to serve as normal, while municipal customers can reap the benefits of wheeling. Virtual wheeling is also perfectly geared for corporates that can aggregate off-take in multiple municipalities.

> To address the limitations of conventional wheeling, Eskom is experimenting with virtual wheeling in collaboration with Vodacom, a leading telecommunications company.

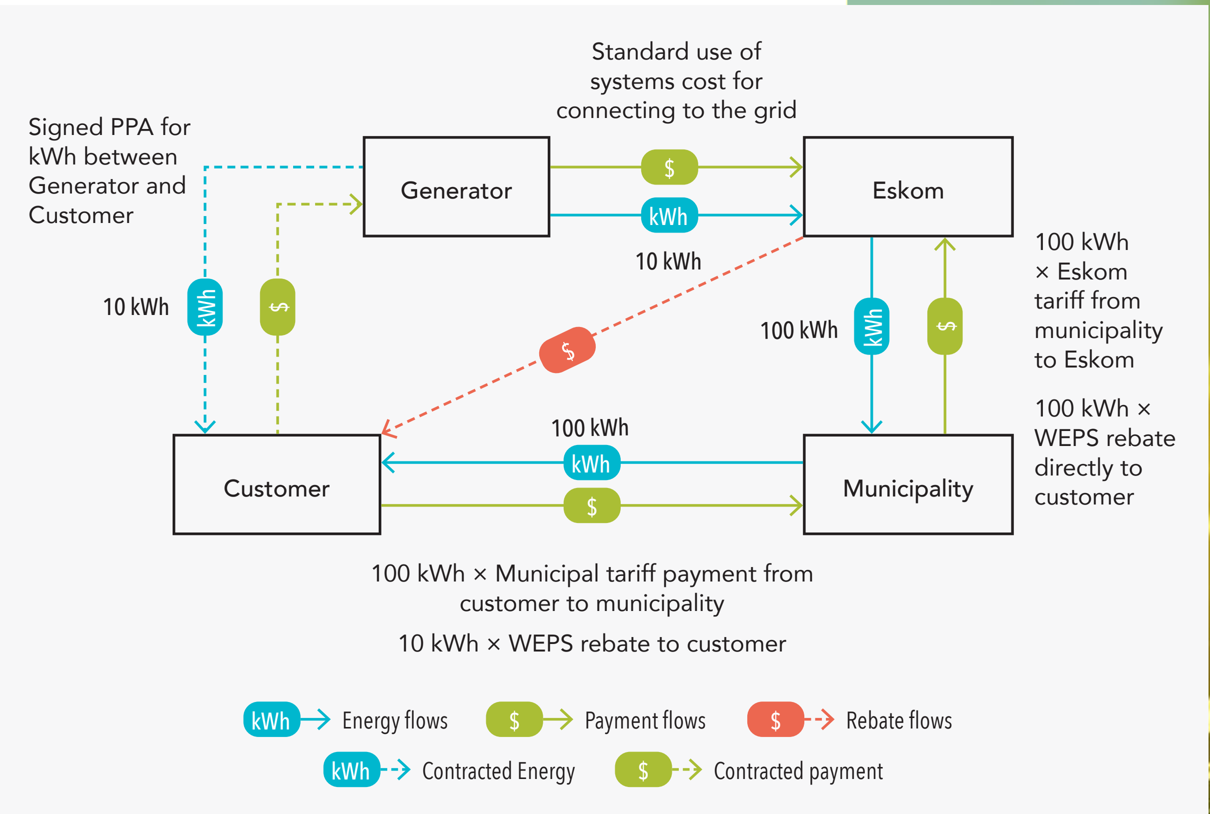


FIGURE 4 Virtual wheeling

Deciding between EG and wheeling

When deciding between using embedded renewable energy on-site (EG) or wheeling renewable energy across the grid, businesses need to carefully evaluate several factors (see Table 4) to make the best choice for their operations.

KEY CONSIDERATIONS	EMBEDDED GENERATION	WHEELING
Energy demand and load profile	Suitable for businesses with consistent energy demand that aligns with on-site renewable generation (e.g., solar or wind).	Ideal if the load site's energy demand fluctuates if there is a need to secure renewable energy from multiple locations to meet demand or if renewable energy demand exceeds on-site available resources.
Available space for installation	Requires sufficient space (e.g., rooftops or land) for the installation of solar panels or wind turbines. Businesses with limited space may face constraints.	Does not require installation space at the load site, as the energy is generated off-site and delivered via the grid.
Grid reliability	Provides independence from the grid and enhances energy security, especially in areas with frequent outages or instability.	Requires reliance on the national grid for transmission, so consider the grid's reliability in the area (i.e. wheeling won't protect from loadshedding).
Grid connection and access fees	Typically involves fewer fees related to grid usage, especially if the system is entirely off-grid or grid-independent.	Requires payment of wheeling fees to the utility or local municipalities for the use of grid infrastructure, adding to operational costs.
Energy flexibility and scalability	May offer limited scalability, depending on available space and resources at the load site.	Offers greater flexibility to scale energy consumption by securing renewable energy from larger, external sources that can meet future demand increases.
Regulatory and licensing requirements	May involve fewer regulatory requirements, but still requires compliance with small-scale embedded generation (SSEG) guidelines and permits.	More complex regulatory requirements, including agreements with grid operators and utilities to ensure compliance with local wheeling frameworks.
Carbon reduction and sustainability goals	Offers immediate carbon reduction by generating clean energy directly at the point of use.	Can still contribute to sustainability goals by ensuring the energy used is sourced from renewable projects, but carbon reductions may be impacted by grid losses.

TABLE 4 Deciding between EG and wheeling

Once an ideal implementation approach has been selected, there are several different procurement options available to businesses.

Procurement options for renewable energy

The landscape of renewable energy financing in South Africa has evolved significantly, offering a range of options that cater to different financial strategies, risk tolerance and operational requirements. Figure 5 outlines the primary procurement options available for businesses interested in investing in renewable energy projects. Understanding the various options is crucial for businesses seeking to implement renewable energy projects.

OUTRIGHT PURCHASE

Outright purchase of renewable energy systems involves buying and owning the system upfront. This approach has high initial costs but offers long-term benefits, such as full control over the system, no ongoing energy payments, and the potential for lower electricity bills. It's ideal for businesses looking for maximum return on investment and energy independence.

POWER PURCHASE AGREEMENT

Power Purchase Agreements (PPAs) are long-term contracts where an energy producer sells electricity to a buyer at a fixed rate. This setup provides financial stability: the producer secures a steady income, and the buyer gets predictable energy costs. In South Africa, PPAs are commonly used to support renewable energy projects, allowing businesses to access clean power without large upfront investments

DEBT FINANCE

A debt-financed purchase of renewable energy systems allows buyers to install the system without paying the full cost upfront. Instead, they secure a loan and repay it over time. This approach spreads the financial burden while still allowing the buyer to benefit from lower energy bills and potential tax incentives. It's a good option for businesses looking to invest in renewable energy without the immediate capital outlay.

LEASE TO OWN

A lease-to-own purchase of a renewable energy system allows users to pay for the system over time through regular lease payments. At the end of the lease term, ownership of the system transfers to the buyer. This option requires little or no upfront cost and offers the benefits of ownership, such as long-term savings and energy independence, once the lease is fully paid off. It's ideal for those who want to own the system eventually but prefer manageable monthly payments.

FIGURE 5 Procurement options for renewable energy

Table 5 presents a comparative analysis of renewable energy financing options in South Africa. This comparison is designed to help businesses make informed choices based on their unique requirements, risk appetite, and overall sustainability goals.

	OUTRIGHT PURCHASE	PPA	LEASE TO OWN	DEBT FINANCING
Financing requirement	Client decision on using available cash for purchase.	Good standing of credit/Ability to make monthly payments.	Good standing of credit/Ability to make monthly payments.	Good standing of credit and Ability to make monthly payments. Most financiers may not offer 100% coverage.
Ongoing monthly expenditure	Low relative to capital expenditure.	Predictable (subject to low risk of utility tariff structure change).	Fixed monthly lease fee.	Fixed (depends on terms).
Operation and maintenance	At owners' cost.	None.	Low (for the term of the lease).	At borrowers' cost.
Ownership	Full ownership.	Owned by generator.	Provider retains ownership.	Borrower retains ownership.
System expansion Flexibility	High	Low	Medium	Medium
Term length (years)	N/A	10–25	7–10	5–10

TABLE 5 Comparative analysis of renewable energy financing options

Figure 6 provides a structured approach to assessing renewable energy procurement options, by simplifying the process of choosing the most suitable financing method based on a company's specific needs and financial capabilities.

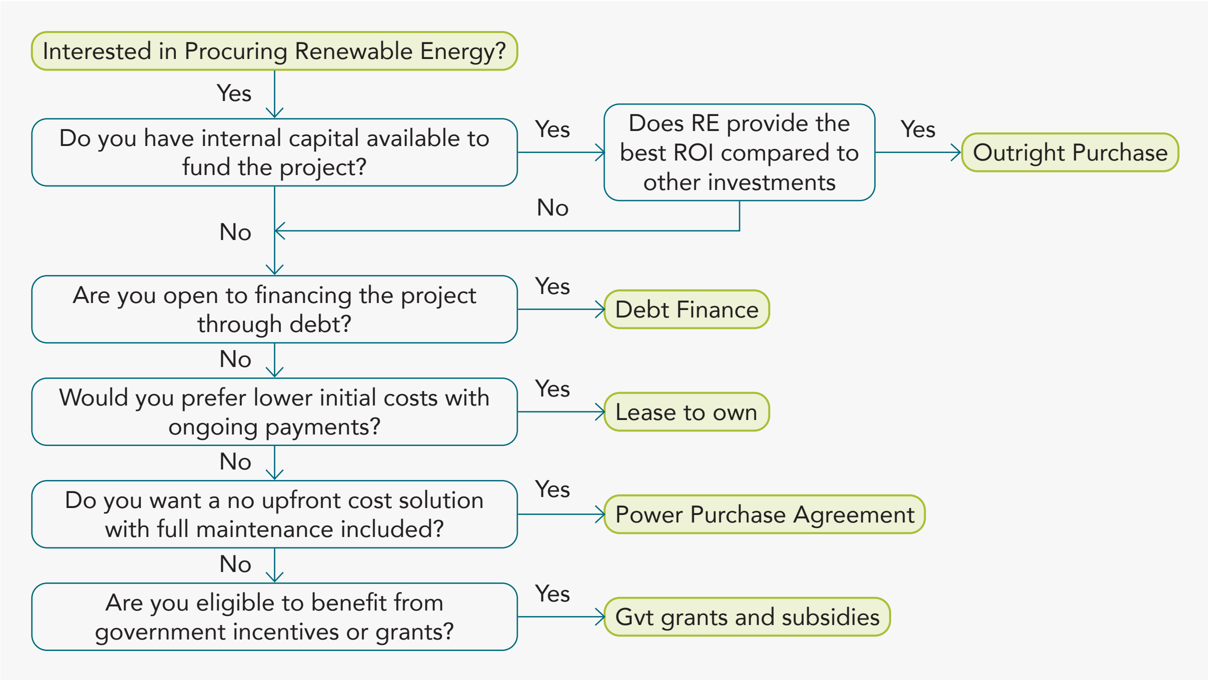


FIGURE 6 Key decision points for assessing renewable energy purchasing options

It is also important to understand the cost implications for each of these purchasing options. The price of a renewable energy system is influenced by several key variables. These include the size and capacity of the system, which dictate the number of solar panels or wind turbines needed; equipment costs, such as inverters, batteries, and mounting structures; and installation expenses, which vary based on the complexity of the site. Additionally, location plays a significant role, as areas with higher solar irradiance or stronger wind speeds can achieve greater energy yields, thus affecting the overall cost-effectiveness. Other variables include permitting and regulatory fees, grid connection costs (wheeling electricity or using embedded generation), and the availability of incentives or subsidies. The final price is also shaped by market factors such as supply chain disruptions or fluctuations in the cost of raw materials like steel and silicon.

