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WHITE PAPER

Wheeling for growth: The socioeconomic impact of expanding renewable energy access in South Africa

Commissioned by

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About Krutham

Krutham is a leading research and consulting firm that specialises in working at the intersection of policy, politics and finance, tackling complex and often important issues that affect society at large. Its analysis is used by companies, investors, financial sector firms, regulators and policy makers in South Africa and around the world. It has offices in Johannesburg and London.

This report was paid for by Discovery Green. Krutham was commissioned to answer the question of what a future world - where a broader range of businesses, particularly SMMEs, had migrated to wheeled renewable power - looks like. The methodology was devised by, and the research and content were produced independently by Krutham, according to its conflicts and related policies, and the contents represent the views of Krutham and its analysts.

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Project Director: Peter Attard Montalto
Project Manager: Matthew le Cordeur
Project Analysts: Dr Cecilia Schultz, Tian Cater, Zethu Diko
Project Editors: Colin Anthony and Janice Roberts

www.krutham.com
Email: info@krutham.com
Tel: +27 11 084 5200

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Acronyms

Acronym	Full meaning
BESS	Battery Energy Storage Systems
CGV	Credit Guarantee Vehicle
DBSA	Development Bank of Southern Africa
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DTIC	Department of Trade, Industry and Competition
EDI	Electricity Distribution Industry
ERA Act	Electricity Regulation Amendment Act
GFCF	Gross Fixed Capital Formation
IEP	Integrated Energy Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ITAC	International Trade Administration Commission of South Africa
ITP	Independent Transmission Project
ITSMO	Independent Transmission and System Market Operator
JET IP	Just Energy Transition Implementation Plan
JET PMU	Just Energy Transition Project Management Unit
NDC	Nationally Determined Contribution
NEDCSA	National Electricity Distribution Company of South Africa
NERSA	National Energy Regulator of South Africa
NTCSA	National Transmission Company of South Africa
PCC	Presidential Climate Commission
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAMRC	South African Medical Research Council
SAREM	South African Renewable Energy Masterplan
SETs	Sectoral Emissions Targets
TDP	Transmission Development Plan
TSO	Transmission System Operator

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Executive Summary

This white paper quantifies the macroeconomic and sectoral impacts of renewable energy wheeling reforms on South African small, micro and medium enterprises (SMMEs) and larger non-energy-intensive tertiary sector firms. It addresses a critical research gap by examining how energy market reforms affect businesses beyond large industrial users who have generally been the focus and demonstrates how enabling these segments to access renewable energy ('green electrons') can support economic growth, job creation and climate resilience. Renewable energy wheeling in South Africa has largely benefited major industrial players, leaving smaller businesses – from big companies and mid-sized firms to SMMEs and informal enterprises – excluded from the energy transition – until now as the aggregator and trader segment becomes enabled by regulatory change. This white paper explores how unlocking renewable energy for this wider segment of economic actors at scale can deliver meaningful national economic, social and environmental benefits.

Table 1: Supply and demand summary – Renewable energy wheeling for South African SMMEs and non-energy-intensive tertiary sector firms

Demand side: enterprise benefits	**Supply-side: renewable energy requirements (maximum impact scenario)**
Electricity consumption & costs	**Required renewable capacity**
Total enterprise electricity: 35TWh/year	**Total capacity needed:** 16.9GW
Current annual electricity spend: R151bn	• ***Solar*** PV: 11.3GW (67%)
Microenterprises account for 29% of spend	• ***Wind***: 5.6GW (33%)
Tariff Savings (20% baseline - 10-30% scenarios range)	**Battery storage requirements**
Annual savings: R30.2bn (R15bn – R45bn)	**Total storage capacity:** 3.7GWh
Represents 0.4% of GDP / year	**Equivalent** to 4% of annual demand
Equals 2.8% of gross fixed capital formation	
Employment impact (20% tariff baseline - 10-30% scenarios range)	**Investment requirements**
New jobs per year: 52,721 (26,340 – 79,081)	**Renewable generation**: R282bn (solar and wind)
• ***Microenterprises*** generate 48% of new jobs	• ***Solar PV***: R169bn
• ***Small and medium enterprises***: 44% of jobs	• ***Wind***: R113bn
• ***Large enterprises***: 8% of jobs	• ***Battery storage***: R26bn
	Total investment: R308bn
Macroeconomic benefits (supply and demand)	**Job creation in renewable sector**
Long-run GDP growth increase from demand: 1.9% → 2.1-2.4% - baseline scenario 2.3% (20% tariff saving)	**Total jobs created**: 227,804
Long-run GDP growth increase from supply: 0.34% under all scenarios (10%, 20% and 30%)	
Long-run investment growth (GFCF): 3.4% → 4.2% baseline scenario (3.9-4.6%)	• ***Solar PV***: 142,203 jobs (62%)
Majority of growth stems from **employment gains**	• ***Wind***: 83,798 jobs (37%)
• **Reduced vulnerability** to load shedding	• ***Battery storage***: 1,803 jobs (1%)
• Improved **investor confidence**	• ***Manufacturing/construction***: 62% of jobs
• Enhanced business **competitiveness**	• ***Operations and indirect***: 38% of jobs

Table 1 summarises the potential scale of impact as a counterfactual of the status quo. On the demand side, the small business sector consumes around 35TWh of electricity annually, spending more than R150bn with microenterprises accounting for 29% of that spend. Unlocking wheeling could generate tariff savings of 10-30% from current levels (in current prices) and we assume a 20% baseline in this report is realised in the medium run as a conservative estimate (vs Eskom tariffs) – though 30% tariffs could be realised over the longer term. This equates to savings of R30.2bn in the baseline and a range of scenarios from R15bn to R45bn a year and create 52,721 jobs per year (assuming 20% tariff savings) or a range of scenarios from 26,340 – 79,081 additional new jobs annually, with nearly half of these in microenterprises. We see many of these impact estimates as meaningful considering we are just changing one single element amongst many in the production functions of these economic actors. Additionally, enterprises are likely to increasingly see access and cost to credit affected by their carbon intensity (ie the type of electricity they use) and also restrictions of export from carbon boarders again based on their carbon intensity – all on top of the embedding of a tighter carbon tax regime over time.