Price benchmarks

The price benchmarks outlined in this guide provide a valuable tool for decision-makers when considering renewable energy installations. By offering a clear reference point on current costs for various technologies (such as solar PV, wind, and battery storage), benchmarks help stakeholders understand the expected investment and compare options more effectively.

Table 6 provides price benchmarks for outright purchases either using debt or the company balance sheet purchase. Access to debt financing for renewable energy systems in South Africa is highly favourable. All major banks offer dedicated lending facilities specifically designed for renewable energy projects. These financing options typically come with interest rates that are amortised and dependent on risk factors, but they are usually below the prime lending rate. This makes debt a viable and attractive option for businesses and individuals looking to invest in solar PV, wind, or other renewable energy systems, further driving the adoption of clean energy technologies.

RENEWABLE ENERGY TECHNOLOGY	<100 KWp	<500 KWp	>500 KWp	>1 MW
Solar (per Wp)	R13.50–16.50	R12.00–15.00	R11.50–14.00	R11.00–13.50
Wind (per Wp)	R40.00–R60.00			R15.00–R19.00

TABLE 6 Market price benchmarks: Outright purchase (debt and balance sheet)

PPAs provide businesses and municipalities with access to clean energy without upfront costs, while offering more predictable and often lower electricity costs than traditional grid power. No data is available for small-scale wind PPAs.

RENEWABLE ENERGY TECHNOLOGY	<100 KWp	<500 KWp	>500 KWp	>1 MWp
Solar (per kWh)	R1.10–R1.45	R1.00–R1.30	95c–R 1.15	80c–90c
Wind (per kWh)	Not specified			70c–R1.00

TABLE 7 Market price benchmarks: PPAs

Leasing enables businesses to benefit from clean energy, reduce energy costs, and avoid upfront capital investment, while also transferring system maintenance responsibilities to the lessor. Table 8 provides a benchmark price for solar PV leases in South Africa. No data is available for wind system leases.

RENEWABLE ENERGY TECHNOLOGY	<100 KWp	<500 KWp	>500 KWp	>1 MWp
Solar (per month)	R7 000–30 000	R25 000–120 000	R100 000–200 000	>R210 000
Wind (per month)	Not specified			

TABLE 8 Market price benchmarks: Leased to own purchase

Different solar PV and wind system types

In the evolving landscape of renewable energy, understanding the various types of solar PV and wind systems is crucial for businesses and stakeholders seeking to optimise energy production and investment. This section explores the different configurations of solar PV and wind systems, highlighting their estimated cost multipliers and the key reasons for their adoption.

The table below provides a cost multiplier to use the above price benchmarking and compare it to other system designs. A cost multiplier works by calculating the total cost of a project by multiplying a base cost by a specific factor. This factor accounts for various additional expenses that may not be included in the initial cost estimate. In South Africa, solar PV—both rooftop and ground-mounted—and large-scale horizontal-axis wind turbines dominate the market these hence these technologies are used as base cases as per the price benchmark tables above.

TYPE OF SOLAR PV SYSTEM	ESTIMATED COST MULTIPLIER	REASON
Rooftop	1.00	Most common type of system due to the availability of roof space, typically accommodating 2 kWp per 10 m^2.
Rooftop (with Asbestos replacement)	1.30–1.50	Asbestos Abatement Regulations 2020 phase out this roofing type, requiring roof replacement. Financiers and insurance providers often avoid asbestos roofs due to long-term risks.
Ground-mount	1.10–1.20	Suitable if there is available land area; cost premium is due to the required mounting structure and civil works.
Floating	1.50–1.75	Applicable if there is a compatible body of water; cost premium arises from the required floats, which depend on import/order volumes. This option also decreases evaporation losses.
Carport	1.25–2.00	Depends on the parking area and the influence of existing vs. required parking infrastructure on mounting costs. Offers the added benefit of providing shade and visibility for sustainable brand promotion.
TYPE OF WIND SYSTEM	**ESTIMATED COST MULTIPLIER**	**REASON**
Large-scale horizontal axis wind turbine	1.00	Dominant technology in South Africa. Horizontal axis turbines consist of a tower, rotor blades, and a nacelle that houses the generator and other components. The rotor blades are aligned parallel to the wind direction, optimizing energy capture. These turbines can range from 1.5 MW to over 10 MW in capacity, with larger models designed for offshore installations.
Small-scale horizontal axis wind turbine	2.20–2.50	Similar to large-scale turbines, small horizontal axis turbines feature a tower, rotor blades, and a nacelle. They are usually smaller in size, with rotor diameters ranging from 1 to 10 meters. These turbines generally have a capacity between 400 watts and 10 kilowatts, making them suitable for residential and small commercial applications.
Large-scale vertical axis wind turbine	1.50–1.75	Vertical wind turbines typically come in two main types: Darrieus (curved blades) and Savonius (scooped blades). They are mounted on a tower or pole, with the rotor positioned vertically. These turbines generally have capacities ranging from 100 kW to several megawatts, depending on the specific design and application.
Small-scale vertical axis wind turbine	2.00–2.20	Typically featuring Darrieus or Savonius configurations, these turbines have a rotor positioned vertically, allowing for a simple and efficient design that minimizes mechanical complexity. Small-scale vertical turbines usually have capacities ranging from 100 watts to 10 kW, making them suitable for small energy needs, such as powering homes or small farms.

TABLE 9 Estimated cost multiplier for solar and wind system types

Energy storage considerations

Battery storage systems may be required to backup a renewable energy system, considering that these systems do not produce electricity continuously and in some instances PPAs, are still susceptible to grid failures. Table 10 provides some energy storage considerations when designing a system.

CONSIDERATION	DETAILS
Charging source	Whether solar or utility power. Using solar for charging allows the battery to act as a hybrid system, which can reduce the required battery capacity and overall costs. A properly sized battery bank can also enable a smaller generator, enhancing overall system efficiency. Additionally, evaluate the reliability of the solar and battery setup based on local conditions, such as the frequency of grid outages and the availability of solar resources.
Need for a generator	A generator can be beneficial during power outages or adverse weather when solar energy is insufficient and battery storage is low.
Sizing battery pack or generator	Determine size based on power requirements, peak demands, energy consumption, and expected runtime. Sizing should consider the charging source (solar or utility).
Reliability and redundancy	Assess the reliability of the solar and battery system based on local grid outage frequency, solar resource consistency, and battery technology reliability.
Scalability and future expansion	Evaluate growth plans and energy needs with the energy services provider to ensure the solution can be expanded or upgraded to meet future demands. Scalability is key for long-term suitability and cost-effectiveness.

TABLE 10 Things to consider when designing an energy storage system

Table 11 provides a comparative analysis of the investment costs and levelised costs of storage (LCOS) for various energy storage technologies. This includes diesel generators, Advanced Lead Acid batteries, Lithium-Ion batteries, and Vanadium Redox Flow systems. Understanding these costs is essential for making informed decisions about energy solutions, particularly in the context of reliability, efficiency, and long-term sustainability.

TECHNOLOGY	DESCRIPTION	INVESTMENT COST (R/KWH)	LEVELIZED COST OF STORAGE (LCOS) (R/KWH)
Diesel generator	Traditional means of providing continuous power supply. Efficient and cheap but faces rising diesel prices and emissions-related costs.	2 000–4 000	5.00–10.00
Advanced Lead Acid	Improved cycle life and depth of discharge compared to traditional lead acid. Suitable for small-scale, short-term applications.	1 500–2 000	Not specified
Lithium-Ion	Industry standard for battery storage due to high energy density, efficiency, fast discharge/recharge, low maintenance, and competitive costs. Lasts around 10 years.	4 000–10 000	4.50–6.00*
Vanadium Redox Flow	Emerging technology for larger applications starting at 400 kWh. Cost-competitive with lithium-ion for longer backup (≥4 hours).	8 000–14 000	Not specified

TABLE 11 Things to consider when designing an energy storage system
*For battery technologies, the cost of grid electricity is included in LCOS contributing ~R2.00/kWh

Utilising energy storage regardless of loadshedding

Energy storage serves as a savings-generating asset regardless of loadshedding by helping businesses mitigate peak tariff costs associated with Time of Use (TOU) tariffs. Figure 7 illustrates an example case where a business has installed Li-ion storage (green line) with the aim of optimising energy costs within a TOU tariff framework. The figure shows a more consistent and lower energy cost throughout the day compared to a business without storage (orange line), which is affected by the full variations of TOU tariffs (purple line).

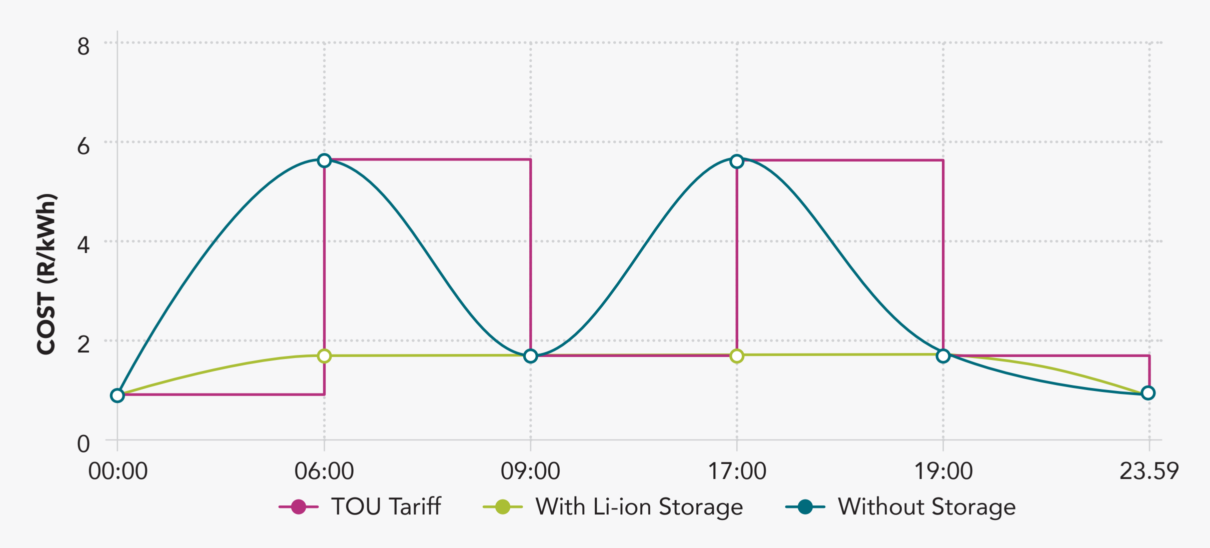


FIGURE 7 Maintaining a more consistent and lower energy cost with Li-on storage

In this scenario:

- **Morning peak (06:00–09:00):** Batteries discharge, saving R3.91/kWh (R5.61–R1.70).
- **Standard time (09:00–17:00):** Solar PV charges batteries and supplements usage.
- **Evening peak (17:00–19:00):** Batteries discharge again, saving another R3.91/kWh.

Five renewable energy incentives to take advantage of

In South Africa, various incentives are available to promote the adoption of renewable energy and enhance energy efficiency. These incentives offer significant financial benefits to businesses, encouraging investments in sustainable technologies. Five key renewable energy incentives that individuals and organizations can take advantage of are detailed in Table 12.