On the supply side, enabling this shift would require 16.9GW of new renewable generation capacity and significant investment in battery storage, unlocking R308bn in infrastructure investment and generating about 228,000 new jobs across solar, wind and storage industries. By contrast these figures seem large especially for jobs but we should consider the scale here vs existing installed capacity. We've built in deliberate oversupply to enable battery storage that enhances grid stability, strengthens aggregator credibility and supports flexible, dispatchable-like services in the energy system.

If SMMEs were to switch 35TWh of electricity use from Eskom to renewable energy, the resulting emissions reduction would be approximately 30.6MtCO_2e, based on 2022 emissions data. This aligns with South Africa's broader decarbonisation trajectory, supporting efforts to reduce carbon emissions in line with the country's Nationally Determined Contribution (NDC) targets, the Integrated Resource Plan (IRP), and the Just Energy Transition Investment Plan (JET IP).

The findings illustrate that enabling wheeling access for SMMEs is more than an energy solution – it is a strategic lever for national development. It can reduce energy costs, stimulate new investment, create jobs, support small business growth, advance environmental goals and contribute to economic transformation.

Introduction

What exactly is the impact of ongoing electricity reforms on the economy, and particularly the corporate sector (outside of large users)? This question has been remarkably under-researched – something this paper seeks to correct.

At their simplest, the ongoing electricity industry reforms are about bringing market forces into play for the benefit of society: choice and competition should drive better outcomes and lower tariffs (vs the alternative models – not necessarily in absolute terms). Quantifying the improvement in socioeconomic outcomes is hard – there are too many variables and too many unknowns, but a broad scenario framing is possible based on sensible and grounded assumptions, and this is what we seek to do here.

Broadly, the economy needs to transition to a better system in institutional and market terms. Such a system clearly needs to provide security of supply (ie, insulate customers from load shedding) and provide the least cost but also dependable price changes over time – especially for corporate customers. South Africa has a competitiveness problem and a productivity problem – electricity security of supply clearly impairs this and the cost of electricity is eroding what comparative advantage South Africa historically had on this front and needs to be addressed as much as possible.

Customers also need an electricity system that is responsive (and with credibility) to transition from brown coal-generated electrons to green renewables-generated electrons. The value of the green electron is a new concept but important for electricity customers who are exposed to carbon taxes, shareholder and stakeholder pressures around sustainability and trade restrictions in terms of carbon borders.

Broadly then, we need a system that produces green electrons reliably and as cheaply as possible. We look at the impacts of that and if and when a new steady state can be achieved – ultimately serviced by a far wider range of distributors, aggregators and traders supporting customers' needs.

Context: South Africa's changing electricity landscape

Electricity reform has been long overdue in South Africa and was brought to a head only by the crisis of chronic and widespread load shedding in recent years. The underlying need for reform however is independent of this – load shedding was catalytic, not causal. Indeed, it can even be partly argued that, without recourse to climate change and the need to reduce emissions, South Africa's monopoly industry setup has failed to provide least-cost tariffs through prudent investments and has been unresponsive to customer needs, while power stations reaching end of life need replacing with the least system cost of providing reliable power. This was the root of the desire to reform through the Electricity White Paper in 1999 and since.

The need for the Energy Action Plan in July 2022 was the result of a long process of getting social partners on board with what in the end was a simple multipoint plan, built on the prior work and vision of the Eskom Roadmap and of Operation Vulindlela (OV). This vision incorporated more actors within a broader and competitive market framework with better regulatory oversight and a clearer legislative and regulatory framework. At its core it had a greater number of different types of producers generating electricity and other services (including transmission investment), competing in a market on a level playing field with an Eskom generation entity that was winding down its assets, and was separate from the market operator in the National Transmission Company to be unbundled. The contracting of electrons to customers then would see a range of new types of entity – local distribution companies, aggregators and traders – that ultimately service the needs of customers in finding the types of contracting, the types of electrons and the types of pricing structure they want and need. A much broader range of reforms, including municipal trading services reforms, market code development, changes to the capacity licensing and wheeling regulatory framework, all swirl around this.

The path we are on is shaped by the need to decarbonise the economy, as outlined in South Africa's NDC pathway, as well as the individual choices companies make in response to their stakeholders, shareholders and wider societal expectations. While the take-up of green electrons has been relatively slow, Eskom has recently launched its own renewables division and does offer certification for some larger clients, though this is not yet a general commercial offering. Demand from electricity customers for such options continues to grow – driven by reporting obligations and broader sustainability requirements – which remains an underappreciated force within the broader reform process.

Rapidly rising costs for Eskom power are now overtaking the fully loaded system cost of cheaper renewables, providing an additional incentive and one that can more easily be tapped by new actors like aggregators and traders for customers. That leaves clear legacy problems for Eskom, which are outside the scope of this paper but already part of the bailout process the SOE has been undergoing in recent years and which may well have to continue in future as its business is scaled down on the generation side and unbundled more broadly.