SECTION	DESCRIPTION	BENEFITS OF RENEWABLE ENERGY PROJECTS
Section 12L Energy Efficiency Deduction	Taxpayers can claim a deduction of 95c/kWh for energy efficiency savings, based on verified results by an accredited institution.	Encourages investment in energy-efficient technologies by reducing taxable income. This reduces the payback period of energy efficiency projects and improves ROI.
Section 12B Accelerated Depreciation	Allows a 125% depreciation allowance on qualifying renewable energy assets in the first year of use, with no limit on the claimable amount.	Accelerates tax savings by allowing the asset to be fully depreciated in the first year, lowering the upfront cost of renewable energy installations and boosting cash flow.
Section 37B Environmental Treatment Allowance	Provides a tax allowance for expenses incurred in acquiring new environmental treatment and recycling assets.	Supports investment in environmentally friendly technologies and infrastructure, reducing overall project costs and enhancing the economic viability of sustainable solutions.
Section 12U Capital Allowances	Offers capital allowances for costs related to roads and fencing for renewable energy facilities producing over 5 MW from various sources (wind, solar, hydropower, biomass).	Reduces the initial capital expenditure associated with infrastructure development for large renewable projects, improving project feasibility and cost-effectiveness.
Section 12I Greenfield and Brownfield Projects	Offers capital allowances for projects with a minimum investment of R50 million for new projects (greenfield) or R30 million for expansions (brownfield) in qualifying environmental assets.	Incentivizes large-scale investments in new or expanding renewable energy projects, providing a substantial tax benefit for compliance and waste management, which strengthens the business case.

TABLE 12 Renewable energy incentives

Implementation timeframes

Project timelines for solar and wind energy installations can vary depending on the project's size, location, and complexity. Typically, utility-scale solar and wind projects take between 18 months and five years to complete. This process includes site selection, permitting, financing, procurement of materials, and construction. For smaller projects, timelines may be shorter, while larger or more complex developments might require extended periods due to environmental assessments and grid connection challenges. Solar projects may take up to 3 years (depending on size and complexity) to complete as shown in Figure 8.

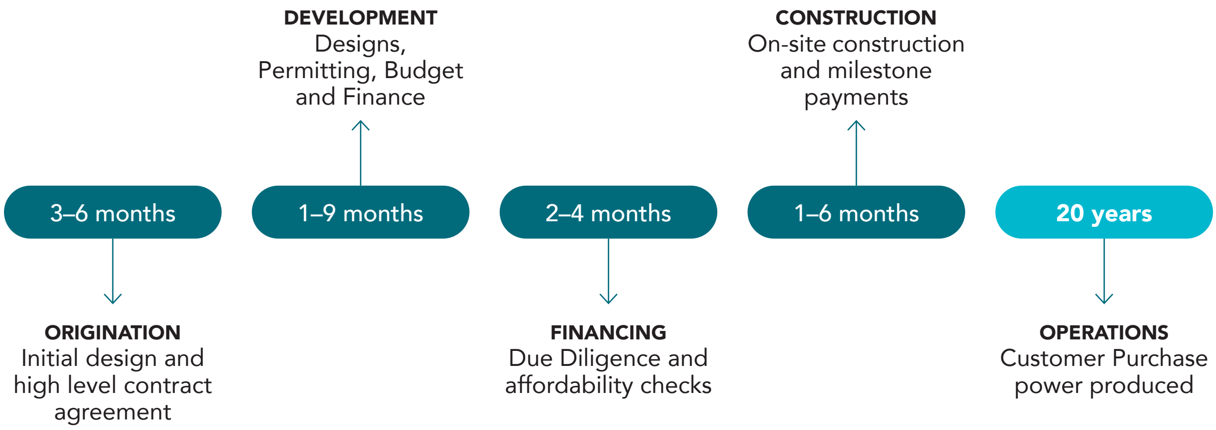


FIGURE 8 Solar project phases and timeline

Wind projects typically take longer than solar projects and Figure 9 illustrates the indicative timeline for the development of a wind project.

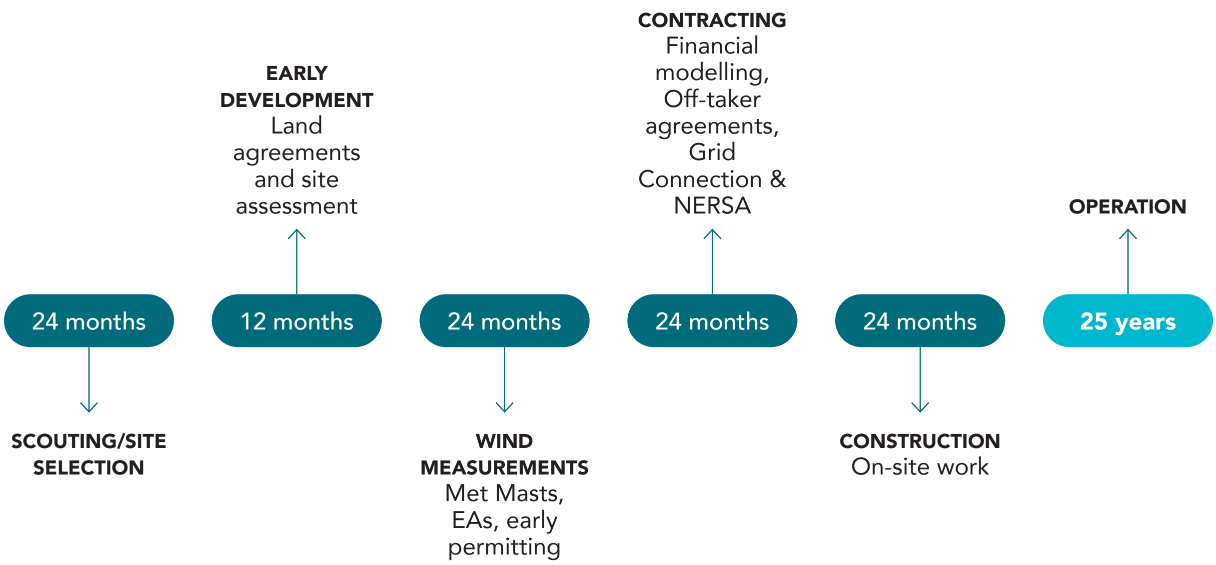


FIGURE 9 Wind project phases and timeline

Mechanisms to certify renewable energy consumption in South Africa

Certifying renewable energy consumption in South Africa is crucial as it enables businesses to meet sustainability and environmental, social, and governance (ESG) goals, comply with emerging regulations like the Climate Change Act, and align with international market expectations. Mechanisms such as Renewable Energy Certificates (RECs) and green tariffs help companies verify their use of clean energy, enhance their reputation, and support the country's transition to a low-carbon economy. This growing demand for certified renewable energy encourages investment in new projects, ultimately accelerating renewable energy adoption and sustainable development in South Africa.

"Certifying renewable energy consumption in South Africa is crucial as it enables businesses to meet sustainability and environmental, social, and governance (ESG) goals, comply with emerging regulations like the Climate Change Act, and align with international market expectations.

Renewable Energy Certificates (RECs):

- **Description:** RECs are issued for every megawatt-hour (MWh) of electricity generated from renewable sources like wind, solar, or hydropower and fed into the national grid.
- **Issuing Body:** Managed by the South African Renewable Energy Certificate Issuing Body (SARECIB), which operates under The South African National Energy Development Institute (SANEDI) guidelines.
- **Function:** They enable companies to claim and report renewable energy usage, supporting sustainability goals and carbon offsetting efforts.
- **Relevance:** RECs are becoming essential in South Africa's renewable energy market for meeting ESG criteria and achieving voluntary green energy commitments.

Power Purchase Agreements (PPAs) with Green Energy Providers:

- **Description:** PPAs are contracts between electricity consumers and renewable energy producers, allowing businesses to procure energy directly from a renewable source.
- **Certification:** The energy supplied under PPAs can be bundled with RECs, ensuring that the electricity consumed is verifiably renewable.
- **Relevance:** PPAs are particularly attractive for large energy consumers looking to secure long-term, price-stable, and certified green energy.

Green tariffs and municipal certification:

- **Description:** Green tariffs are structured programs offered by some municipalities, like the City of Cape Town, to provide consumers with the option to purchase electricity sourced from renewable generation.
- **Certification:** Green tariff programs can be paired with RECs to certify that the purchased electricity is from renewable sources.
- **Relevance:** These programs are relevant for businesses and residential consumers seeking an easy-to-implement solution for renewable energy certification.

Embedded generation certification:

- **Description:** Businesses that generate renewable energy on-site (e.g., solar PV installations) can certify their generation through on-site metering and verification processes.
- **Certification:** This energy can be registered with SARECIB to issue RECs or used for internal sustainability reporting.
- **Relevance:** Certification of embedded generation is useful for companies with large facilities looking to integrate renewable energy into their consumption profile.

These mechanisms provide a credible way for businesses and consumers to certify their renewable energy consumption in South Africa, enhancing transparency, supporting compliance with sustainability targets, and promoting market growth.

04

Hurdles to anticipate when implementing renewable energy in South Africa

While the issue of high capital costs of renewable energy can be overcome through the different financing mechanisms previously discussed, other concerns must be addressed to unlock the potential benefits in SA.

Electricity grid capacity constraints

South Africa's existing grid capacity significantly impedes renewable energy development. The infrastructure, originally designed for centralised coal-fired generation, creates congestion, particularly in remote areas abundant with renewable resources. This limits efficient electricity transport to demand centres. Additionally, the intermittent nature of renewable energy generation presents integration challenges, as the current grid lacks the flexibility to manage fluctuating outputs effectively.

Transmission grid challenges

Upgrading the transmission infrastructure to support renewable energy requires substantial investment in new lines, substations, and technology. Eskom aims to construct 15 000 km of new transmission lines by 2032, necessitating an eightfold increase in construction efforts. However, investment challenges, regulatory hurdles, and Eskom's financial constraints hinder this critical expansion.

To address these challenges and expedite the necessary infrastructure upgrades, the newly formed NTCSA has been tasked with overseeing and implementing the expansion of the transmission grid. The National Transmission Company of South Africa is specifically mandated to tackle the complex issues surrounding investment, regulation, and financial constraints, with the aim of ensuring that South Africa's transmission infrastructure can adequately support the integration of renewable energy sources.

Capacity constraints: Limited grid capacity in key regions.

Geographical concentration: Renewable energy projects are clustered in high-resource areas, causing congestion.

Infrastructure lag: Slow rate of transmission line construction.

Allocation issues: A high surge in connection applications complicates the "first-ready, first-served" principle.

Investment hurdles: Funding difficulties due to political and regulatory challenges.

Regulatory barriers: Lengthy permitting processes and compliance requirements.

Skill shortages: Lack of expertise for grid upgrades.

Policy uncertainty: Inconsistent procurement hampers investment.

Short-term solutions: Proposed curtailment and battery storage.

Long-term needs: New transmission infrastructure and collaboration between industry and Eskom.

These challenges illustrate the complex relationship between renewable energy deployment and grid infrastructure in South Africa, underscoring the necessity for coordinated efforts to facilitate successful large-scale renewable energy implementation. Figure 10 shows the current available transmission capacity across the country's nine provinces, indicating areas where grid-connected renewable energy systems cannot currently be installed.

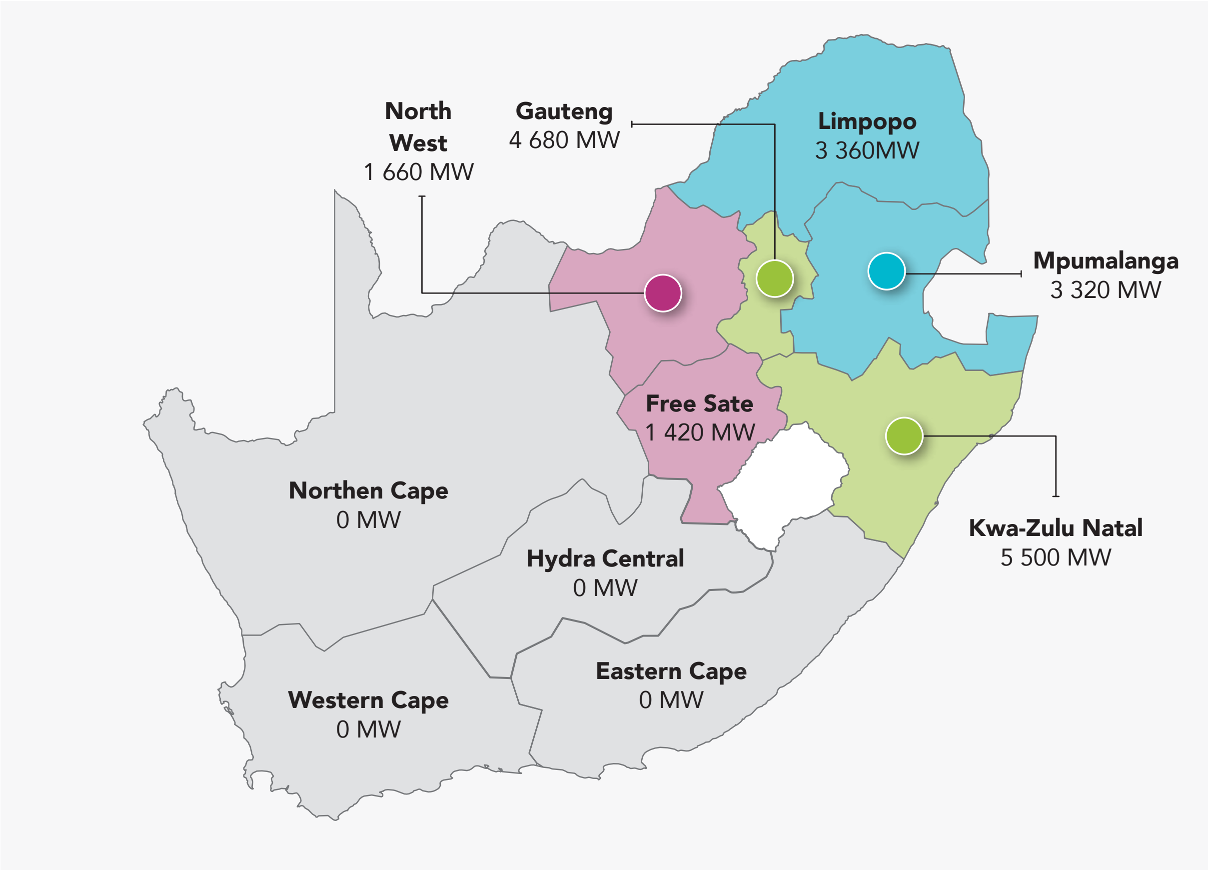


FIGURE 10 Available generation connection capacity
Source: GCCA 2025

Distribution grid

The distribution grid, managed by municipalities, faces issues with aging infrastructure that can create bottlenecks and delays in connecting new renewable projects. These inefficiencies can lead to unreliable power supply and potential cost increases due to inconsistent tariffs and governance, complicating renewable energy integration and affecting project viability. Businesses may experience disruptions or higher expenses, but these challenges also present opportunities to contribute to grid modernization, enhancing the long-term reliability and profitability of renewable investments. Figure 11 depicts the decline in investment in maintaining municipal assets from 2009 to 2019 across various provinces.

Maintenance, refurbishment, and strengthening backlogs in the distribution network are significant, with estimated costs reaching R68.1 billion as of 2014, growing by R6.2 billion annually (Business Tech, 2024). The success of renewable energy investments largely depends on the speed and effectiveness of these grid improvements.

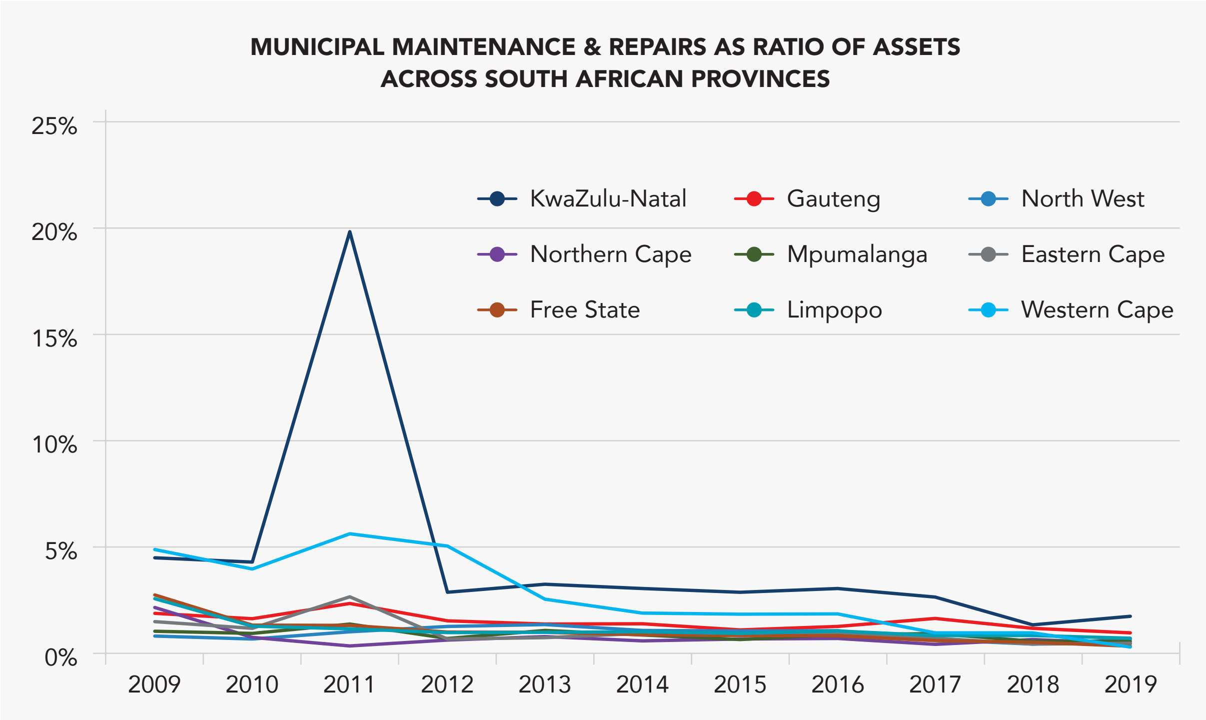


FIGURE 11 Municipal maintenance and repairs as a ratio of assets
Source: CODERA Analytics

In the short term, the South African Government has proposed solutions such as load curtailment frameworks and bulk energy storage to manage capacity constraints. However, long-term success hinges on constructing new transmission and distribution infrastructure for effective integration of renewable energy sources. Collaboration between industry and the public sector is essential to expedite these developments and explore funding models to support the necessary grid upgrades.

Regulatory and policy uncertainty

Regulatory and policy uncertainty poses a significant hurdle to private sector renewable energy uptake in South Africa, as it creates an unpredictable environment that deters investment. Investors are often hesitant to commit capital to renewable projects due to unclear regulations and fluctuating policies, which increase financial risks. This uncertainty affects project viability, making it challenging for developers to assess the feasibility of their initiatives and secure necessary financing. Additionally, the lack of clear guidelines complicates long-term planning, limiting growth in the sector. Inconsistent policies can also create an uneven playing field, disadvantaging new entrants while benefiting established players. Moreover, delays in implementing supportive policies can stall project approvals and overall market growth. Addressing these uncertainties is essential for fostering a more conducive environment for private sector investment in renewable energy, allowing South Africa to fully harness its renewable potential.

- **Policy inconsistencies**: Although the IRP 2019 offers guidance, uncertainty has arisen with the IRP 2023, which reflects a projected decline in renewable energy growth.
- **Regulatory delays:** Protracted approval processes, such as licensing, environmental impact assessments (EIAs), and grid connection agreements, delay the timely execution of renewable energy projects.
- **Grid uncertainty:** Lack of clarity regarding grid curtailment policies and grid queuing further complicates the planning and integration of renewable energy into the national grid.

Limited wheeling models available

Wheeling agreements and tariffs remain areas of contention, with regulatory uncertainty around how wheeling costs will be structured in the future. Furthermore, the evolving regulatory environment, particularly as NERSA works to accommodate more IPPs and decentralised energy solutions, presents both opportunities and risks for businesses, as policies can shift and impact long-term project viability.

The table below provides an overview of various wheeling scenarios in South Africa, outlining the current status and challenges associated with each. Wheeling models vary based on whether generators are connected to Eskom or municipal grids and whether they serve single or multiple customers across municipalities.

SCENARIO	SHORT NAME	STATUS	COMMENT
Eskom-connected generator to a single Eskom-connected customer	Eskom wheeling	Active	Many active projects across the country. Mostly large-scale off-take for example, mines
Eskom-connected generator to multiple Eskom-connected customers	Portfolio wheeling	In progress	Eskom is busy piloting multiple generators to multiple off-takers
Eskom connected generators to the municipal-connected customer(s)	Traditional wheeling	Limited	Municipal capacity and good standing are currently a barrier to large-scale offtake
Eskom connected the generator to multiple municipalities and connected customers	Virtual wheeling	In progress	Eskom is busy with a pilot that should show its first transaction by January 2025
Municipal-connected generator to municipal-connected customer(s) (Same municipality)	Municipal wheeling	Limited	Many municipal pilots are currently underway. Challenges with municipal capacity to connect large generators and create wheeling frameworks
Municipal-connected generator to multiple municipalities' customer	Inter-municipal wheeling	No available yet	There aren't any examples of this yet

TABLE 13 Availability of wheeling models

Underdeveloped liberalised electricity market: Limited electricity traders operating on scale

Energy trading, crucial for a liberalised electricity market, plays a pivotal role in South Africa's energy landscape. The system's design, which allows for the aggregation of wheeling offtake across multiple generators and off-takers, is an early-stage opportunity. This framework has the potential to enhance the retail market and support private generation, laying the groundwork for a more diverse and resilient energy sector.

Recent developments have seen licensed traders entering the market, marking the beginning of a shift towards increased competition. This progress is encouraging for the future of renewable energy integration, as it opens up new avenues for electricity distribution and consumption.

While these advancements are commendable, there's still work to be done to fully unlock the potential of energy trading for renewable energy deployment. The licensing process for traders, though thorough, could benefit from streamlining to encourage more participants. Additionally, developing a more flexible trading platform remains a key area for improvement to better accommodate the unique characteristics of renewable energy sources.

As South Africa continues to refine its energy trading system, there's optimism that regulatory reforms and market mechanisms will evolve to better support renewable energy integration. With ongoing efforts and collaboration between stakeholders, energy trading has the potential to transform from a challenge into a powerful catalyst for the country's renewable energy transition.

Land availability and location

Land availability and location are significant hurdles to private sector renewable energy uptake in South Africa. Optimal sites for projects, such as solar farms and wind turbines, are often in remote areas with high resource potential, but these locations may compete with agriculture, conservation, and residential developments. Securing land can be complex, involving lengthy negotiations and a cumbersome permitting process that requires compliance with various environmental regulations, leading to potential delays. Additionally, even when land is accessible, a lack of necessary infrastructure, such as roads and transmission lines, can hinder project feasibility.