Reforms to the market and supply side ultimately will in our view benefit customers but also crowd in additional demand for green electrons and for the lowest-cost power, which in turn can drive investment and funding for renewables capacity and associated and auxiliary systems services (including transmission, some balancing gas and particularly batteries and inter-seasonal pumped storage).

Purpose and relevance of this white paper

While different in nature, both the demand side and sell side impacts of the reform process on the economy are important and need to be more fully understood, which is the purpose of this paper. Too much focus is

often placed on the largest consumers of electricity and while important, this misses the much larger number of broader "average" or "normal" customers for electricity and their needs, which are in focus here.

The South African economy and its companies face many crises – electricity reform is a key bright spot and while ongoing, the process is incomplete and needs to be driven to conclusion. The need to remind people what the end point looks like and flesh it out in both quantitative and qualitative ways should help reinvigorate momentum for reform and contribute to both the view of social partners and the political economy that will be so important in overcoming any blockages in the path ahead.

Contribution to national development goals

Objective	Key impacts	Supporting evidence & details
Inclusive economic growth & jobs	• Tariff savings (10-30%) free up capital for investment • 52,721 (26,340 – 79,081) new jobs/year • Boosts GDP and investment via higher productivity	• R69bn-R208bn (PV) savings over five years ≈ 0.7-2% of GDP, 4.5-13.5% of GFCF • SMMEs employ ~9 million people, capture most savings-driven job growth • Lower costs and improved reliability support expansion and hiring
Industrialisation & infrastructure	• Spurs local manufacturing of renewables and storage • R308bn investment and ~228,000 jobs for renewables and storage	• SAREM local content targets: solar 45→50%, storage 20→60%, wind 47% • Majority of jobs in solar PV, wind, and batteries manufacturing/construction
Energy security & reliability	• Reduces reliance on Eskom coal and grid instability • Expands access to affordable, reliable renewables	• By 2042, renewables at 64% of capacity; coal at 10%[1] • Wheeling delivers resource-area renewables nationwide
Environmental sustainability & climate	• Accelerates decarbonisation and coal phase-out • Cuts emissions by 30.6MtCO_2e, aligning with climate targets, carbon tax • Improves public health by reducing coal-related pollution	• Phaseout of 28GW coal by 2042; build 48GW wind and 28GW solar • 2030 emissions target of 350-420MtCO_2e • Lower air pollution and health risks for vulnerable groups
Equitable access & inclusion	• Reduces barriers to SMME participation in the energy transition • Strengthens energy and financial inclusion	• SMME tariffs at R4/kWh; aggregation and simplified contracts unlock wheeling benefits • SAREM and JET-IP support procurement from black- and women-owned manufacturers, youth employment
Policy & institutional reform	• Modernises legislation, market structures and regulation • Enables Eskom unbundling, transparent tariffs, liberalisation	• ERA Act (2025), Climate Change Act (2025), Carbon Tax amendments, SAREM, JETIP • NERSA's 2025 wheeling framework ensures fair, cost-reflective grid access
Health & social development	• Reduces health risks from coal emissions and pollution • Ensures reliable power for health, education, communities	• SAMRC: 6% higher mortality risk near coal plants; transition mitigates this • Enhanced energy access for healthcare and social infrastructure

[1] This calculation was made by assessing coal decommissioning by 2042 (latest Eskom plan) and the latest 2024/5 IRP plan.

Methodological approach

In this report, we want to look at what the world looks like when a very large chunk of the corporate entities in South Africa have access to renewable power (green electrons) via a reformed electricity supply industry. In other words, we are looking at a scenario of an end state, after current reforms are concluded, to see how the impact of this differs from the current status quo in terms of the socioeconomic effect.

We are not looking here at the transition to that new world, which might well be stop-start and non-linear (even though we have a view that momentum is strong and headed in the right direction). Too much analysis often gets lost in the question of what happens this year and next and the one after that, rather than considering what customers will experience in the end state. This paper focuses on that end state.

The baseline scenario was developed to reflect current energy demand and cost exposure among SMMEs and non-energy-intensive tertiary sector firms. Enterprise classifications were based on turnover thresholds in line with the National Small Business Act and South African Revenue Service (SARS) requirements, enabling consistent segmentation across sectors. Enterprise counts were derived by triangulating data from sources including the Small Enterprise Development Agency (SEDA) SMME updates, FinFind reports and FinMark Trust surveys. Conservative averages were applied to address inconsistencies, especially for microenterprises.

We applied a context-specific method to estimate electricity consumption across enterprise sizes, using UK benchmarks as a baseline and adjusting them for South African conditions. For microenterprises, we drew on local case studies and adjusted the benchmarks downward to reflect lower energy usage among service-oriented businesses (majority of microenterprises), frequent power outages (averaging 1.33 days per month nationally) (Minerals Council SA, 2025, 2025), reduced operating hours and widespread use of energy-efficient lighting. For small and medium enterprises that are not energy-intensive, we applied a range of estimates – assigning higher values to manufacturing and industrial operations and lower values to service-sector firms, many of which operate in shared premises or for limited hours. For energy-intensive medium enterprises and large non-energy-intensive enterprises, we relied on local case studies, electricity consumption data from the Department of Mineral Resources and Energy (DMRE) and registered taxpayer data from SARS to estimate annual energy usage (DMRE, 2022; SARS, 2024).