GEOGRAPHIC MISMATCH:
The most suitable locations for renewable energy (e.g., wind in the Northern Cape, solar in desert regions) are far from major demand centres, necessitating costly and extensive grid infrastructure to transport the generated electricity.

Community opposition can also pose challenges, as residents may express concerns about environmental impacts and changes in land use, resulting in delays or project cancellations. Furthermore, the regulatory framework regarding land use can be inconsistent across provinces and municipalities, creating confusion for developers.

Addressing these land-related challenges is essential for facilitating private sector investment in renewable energy, enabling the sector to grow and effectively contribute to South Africa's energy transition.

05

Implementing renewable energy in the context of South Africa's electricity landscape

South Africa's electricity market is a complex and evolving space, shaped by a combination of public and private sector players. Eskom, the state-owned utility, remains the largest market participant, generating around 81.5% of the country's electricity, predominantly from coal. However, its role is changing through increased market liberalisation and the structural unbundling into generation, transmission and distribution. Figure 12 illustrates the current composition by source of the installed power generation capacity in South Africa.

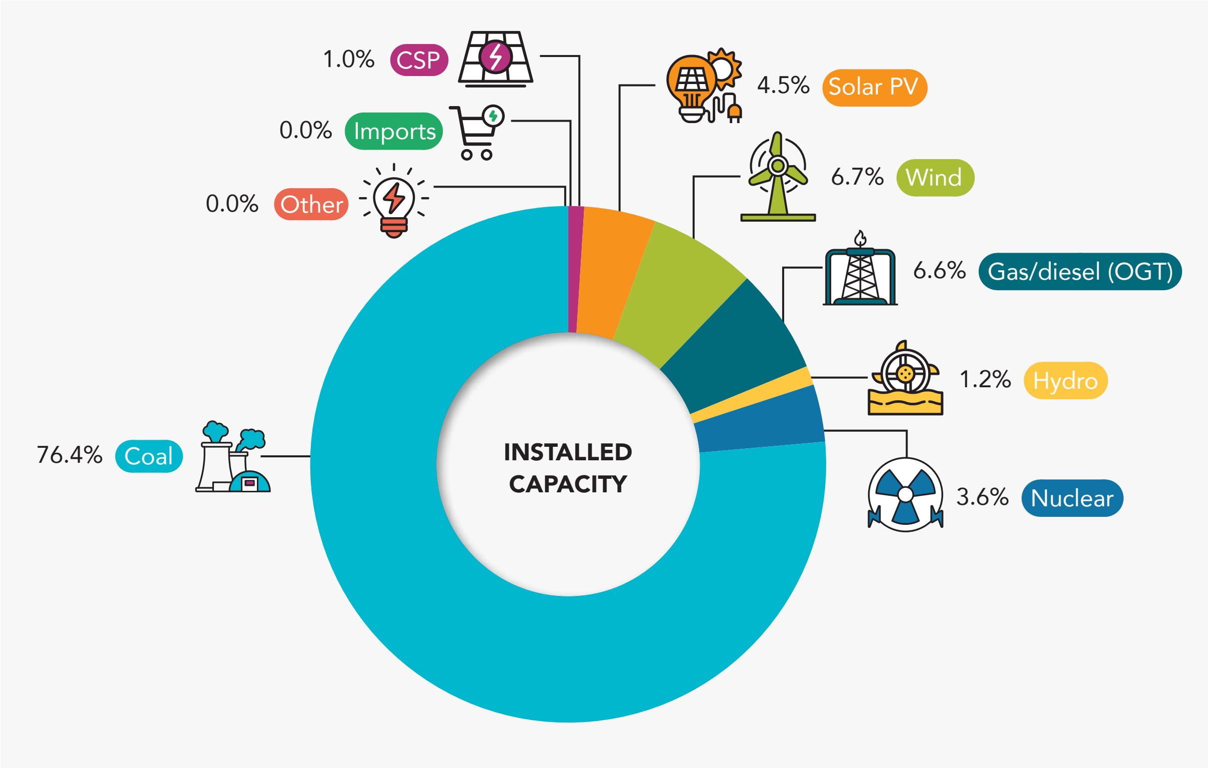


FIGURE 12 GreenCape visualisation of Eskom data

The generation sector is experiencing growing participation through the private sector, especially for renewable energy. IPPs have become increasingly influential, especially through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has added significant renewable capacity to the national grid. The program's success has driven private sector interest in renewable energy.

The National Transmission Company of South Africa (NTCSA) oversees the critical transmission infrastructure as part of the broader effort to unbundle Eskom's operations and improve efficiency in the electricity sector.

Municipalities also play a critical role, purchasing bulk electricity from Eskom and distributing it to end-users through their distribution networks. Municipalities manage 60% of the distribution network in South Africa, with the remainder managed by Eskom. South Africa has 257 metropolitan, district and local municipalities. There are eight metropolitan, 44 district and 205 local municipalities. 165 of these municipalities hold electricity distribution licenses.

Consumers, and especially businesses have increased control of their energy sourcing, leveraging opportunities such as self-generation through renewable energy installations, entering into PPAs with IPPs, and participating in the emerging energy trading markets. Municipalities are also investigating opportunities to diversify energy sources, however, the financial strength of municipalities varies widely, with many experiencing challenges due to poor revenue collection, high debt, and inadequate infrastructure maintenance. This instability often affects their ability to deliver reliable electricity, leading to uneven distribution quality across the country.

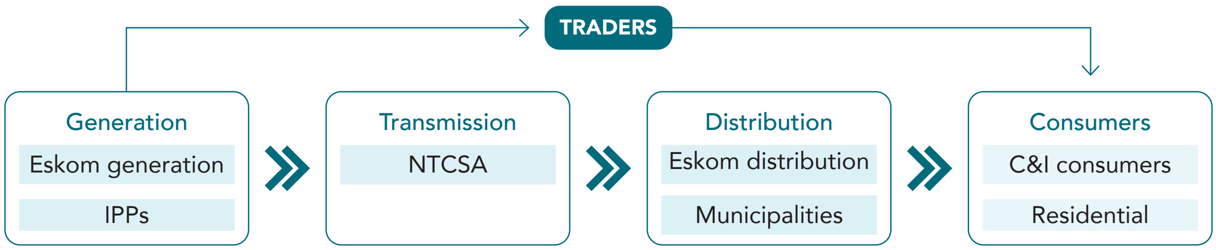


FIGURE 13 Key players in the electricity sector

The newly formed Department of Electricity and Energy in the 7th administration, and the National Energy Crisis Committee (NECOM) play key roles in policy and crisis management. The National Energy Regulator of South Africa (NERSA) serves as the governing body for the sector, regulating tariffs, licensing new projects, and enforcing compliance.

Electricity supply vs. demand in South Africa

As of 2024, approximately 94% of the population has access to electricity (SA News Agency, 2024). Electricity supply and electrification rate is a key metric in evaluating a country's ability to support its population and drive economic opportunities. However, despite this relatively high electrification rate, challenges remain in ensuring that the installed capacity can consistently meet demand. When demand exceeds supply, the utility often resorts to systematic load reduction to protect the grid and prevent system-wide failures, as has been observed in South Africa due to strain on Eskom's ageing infrastructure and lack of maintenance.

Electricity supply

While coal is expected to remain the primary source of South Africa's power (76.4%) for the foreseeable future, renewable energy is slowly gaining ground. In 2023 Eskom supplied 185 803 TWh to the national grid. IPPs added a further 17 957 TWh, playing a vital role as the country diversifies its energy mix. Imports contributed 8 654 TWh while wheeling accounted for 2 904 TWh. This split in national electricity supply is illustrated in Figure 14 below

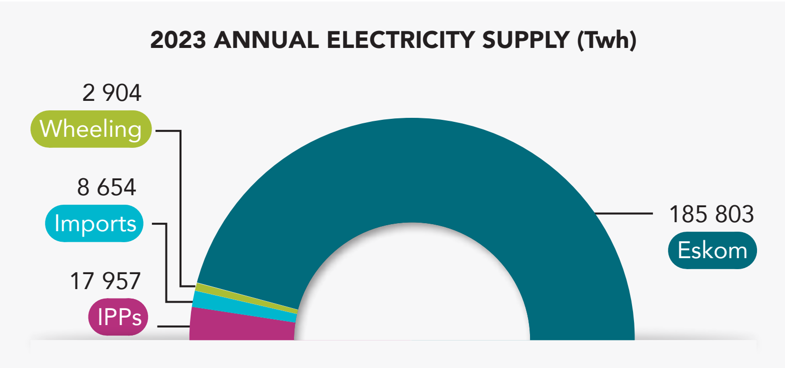


FIGURE 14 Percentage share of electricity supply
Source: Eskom 2023 Integrated Report

South Africa does have plans to decommission 25 GW of coal power by 2040, primarily replacing this capacity with renewable energy, Eskom has announced that certain coal-fired plants will operate beyond their scheduled retirement. This extension, until at least 2030, is meant to protect the national grid from instability. Eskom stated that the utility will continue some coal operations while reviewing the transition to cleaner energy sources.

COAL POWER PLANT	CAPACITY TO BE DECOMMISSIONED (MW)
Arnot	2 100
Camden	1 200
Duvha	3 000
Grootvlei	600
Hendrina	1 000
Kendal	686
Kriel	3 000
Letabo	3 090
Matimba	2 660
Matla	3 600
Tutuka	3 654

TABLE 14 Coal capacity to be decommissioned
Source: Eskom 2024 data

As South Africa's electricity market continues to evolve, the transition from a coal-dependent energy system to one that increasingly incorporates renewable energy sources is becoming a crucial strategy for ensuring energy security and sustainability. The gradual decommissioning of coal power stations presents both a challenge and an opportunity: while it requires careful planning to replace lost capacity, it also accelerates the need for renewable energy integration.

Loadshedding in South Africa

Loadshedding in South Africa has had significant economic and social impacts. In 2008, outages were driven by a demand crisis, with electricity consumption outpacing supply. The country was short by 2 000 MW–4 000 MW, leading to widespread supply disruptions. From 2017 to 2023, the supply crisis intensified, with Eskom unable to maintain its power plants, causing frequent outages. By 2023, loadshedding reached Stage 6 (up to 6 000 MW shortfall), resulting in around 8–12 hours of outages per day, costing the economy R1 billion per day during peak stages. The Energy Availability Factor (EAF)[1] is a good measure of generation infrastructure performance, the South African EAF has continued to drop since early 2014 to its lowest (54.69%) in 2023.

Eskom has implemented various measures to address the crisis, including emergency procurement of power from independent producers, efforts to improve maintenance, and pushing for more renewable energy integration. Currently the 2024 EAF has averaged 56.73% and is expected to continue to improve to 69% by 2030 offering continued relief to businesses and consumers. Figure 15 illustrates the historic and future EAF projections.