To calculate the supply of renewables and battery to support the 35TWh, we assessed the required supply in peak (10 hours) and off-peak (14 hours) periods. Wind was allocated an amount to service 85% of the peak demand, while solar PV was allocated an amount to service 15% of the peak demand, as well as charging batteries for the off-peak period. This then provided our breakdown of the supply of wind, solar PV and batteries to service the total demand. Our investment and employment requirements were informed by the International Renewable Energy Agency (IRENA), the Integrated Energy Plan (IEP), the Council for Scientific and Industrial Research (CSIR), the South African Renewable Energy Masterplan (SAREM) and the UCT Graduate School of Business (GSB) benchmarks. We applied these metrics – investment per GW for solar PV and wind, and per GWh for batteries, as well as jobs per unit – to estimate the total capital outlay and employment needed. Emissions were estimated using data from South Africa's National Greenhouse Gas Inventory Report (2024). The total emissions from electricity generation were divided by the total electricity generated to derive an updated grid emissions factor. This factor was then applied to the relevant electricity consumption figure to estimate total emissions, ensuring alignment with official data.

Baseline scenario

This baseline scenario provides a data-driven overview of South African SMMEs and larger non-energy-intensive companies in the tertiary sector, focusing on their energy access, consumption and economic contribution. It highlights their position within the national electricity market and the opportunity for renewable energy wheeling. The purpose is to quantify and contextualise the scale and energy needs of these segments, illustrating their distribution, employment contribution and role in GDP. It frames the need –

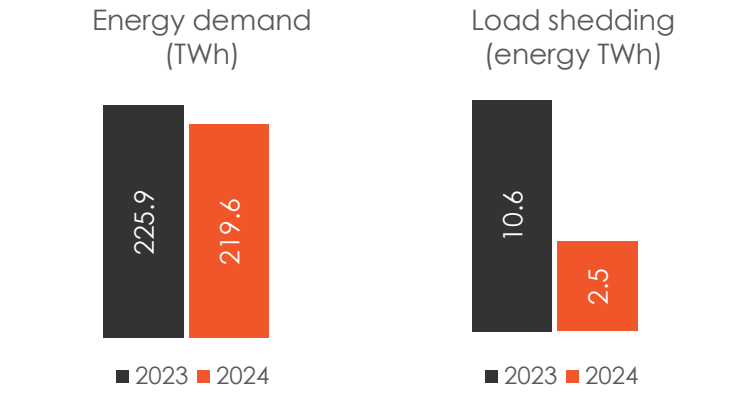
and opportunity – to unlock wheeling for businesses historically excluded from direct energy procurement. Unlike large industrial users, tertiary sector companies often lack the scale to enter into power purchase agreements (PPAs) with independent power producers (IPPs), making alternative access models essential. The scope includes:

1. Trends in electricity supply, demand and tariff escalation
2. The number, sectoral distribution and employment footprint of SMMEs and relevant tertiary sector companies
3. Their economic contribution, including GDP share and cost per job
4. The current policy and market environment for renewable energy access and limitations of wheeling for these groups

Setting the scene: energy challenges facing SMMEs and the tertiary sector

Between 2023 and 2024, South Africa experienced a notable improvement in electricity supply, with total energy production rising 4% and the number of consecutive days without load shedding reaching 281 by the end of 2024 (CSIR, 2025). Yet, as ***Figure 1*** shows, these gains occurred alongside a 3% decline in overall energy demand, reflecting shifts in consumption patterns, improvements in energy efficiency and/or broader economic constraints. During the same period, the national average electricity price increased 12.74% to approximately 195 cents per kilowatt-hour (c/kWh)(CSIR, 2025).

Figure 1: Comparison of energy demand and availability in TWh, 2023 and 2024



Source: CSIR (2025)

In January 2025, the National Energy Regulator of South Africa (Nersa) approved a further average Eskom tariff increase of 12.74% for 2025/26, maintaining the average price at roughly 220c/kWh – well above the average annual inflation rate of 5% (Reuters, 2025). Since 2010, Eskom's aggregate standard tariffs have increased nearly 15% a year, far outpacing inflation and placing sustained cost pressure on businesses. These rising energy costs have, in turn, raised the economy's overall cost base and impeded economic growth, as the increases are ultimately passed on to consumers (Steenkamp, 2024).

Table 2: Electricity supply update: February to March 2025

Metric	February 2025	March 2025	Unit
Load shedding	**114**	**55**	**Hours**
Planned maintenance (average)	6,984	5,741	Megawatts
Unplanned outages (average)	12,359	13,864	
Other maintenance (average)	558	293	
Total	**19,900**	**19,898**	

Source: Minerals Council of South Africa (2025)

While energy availability has improved since 2023, evident in fewer load shedding days, power outages remain a regular occurrence across the country. The latest electricity update showed that planned (including load shedding) and unplanned outages totalled 39,797MW for February and March 2025 (Minerals Council SA, 2025). This translates to 209 hours of power cuts (approximately nine days). These outages cause significant damage to the country's economy. In 2023, the South African Reserve Bank (SARB) suggested that stage six load shedding cost the economy R900m per day and five percentage points in GDP for 2022 (Fraser, 2023).

The impact of power cuts varies by sector, yet outages threaten the production, profitability and sustainability of all businesses – formal and informal, micro and large. A 2023 survey found that SMMEs incur, on average, R7,169 per month in additional costs to cover fuel for generators, rechargeable equipment and replacing wasted goods and damaged appliances (Nedbank & Township Entrepreneurs Alliance, 2023). These costs differ depending on the business's ability to adapt to power cuts and its financial capacity to invest in alternative energy sources.

For township enterprises with smaller turnovers, doing nothing often costs less than trying to keep operating. Nearly two-thirds of SMMEs reportedly close or suspend operations during load shedding, while 17% improvise by rescheduling, working from different venues or shifting to non-energy-intensive tasks (Nedbank & Township Entrepreneurs Alliance, 2023).

Revenue losses are driven by productivity declines, missed production targets, unfilled orders and delayed projects (Daisy Business Solutions, 2023). Load shedding also disrupts supply chains, delaying manufacturing, warehousing and transportation, leading to cancelled orders, lost contracts and penalties.

Beyond individual businesses, persistent load shedding reduces overall economic activity, leading to lower consumer spending, declining investment and shrinking demand. Sector-specific impacts amplify these effects: manufacturing can experience up to a 50% drop in productivity, alongside increased waste and higher operational costs; hospitality businesses face reduced operational capacity, service quality and customer volumes; and retail and food enterprises suffer from spoilage, lost trading hours and heightened customer attrition (Mkhombo, 2023; Roff et al., 2022; Sakeliga, 2022; Schoeman & Saunders, 2018). ***Table 3*** outlines the monthly average revenue losses and additional costs SMMEs face due to load shedding.

Table 3: Average revenue loss and additional cost due to load shedding

	Average revenue loss (R/month)	Average additional cost (R/month)
Food and beverage	R11,581	R6,356
Services	R12,238	R6,697
Agriculture	R18,135	R10,047
Manufacturing	R20,294	R10,812
Engineering & construction	R9,077	R16,607
Beauty	R7,083	R2,577
Information technology	R11,246	R1,708
Clothing	R2,750	R2,889
Retail	R9,339	R3,923
Financial services	R2,500	R8,655
Healthcare	R8,333	R6,854
Auto	R13,300	R10,375
Events & entertainment	R4,255	R10,000
Marketing	R5,000	R1,962
Logistics	R3,333	R14,875
Consulting	R1,880	R6,000
Wholesale	R2,000	R5,000
Crafts	R35,000	R500
Other	R8,333	R10,375
Total (average)	**R9,772**	**R7,169**

Source: Nedbank & Township Entrepreneurs Alliance (2023)

To summarise, while 2024 and 2025 (so far) haven't seen the levels of countrywide load shedding experienced in 2023, the combination of volatile supply, rising tariffs and ongoing localised outages has placed significant strain on South African businesses – particularly SMMEs and non-energy-intensive companies in the tertiary sector. For SMMEs and larger non-energy-intensive companies in the tertiary sector, energy access is not only a cost consideration but a fundamental determinant of operational resilience, competitiveness and growth. Understanding the baseline energy demand of these businesses is critical to assessing their vulnerability to supply disruptions and escalating costs, as well as identifying opportunities for more affordable and reliable alternatives. The following section outlines the scale, structure and characteristics of the enterprises under consideration, followed by a description of baseline energy demand, consumption patterns and cost exposure for SMMEs and relevant tertiary sector companies.

Enterprise profiles

For this analysis, enterprises are classified according to annual turnover thresholds, guided by the National Small Business Act (102 of 1996) and SARS requirements for small business corporation tax (BASA, 2019; SARS, 2024). Turnover is the preferred proxy because workforce size can vary widely by sector – labour-intensive firms may have a large workforce despite modest revenues, while companies with significant revenues might employ fewer people. To this end, revenue gives more consistent segmentation across industries. ***Table 4*** outlines the annual turnover bands for each enterprise category, as well as the number of enterprises per category used for this analysis.

Table 4: Annual turnover thresholds and enterprise counts by business size category

	Annual turnover bands	Number of enterprises
Microenterprises	< R1m (no lower bound)	1,000,000
Small enterprises	R1m ≤ R10m	88,153
Medium enterprises	R10m ≤ R50m	19,294
Large enterprises	≥ R50m	1,332
Total (no. of enterprises)		**1,108,780**

The large enterprises included in this analysis are those where renewable energy wheeling will be viable and have thus far been excluded. In other words, large enterprises in this scenario do not include industrial users like mines and smelters with long-term energy strategies and financial muscle to enter into power purchase agreements with IPPs. The large enterprises in this study therefore mainly operate in the tertiary sector, with one exception. We included agriculture, forestry and fishing, which are classified under the primary sector, because many large enterprises in these fields (such as commercial farming operations and aquaculture) are heavily reliant on electricity for critical processes like refrigeration, irrigation and incubation.

Furthermore, collecting data on microenterprises in South Africa is challenging due to widespread informality, fragmented data systems and limited reliable records. Most microenterprises are unregistered and lack formal bookkeeping, making accurate data collection difficult. To address this, we draw on two primary sources: the SEDA's SMME updates and FinFind's SMME reports, complemented by the latest FinMark Trust SMME survey (SARS, 2024; SEDA, 2023). There is consensus that South Africa has approximately 3.2 to 3.5 million SMMEs, of which 80% or higher are microenterprises (FinFind, 2018; Motsomi, 2024). The divergence comes in between different estimates of formal microenterprises, if any (Motsomi, 2024). We took the average of existing estimations (1.5 million, 890,000 and 650,000) and rounded it down to one million.

Baseline electricity demand

Electricity consumption estimates for South African enterprises were developed using local data and international benchmarks, adjusted for sector-specific characteristics and South Africa's energy context. Microenterprise estimates (11TWh/year) reflect observed usage in areas like Khayelitsha and Langa, while small enterprise figures (2.4TWh/year) build on UK benchmarks, adjusted for higher energy needs and backup power use. Medium enterprises are split by energy intensity (6.5TWh vs 11TWh/year) to capture sectoral variation and large enterprises are estimated at 4.0TWh based on energy balances data for commercial and public services, international benchmarks and backup generation investments.