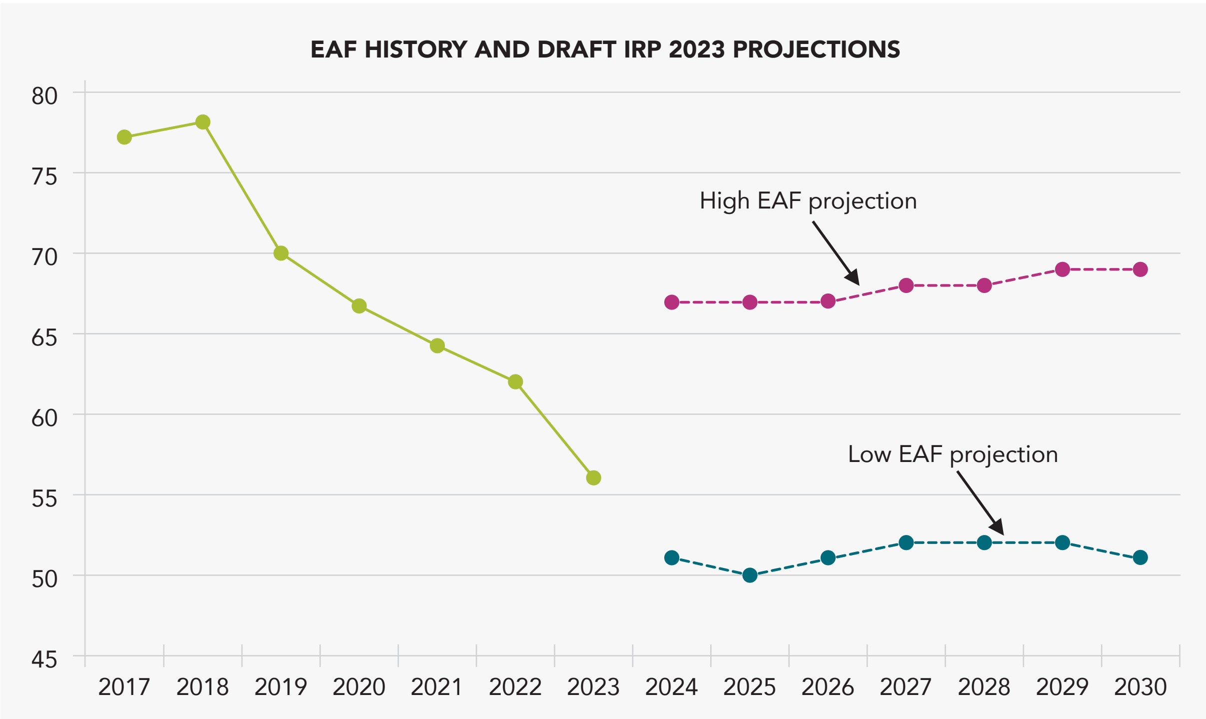


FIGURE 15 EAF history (2023) and projections (2024–2030)

1 The ratio between the unavailable energy of the units that are out on unplanned outages over a period compared to the total net installed capacity of all units over the same period

Renewable energy market

The REIPPPP, launched in 2011, was a pivotal initiative aimed at attracting private investment in renewable energy, particularly in wind and solar power. This competitive bidding process led to the successful development of large-scale renewable projects, significantly increasing installed capacity by 2015 and contributing to a more diverse energy mix that reduced reliance on coal.

However, between 2015 and 2020, the sector faced challenges due to financial difficulties at Eskom, South Africa's state-owned utility, resulting in frequent loadshedding. This situation underscored the need for a more resilient energy system and heightened interest in renewables among businesses and households. In response, the government pursued further market liberalisation from 2020 onward, enabling private procurement of renewable energy and facilitating the use of wheeling agreements and offsite power purchase agreements, thus fostering continued growth in the sector.

By 2030, South Africa is forecasted to achieve approximately 32 GW of installed renewable energy capacity, marking a significant transformation in its energy landscape. In 2023/24, changes in legislation have enabled private procurement to become the main driver of new renewable builds, particularly solar PV, while transmission constraints are increasingly impacting the sector.

To accommodate more renewable energy, the transmission development plan will require expansion.

Demand for renewables in South Africa is surging, with a total increase in installed capacity for large-scale systems expected to exceed ~22 GW by 2030. The implementation of wheeling agreements and the finalisation of a virtual wheeling pilot will facilitate offsite electricity power purchase agreements, further boosting private market engagement. This shift toward private procurement signals increased stability for manufacturers of key components, reducing the volatility often seen with public procurement cycles.

Investment opportunities for large-scale renewable energy in 2024–2030 are promising. It is estimated that the private market will add around 6 GW of solar PV and 4 GW of wind power by 2030, driven by ongoing market liberalisation. Public procurement is also set to contribute, with projections of 2.6 GW of solar PV, 3.2 GW of wind power, and 3.7 GWh of battery storage capacity to be added. This new capacity will primarily be generated by IPPs and sold to national utilities or local municipalities through the REIPPPP.

> Supporting the localisation of renewable energy manufacturing, the South African government is advancing initiatives outlined in the South African Renewable Energy Masterplan (SAREM), which aims to industrialise the country's renewable energy and energy storage value chain.

In addition to large-scale projects, investment opportunities in smaller-scale embedded generation are also emerging. The rooftop solar PV market has expanded significantly, with total installed capacity reaching 4 GW in 2023/24. An estimated 10 GW of addressable market potential remains across residential, commercial, and industrial rooftops.

The demand for energy storage, particularly behind-the-meter lithium-ion solutions, has surged due to load shedding. Installed capacity grew from 500 MWh to 1.2 GWh in 2023, with projections suggesting it could reach 6.5 GWh by 2030. Overall, the combination of systematic supply constraints, cost competitiveness, and carbon reduction targets is driving a robust landscape for new generation and energy efficiency opportunities in South Africa, setting the stage for a vibrant renewable energy market by 2030. The projected growth of the entire sector for both public and private procurement is illustrated in Figure 16.

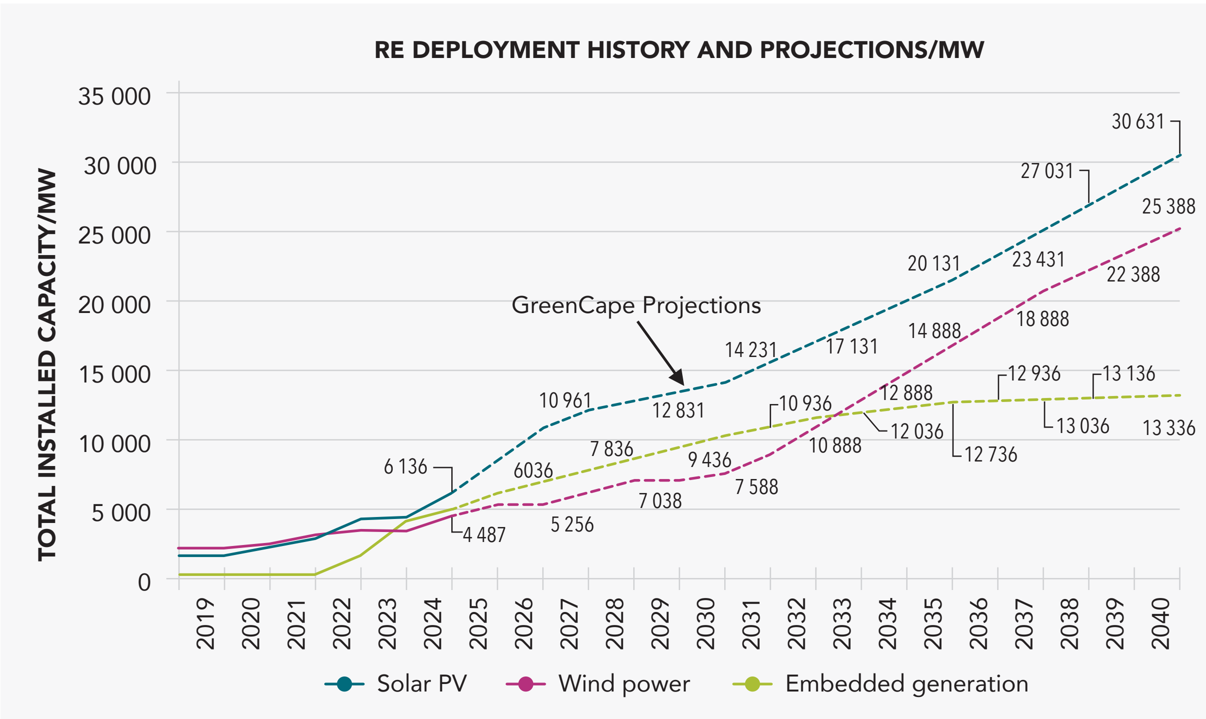


FIGURE 16 Renewable energy deployment and projections
Source: GreenCape analysis

Electricity demand

Over the last decade, South Africa's electricity demand has faced significant challenges, shaped by the needs of various sectors across the economy. Industry dominates the demand side, consuming 47% of electricity, followed by the residential sector at 22% and services at 18% (EnerData, 2024). Since 2010, the country has experienced stagnant or declining electricity demand, driven by economic factors, improvements in energy efficiency, and a slowdown in industrial activities, particularly in mining and manufacturing. Broader economic challenges, including reduced commodity prices and a shift toward a more service-oriented economy, have contributed to this stagnation. Additionally, rising electricity costs have prompted both businesses and consumers to adopt energy-efficient technologies and practices, further reinforcing the lack of growth in demand.

As shown Figure 17 , in 2023, electricity demand decreased by 4% to 195 TWh per annum, continuing a downward trend that has persisted since 2010, with an average annual decline of 2.5% since 2018. This stands in contrast to the period from 2005 to 2010, when consumption remained relatively stable, fluctuating between 204 and 221 TWh (EnerData, 2024).

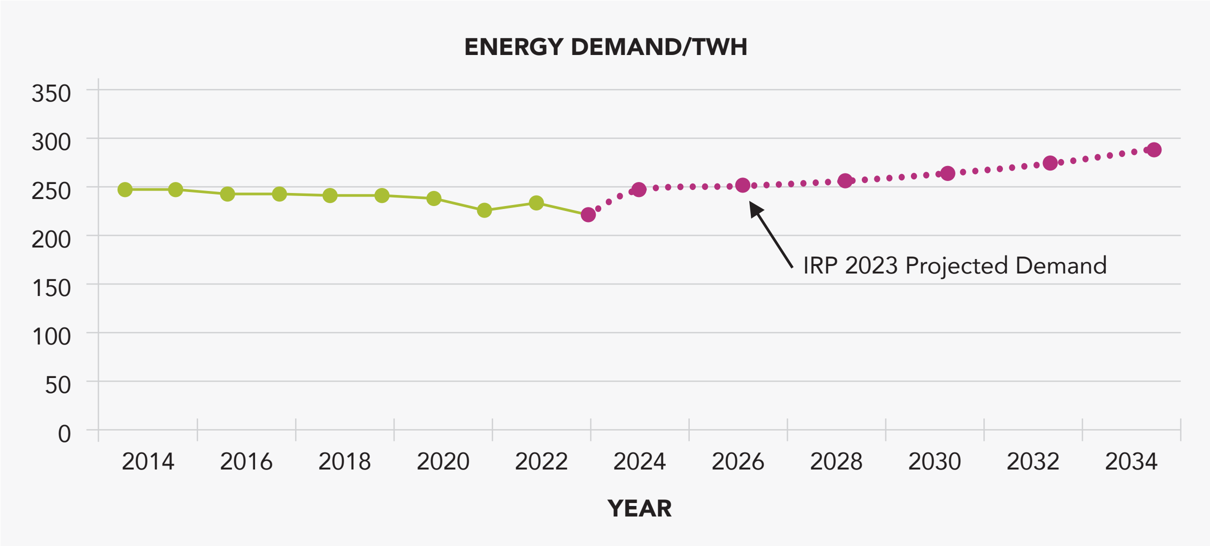
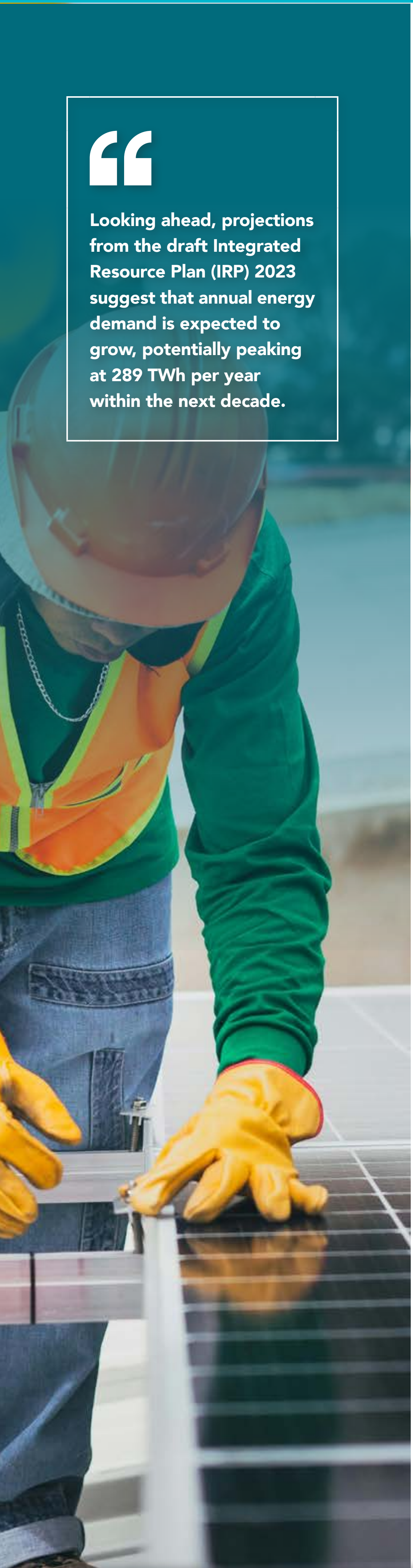