The tariff rate is the sum of municipal rates per kWh, as well as annualised monthly service and capacity charges. The tariffs range from R4/kWh for microenterprises, often operating from residential premises, to R5.6/kWh for medium energy-intensive enterprises based on the average municipal tariffs and charges for businesses (typically 25% higher than residential). The R3.8/kWh for medium and large (non-energy-intensive) enterprises is based on the assumption that these businesses benefit from Eskom's standard tariff bands for

higher-volume consumers and access to time-of-use pricing options. These tariffs are structured according to Nersa-approved frameworks and do not involve individually negotiated pricing agreements. Instead, they reflect standard rates applicable to customers in similar consumption categories, including bulk purchase and time-of-use tariffs, which are distinct from the exceptional and highly restricted Negotiated Pricing Agreements (NPAs) reserved for specific, energy-intensive industries.

Table 5: Enterprise annual energy consumption and spend estimates

	TWh/year	Tariff	No of companies	Annual spend
Microenterprises	11.0	R4	1,000,000	R44bn
Small enterprises	2.4	R5.6	88,153	R13.3bn
Medium enterprises (non-energy intensive)	6.5	R3.8	13,282	R36.4bn
Medium, energy-intensive enterprises	11.1	R5.6	6,012	R42.3bn
Large, energy non-intensive enterprises	4.0	R3.8	1,332	R15.2bn
Totals	**35**	**R5 (average)**	**1,108,780**	**R151bn**

While firm-level data on annual electricity expenditure is difficult to obtain, these estimations illustrate the substantial spend on electricity costs. The total annual spend of R151bn was calculated by multiplying estimated consumption by tariff and scaling by the number of enterprises in each category. Microenterprises - typically the most vulnerable and least able to absorb cost shocks – account for over 29% of this total. Rising energy costs threaten the viability of many micro and small businesses, forcing them to divert resources away from growth, innovation or workforce expansion, simply to keep up with basic operational expenses. In this paper we assume savings from these fully loaded tariffs.

Macroeconomic growth and employment dynamics

SMMEs and the tertiary sector play a central role in South Africa's economy. As ***Table 6*** shows, SMMEs employ around ten million people, which accounts for roughly 40% of total employment and an estimated 38.7% of GDP (Arnoldi, 2024).[2] The majority of SMMEs operate within the services sector, with 30% in wholesale and retail trade, 23% in community and social services and 14% in financial services (Ndjama & Westhuizen, 2024).

Table 6: SMME sectoral employment and average cost per job

Sector	Employees (estimation)	Average cost per job (low-skilled and semi-skilled) per year
Agriculture	646,800	R77,550
Mining	69,900	R376,400
Manufacturing	753,750	R263,050
Construction	883,350	R232,200
Trade and accommodation	2,565,750	R189,700
Transport and communication	585,200	R263,050
Finance	1,190,000	R328,800
Community services	2,375,400	R202,300
Private households	646,800	R77,550
Total	**9,716,950**	**R223,400 (average)**

[2] Most public estimates include informal and formal employment, where SMME employment contribution is often close to 60%. However, this study focuses on formal enterprises alone, hence the smaller estimation.

Large, non-energy-intensive companies in the tertiary sector, such as those in finance, real estate, business services, transport and communication, wholesale and retail trade, catering and accommodation and community, social and personal services, also play a significant economic role. For example, the finance, real estate and business services sector remains a key driver of South Africa's GDP growth. In 2023, this sector contributed approximately R1.03tn in value to GDP, making it the single largest contributor among all sectors (Statista, 2024). In 2024, the sector grew by 3.5% and was the biggest contributor to annual GDP growth, adding 0.8 percentage points to the national total (StatsSA, 2024). The broader services sector, which includes finance, real estate and business services, reached a record R1.16tn in GDP in the fourth quarter of 2024 (TradingEconomics, 2024).

The pressure on these enterprises and their employees due to South Africa's energy volatility is especially concerning in labour-intensive sectors such as agriculture, manufacturing and food and beverages – all of which report a high incidence of job losses due to financial strain caused by unreliable power supply. According to the Nedbank and the Township Entrepreneur Alliance's 2023 survey, more than two-thirds of SMMEs have had to retrench staff due to financial losses from power outages, with the most affected sectors being food and beverages (83%), manufacturing (83%), agriculture (76%) and IT services (70%) (Nedbank & Township Entrepreneurs Alliance, 2023).

These trends pose a broader threat to national employment levels. As shown in ***Table 6***, SMME-heavy sectors such as trade and accommodation, community services and construction collectively employ millions of workers – 2.5 million, 2.3 million and 883,000 respectively. Agriculture and private households, which have relatively low average job costs (R77,550), also employ over 1.2 million people combined.

For large enterprises, ***Table 7*** shows that their economies of scale provide some buffer. Yet industry trends similarly show disproportionate increases in expenditure on utilities. The overall industry trend is equally concerning. StatsSA's annual financial statistics from 2016 to 2023 show that rental expenditure, which includes electricity for all industries, jumped from R270bn in 2022 to R314bn in 2023 (StatsSA, 2017, 2019, 2021, 2023).[3] This surge is likely reflective of both higher utility tariffs and increased consumption, putting pressure on profit margins even for well-capitalised firms. Such rising costs can deter investment in new projects, expansion or job creation, as companies prioritise cost-containment over growth. The squeeze on margins may also accelerate automation or restructuring, reducing the demand for labour and curtailing opportunities for new employment, especially in energy-intensive sectors.

Table 7: Large enterprises sector distribution, employees and costs

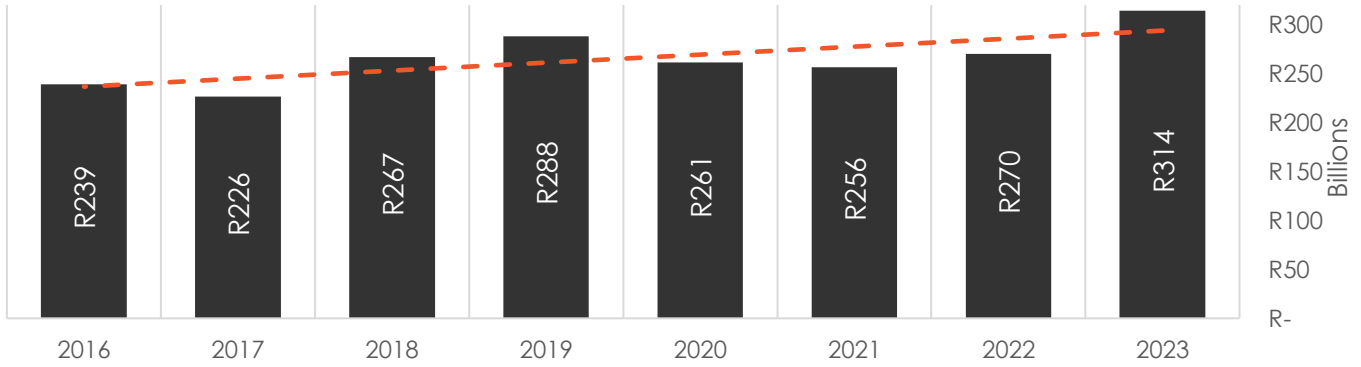
Sector	Number of enterprises	Estimated employees	Average cost per job per year
Financial intermediation, insurance, real estate & business	654	5,422,968	R381,500
Wholesale & retail trade, catering and accommodation	343	2,844,156	R240,000
Community, social & personal services and agriculture	244	2,023,248	R331,000
Transport, storage and communications	91	754,572	R263,050
Totals	**332**	**11,044,944**	**R308,888**

Moreover, these sectors are particularly sensitive to market sentiment and investor confidence. South Africa's ongoing electricity crisis and the persistent threat of load shedding have eroded investor

[3] In national accounts such as StatsSA's *Annual Financial Statistics*, utility payments such as electricity, water, and sometimes municipal services are bundled into "Rental of land, buildings and other structures including water and electricity" expenditure category.

confidence, as evidenced by subdued business sentiment and declining fixed investment. The unpredictability of power supply not only raises operational costs but also increases uncertainty, discouraging both domestic and foreign investment. This erosion of confidence coincides with stagnating GDP growth, with recent forecasts suggesting growth rates far below what is needed for meaningful job creation (Lawlor, 2023; SANEA, 2024; Swanepoel, 2025).

Figure 2: Expenditure across all industries on electricity-related expenditures, 2016-2023



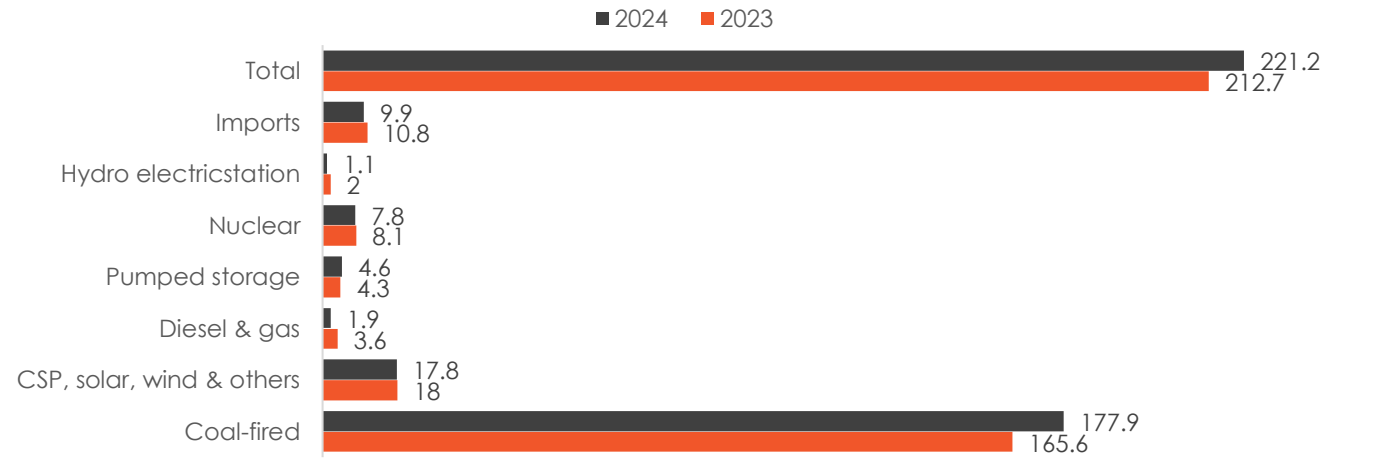
Source: StatsSA Annual Financial Statistics (2017, 2019, 2021, 2023)

Energy costs and supply reliability have become critical challenges for SMMEs and non-energy-intensive tertiary sector firms, threatening their viability and broader economic stability. Without targeted intervention, continued tariff increases and load shedding will lead to further business closures, job losses and declining investment – particularly in labour-intensive and low-margin sectors. The current energy crisis has already eroded investor and business confidence, undermining fixed investment and economic growth. The situation escalates the urgency for measures to protect these key contributors to employment and GDP from escalating energy-related risks.