FIGURE 17 Annual energy demand history and forecast
Source: GreenCape analysis of Eskom data and draft IRP 2023



Looking ahead, projections from the draft Integrated Resource Plan (IRP) 2023 suggest that annual energy demand is expected to grow, potentially peaking at 289 TWh per year within the next decade.

The draft IRP 2023 electricity demand projections are shaped by several interconnected factors. First and foremost, anticipated economic growth plays a significant role; higher growth rates in sectors like manufacturing and services typically lead to increased energy consumption.

Additionally, an analysis of demand patterns across various sectors (industrial, residential, and services) helps to identify trends and shifts in consumption. For instance, fluctuations in industrial activity, especially in critical sectors like mining, can have a major impact on overall demand. Improvements in energy efficiency are also factored into the projections. Ongoing initiatives promoting energy-saving technologies can dampen growth in electricity demand. Furthermore, government policies aimed at promoting renewable energy and reducing reliance on fossil fuels are integral to shaping future consumption patterns. Lastly, broader economic conditions, such as commodity prices and global market trends, can affect local industries and, consequently, electricity demand. By integrating these diverse factors, the projection provided above seeks to provide a comprehensive understanding of future electricity needs, ensuring that planning is aligned with anticipated economic and social developments.

06 The key renewable energy role players in South Africa

Who's who and what do they do?

When thinking about installing renewable energy in South Africa, it is important to understand how the different stakeholders within the industry interact with each other as well as what organisations govern their operations. Figure 18 gives an overview of the electricity landscape within South Africa, at the time of writing.

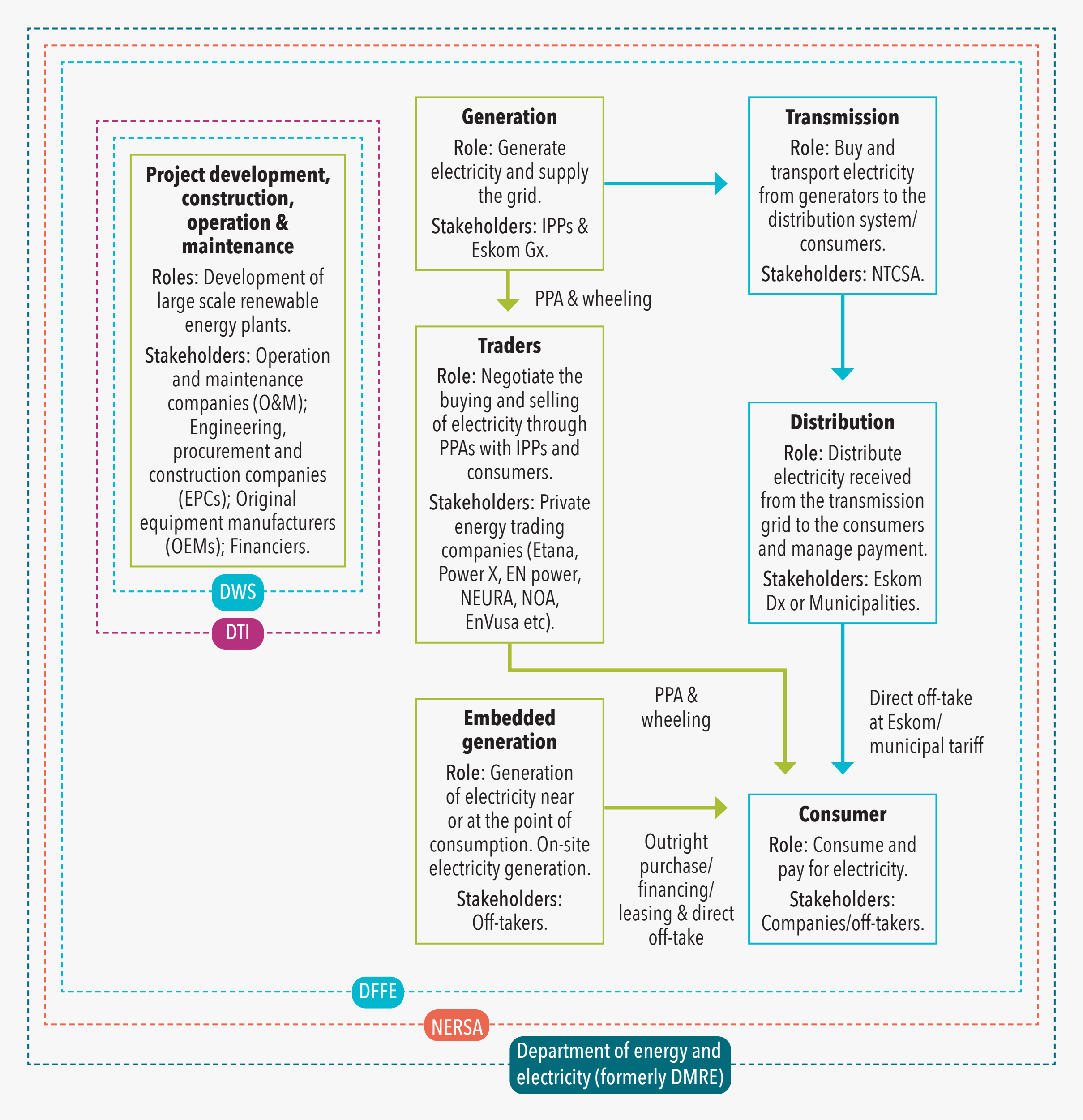


FIGURE 18 SA electricity landscape

To fully understand the electricity landscape in South Africa, it is essential to recognise the responsibilities of the key entities involved under national policies. The national government, through the Department of Energy and Electricity, is responsible for energy planning, policy implementation, and regulatory compliance. This includes overseeing frameworks such as the Integrated Resource Plan, the National Energy Act (NEA), and the Independent Power Producer Office (IPPO).

Various agencies, including Eskom, the National Energy Regulator of South Africa (NERSA), and the National Transmission Company of South Africa (NTCSA), manage energy generation, distribution, and transmission. Local municipalities handle the distribution of electricity to consumers within their areas. Additionally, private entities such as IPPs, Original Equipment Manufacturers (OEMs), Engineering, Procurement, and Construction (EPC) contractors, and energy traders play crucial roles in project execution and electricity trading. Some detail on key stakeholders is captured in Table 15.

ORGANISATION	POLICY	RESPONSIBILITIES
NERSA	Electricity Regulation Act (ERA)	Issuing and monitoring of licenses and registrations for generation, transmission, distribution, import/export and trading entities. Also responsible for approving electricity tariffs.
	Integrated resource plan (IRP)	Assist in the implementation of the IRP by ensuring the issuance of generation licensing aligns with IRP goals.
	RE policies	Approve PPAs and regulate IPPs, implement and monitor SSEG and net metering policies.
	Grid and distribution network codes	Monitor compliance and enforce all the grid codes of South Africa.
	Other	Mediate and resolve disputes between industry players.
Department of Energy and Electricity	IRP	Responsible for the implementation and continued update of the IRP.
	National Energy Act (NEA)	Responsible for the development and implementation of energy policies. Mandated to monitor and report energy-related data.
	Independent power producer procurement programs (IPPP)	Manage the various power producer procurement programmes and oversee the operations of the Independent Power Production Office (IPPO).
	ERA	Gives the department the responsibility to monitor the operations of NERSA and ensure they are fulfilling their responsibilities.
Department of Forestry, Fisheries and the Environment (DFFE)	National Environmental Management Act (NEMA)	Predict, monitor and manage the environmental impact of all projects.
	Climate Change Act 22 of 2024	The Climate Change Act 22 of 2024 sets a regulatory framework for South Africa's transition to a low-carbon, climate-resilient economy, impacting business operations through new emissions targets, reporting requirements, and a focus on socio-economic inclusivity.

TABLE 15 Key stakeholders in the national electricity landscape

The renewable energy market in South Africa is shaped by a framework of key policies and regulations designed to promote sustainable energy development and diversify the energy mix. These policies aim to address the pressing challenges of energy security, reduce reliance on coal, and meet climate change commitments. Central to this framework is the REIPPPP, which has catalysed significant investment in wind and solar projects. Additionally, the Integrated Resource Plan (IRP) outlines the country's long-term energy strategy, while the National Energy Act (NEA) and other regulatory frameworks establish guidelines for energy governance and compliance. Together, these policies create an enabling environment for the growth of renewable energy, driving both public and private sector engagement in the transition toward a more sustainable energy future. Table 13 below provides insights on six relevant policies that companies should be aware of when exploring renewable energy. More detail is provided on the latest policy update, the South African Climate Change Act 22 of 2024 and Implications for Businesses.

POLICY	INSIGHT/RELEVANCE
South African grid code/ Network code (SAGC)	Overseen by NERSA the SAGC applies to generators, distributors as well as end-users. It outlines the conditions and requirements to which prospective connection applicants must adhere. It also outlines the development plan for the transmission system.
Distribution network grid code	Applies to any prospective connectors to the distribution network, embedded generators included. It outlines the rules, rights, procedures and technical requirements for any potential connections to the distribution system. Similar to the SAGC it also contains development plans for the future of the distribution network.
Electricity Regulation Amendment ACT (ERA)	In 2024, amendments to the ERA act opened up a more competitive electricity market within SA, paving the way for further development of renewable energy power plants. It establishes the role of NERSA as the regulator of licensing, and prices and ensuring a fair and efficient electricity market.
Interim grid capacity allocation rules (IGCAR)	Dictates the eligibility criteria and evaluation process used by Eskom when processing applicants for grid connection. Establishes a "first ready, first served" principle when it comes to gaining access to the grid.
Integrated Resource Plan (IRP)	Outlines the future of electricity production within SA and details the timeframe and goals of the Renewable energy transition.
Climate Change Act 22 of 2024	The Climate Change Act 22 of 2024 sets a regulatory framework for South Africa's transition to a low-carbon, climate-resilient economy, impacting business operations through new emissions targets, reporting requirements, and a focus on socio-economic inclusivity.

TABLE 16 South African renewable energy policy

South African Climate Change Act 22 of 2024 and implications for businesses

The Climate Change Act 22 of 2024 marks a significant step forward in South Africa's commitment to addressing climate change. This legislation is designed to enable an effective climate change response while facilitating a long-term, just transition to a low-carbon and climate-resilient economy and society. Aligned with sustainable development goals, the Act sets out a regulatory framework to guide the country's climate policies and actions, ensuring that environmental sustainability and economic growth are pursued in tandem.

For businesses, the Climate Change Act introduces a new era of compliance and strategic adaptation. It mandates the development and implementation of sectoral emissions targets (SETs), which will impact industries such as energy, transportation, mining, and agriculture. Companies operating in these sectors will need to closely monitor their greenhouse gas emissions and may be required to implement mitigation strategies to align with the SETs. The Act also promotes transparency and accountability through mandatory greenhouse gas reporting and the submission of climate risk disclosures. These requirements will likely necessitate that businesses invest in enhanced environmental management systems, data collection, and reporting mechanisms.

Furthermore, the Act's focus on a just transition means that businesses will need to consider not only the environmental impact of their operations but also the socio-economic implications for affected communities. Companies will need to proactively engage with stakeholders and contribute to socio-economic development initiatives that support the transition of workers and communities dependent on high-carbon industries.

Overall, the Climate Change Act 22 of 2024 is expected to drive a paradigm shift in how businesses approach sustainability, risk management, and corporate social responsibility. Proactively adapting to these changes can position businesses as leaders in the emerging low-carbon economy and create opportunities for innovation, investment in green technologies, and collaboration in sustainable development initiatives.

Decision tree for choosing a system and the policy impacts

It is also important to know that the decisions made regarding the size and location of the system will have an impact on the legislative requirements of that system. Several key policies apply to all systems, shown and explained below. However, some conditional rules can affect the project timeframe, system constraints and obligations. A few key concerns when choosing a system have been highlighted in the decision tree below (Figure 19).

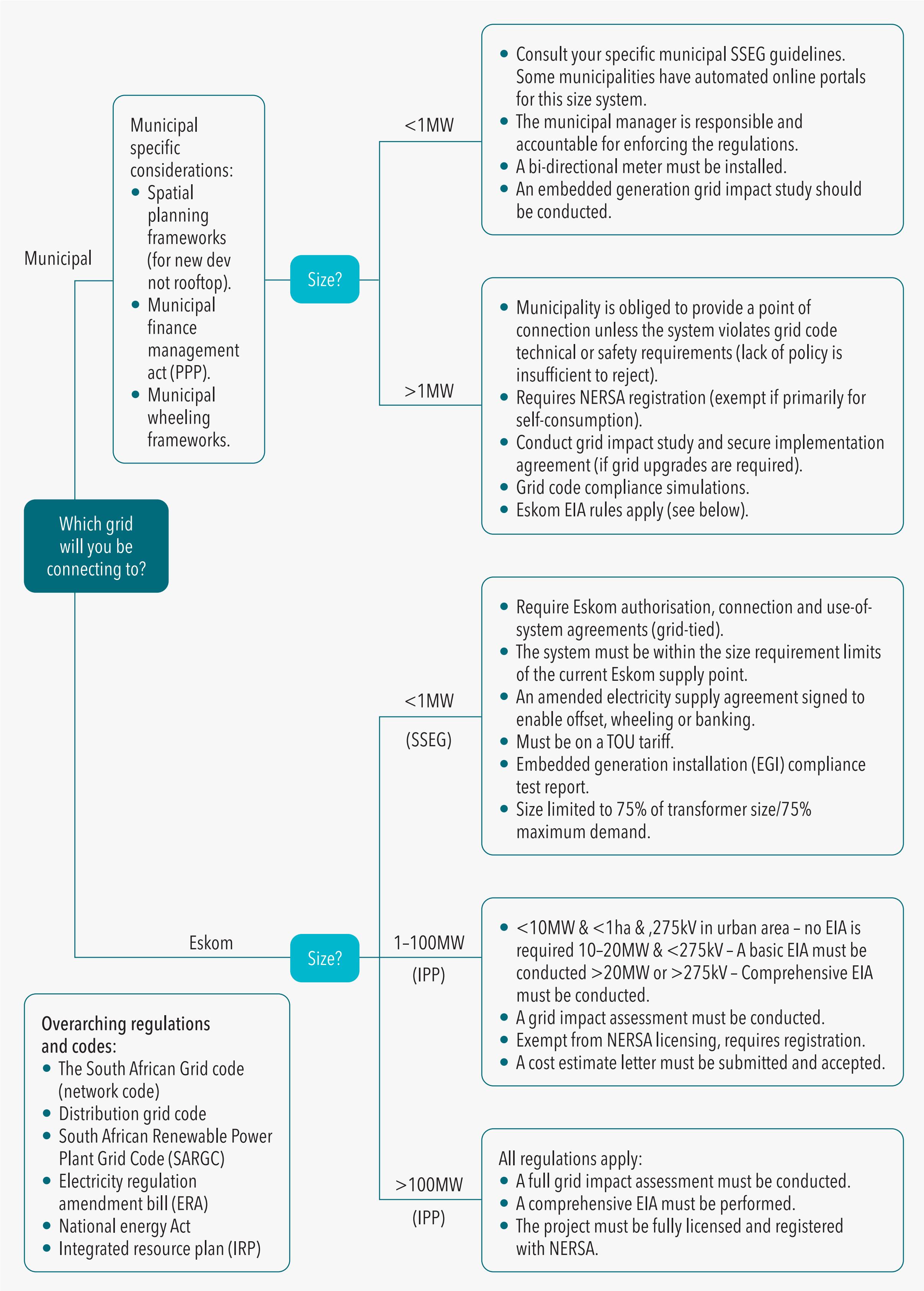


FIGURE 19 Decision tree for choosing a system and the policy impacts

Notes:

Self-consumption = sized based on existing load.

Systems being upgraded from SSEG to >1 MW must apply for licenses as a new system entirely.

NERSA: Only registration is required if >100 kW. Require both license & registration if >100 MW.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07 Resources and support

Navigating the complexities of renewable energy adoption requires access to the right resources and support. This section provides businesses with essential tools, guides, and contacts to simplify the transition to clean energy solutions. Whether decision-makers are looking for technical assistance, financial support, or strategic advice, these resources are curated to help make informed decisions at every step of the renewable energy journey. From industry-specific insights and regulatory updates to funding opportunities and implementation partners, this comprehensive compilation ensures that businesses are well-equipped to succeed in South Africa's evolving energy landscape.

Tools and guides

As businesses in South Africa increasingly adopt renewable energy solutions, having access to the right tools and guides is essential for a successful transition. This section presents a curated collection of resources designed to support decision-makers in navigating the complexities of renewable energy implementation.

GreenCape

- **Energy Market Intelligence Reports:** Insights into trends and opportunities in renewable energy.
- **Case studies:** Successful examples of renewable energy projects.
- **Guides on energy efficiency:** Practical advice for reducing energy consumption and costs.
- **Policy Frameworks:** Information on regulations affecting the renewable energy sector.

For further exploration, visit the GreenCape Library.

The following is a curated list of resources designed to support businesses in South Africa as they transition to renewable energy solutions. This compilation includes essential tools and guides to help decision-makers navigate the complexities of renewable energy implementation, from assessing current energy use to understanding regulatory requirements.

TOOL	DESCRIPTION	LINK
RETScreen Expert	Software for assessing the technical and financial viability of renewable energy projects.	RETScreen Expert
HOMER Pro	Microgrid software for modeling and optimizing hybrid renewable energy systems.	HOMER Pro
South African Energy Performance Certificate (EPC) Tool	Tool to assess and certify building energy performance as per South African regulations.	EPC Tool
SANS 10400-XA Building Energy Efficiency Standard Tool	Tool to ensure compliance with energy efficiency standards for buildings in South Africa.	SANS 10400-XA Compliance
Carbon Trust Carbon Footprint Calculator	Tool to measure and track the reduction of carbon footprint from renewable energy projects.	Carbon Trust Calculator
Eskom Time-of-Use (TOU) Tariff Calculator	Calculator to help businesses optimize energy use based on Eskom's time-of-use tariff structure.	TOU Calculator
SANEDI Tax Incentive Tool	Tool to assist businesses in accessing tax incentives for energy efficiency and renewable energy projects.	SANEDI Tool
PVWatts Calculator	Online tool from NREL to estimate the energy production and cost of energy from grid-connected PV systems.	PVWatts Calculator
Energy Star Portfolio Manager	Online tool for tracking energy and water consumption, benchmarking, and identifying opportunities for savings.	Energy Star Portfolio Manager

Useful contacts

The table below offers a curated list of key contacts and stakeholders, including industry associations, government bodies, financial institutions, and technology providers. These connections can provide valuable support, guidance, and collaboration opportunities to help businesses successfully navigate their renewable energy projects.

CATEGORY	NAME	DESCRIPTION	WEBSITE
Government resources	Department of Electricity and Energy (DMEE)	The primary government department responsible for energy policy and regulation.	Website not active yet
Government resources	Renewable Energy Independent Power Producers Procurement Programme (REIPPPP)	A government program aimed at procuring renewable energy capacity from independent power producers.	https://www.ipp-projects.co.za/
Government resources	National Energy Regulator of South Africa (Nersa)	The regulatory authority for the electricity industry in South Africa.	https://www.nersa.org.za/
Industry associations	South African Photovoltaic Industry Association (SAPVIA)	Represents the solar photovoltaic industry in South Africa.	https://sapvia.co.za/
Industry associations	South African Wind Energy Association (SAWEA)	The association for the wind energy industry in South Africa.	https://sawea.org.za/
Industry associations	South African Solar Thermal Technology Association (SASTA)	Promotes the development and adoption of solar thermal technologies.	https://sasta.co.za/
Financial institutions	Development Bank of Southern Africa (DBSA)	Provides financial support and technical assistance for renewable energy projects.	https://www.dbsa.org/
Training and capacity building	GBCSA	Training and certifications for renewable energy and energy efficiency.	https://www.gbcsa.org.za/
Training and capacity building	SARETEC	Specialised training for wind and solar energy technicians.	https://www.saretec.org.za/
Sector Support	GreenCape Sector Development Agency	Support for technical assistance and investment facilitation.	https://greencape.org.za/
Consultancy and support	CSIR	Research support, energy modeling, and project feasibility studies.	https://www.csir.co.za/
Industry networks	SAREC	Advocacy and industry support, networking opportunities.	https://www.saretec.org.za/
Technical resources	ESKOM	Support for grid connection, wheeling agreements, and grid codes.	https://www.eskom.co.za/
Technical resources	SAPVIA	Standards for solar PV installation, service providers, and procurement guidelines.	https://sapvia.co.za/


SECO

08 A call to action

As South Africa's energy landscape continues to evolve, the shift towards renewable energy solutions presents a compelling opportunity for businesses seeking to address their power needs sustainably. This guide serves as a valuable resource, illuminating the benefits of renewable energy adoption, from significant cost savings and enhanced supply security to improved operational efficiency and alignment with stringent carbon regulations. By outlining clear implementation paths and procurement models, alongside a structured five-step process for enhancing energy resilience, the guide equips businesses with the necessary knowledge and tools to navigate this transition successfully.

While challenges remain, such as regulatory uncertainties and grid capacity constraints, the insights and real-world case studies provided herein prepare businesses to tackle these hurdles effectively. Ultimately, embracing renewable energy not only strengthens individual business resilience but also contributes to a more sustainable and stable energy future for South Africa as a whole.

Call to action: Take the next step towards renewable energy adoption. Review the guide, assess current energy needs, and explore the available options. Together, let's build a more resilient and sustainable energy future for South Africa.

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The World Business Council for Sustainable Development (WBCSD)

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NBi
National Business Initiative
CLIMATE GROUP
GreenCape
World Business Council for Sustainable Development