Renewable energy wheeling adoption

Eskom's approved tariff increase for 2025/26 at 220c/kWh is significantly higher than the cost of newer variable energy sources like solar PV and wind, which range between 50 and 60c/kWh (CSIR, 2025). However, coal continues to dominate South Africa's energy mix and during 2024, the contribution of renewable energy decreased slightly, as ***Figure 3*** shows.

Figure 3: Energy production and mix, 2023 and 2024 (TWh)



Source: CSIR (2025)

Furthermore, as of 2025, renewable energy wheeling remains largely inaccessible to South African SMMEs and non-energy-intensive tertiary sector companies. While at least several hundred megawatts of renewable energy have been secured through wheeling agreements in South Africa by large industrial users like mines and smelters, adoption among smaller businesses is minimal.

Several structural and financial barriers inhibit broader uptake:

- **Minimum offtake requirements**: Wheeling frameworks typically work for "larger buyers", effectively excluding most SMMEs whose average demand falls well below the economic threshold for traditional wheeling arrangements.
- **Contract complexity:** Wheeling arrangements require multiple bilateral agreements – between the generator, buyer and distributor, among others – which demand legal and administrative capacity. As Vodacom has stated, even major corporations find these arrangements challenging in the current South African context (Kastelic, 2024). For SMMEs, the complexity is often prohibitive.
- **Limited grid access:** Only a handful of municipalities have developed wheeling frameworks and even these remain in pilot phases with no standardised compensation or billing mechanisms. This limits access to wheeling for businesses.
- **Lack of aggregation models:** While large companies with multiple sites (like Vodacom) are beginning to explore virtual wheeling to aggregate demand across locations, no comparable platforms exist for SMMEs. This leaves smaller users without a mechanism to bundle their energy needs and engage meaningfully in wheeling arrangements.
- **Financing constraints:** Renewable energy adoption more broadly remains a challenge for SMMEs due to affordability. According to Sapvia, although more than 60,000 solar PV installations have been made across residential, commercial and industrial sectors, SMME participation is low due to the capital-intensive nature of solar deployment (Mkhwebane & Ntuli, 2019). The financing landscape reflects this: 95% of renewable energy project support comes from grants, while loans account for just 3% and private equity less than 1% (Spani, 2024). For wheeling specifically, while there are added costs per kilowatt-hour (kWh) – including grid use fees and administrative charges – these are typically not the main drivers of financial burden. Instead, the more significant challenge for smaller firms arises from the onerous credit support requirements that offtakers must meet when signing PPAs, particularly if they lack strong balance sheets.

These barriers have effectively created a two-tier energy market. Large-scale users are increasingly able to hedge against Eskom's inflationary tariffs through wheeling and direct procurement from IPPs. SMMEs, however, remain locked into a centralised, high-cost energy supply model – even as they face growing vulnerability to load shedding and cost shocks.

Enabling SMMES access to renewable energy through wheeling will require a combination of regulatory reform, simplified contracting processes, grid access expansion and the creation of aggregation mechanisms tailored to small and distributed energy users. Addressing financing constraints – whether through concessional lending, blended finance, or de-risking instruments – will also be vital if smaller businesses are to participate in South Africa's energy transition.

Key insights and implications

1. **Energy affordability and supply stability** have become critical concerns for SMMEs and non-energy-intensive tertiary sector firms, affecting their profitability, job retention and economic contribution. Without targeted action, rising electricity tariffs and persistent supply disruptions will continue to cause business failures, job cuts and reduced investment – particularly in sectors that are labour-intensive and operate on thin margins.

2. **Enabling access to affordable, reliable renewable energy**, particularly through mechanisms like wheeling, has the potential to reverse these trends, driving macroeconomic growth, job creation and investment, while delivering significant environmental benefits.
3. **The transition to renewables is not just an energy policy imperative**, but a national economic and social priority. Realising these benefits will require targeted reforms to address the current barriers to wheeling and renewable energy adoption for SMMEs and tertiary sector firms.

These insights highlight the urgency and opportunity for systemic intervention. The next sections of this white paper explore how unlocking renewable energy wheeling can deliver on these impact areas, and what policy, regulatory and market changes are needed to achieve an inclusive, sustainable energy transition for South African businesses.

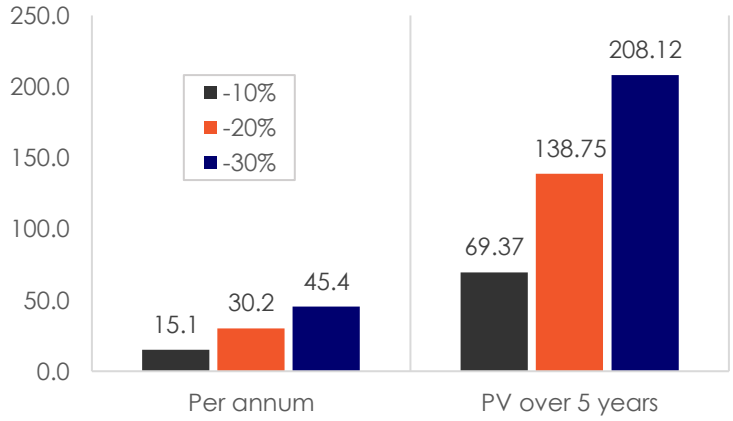
Macroeconomic impact

To assess the macroeconomic impact of introducing green wheeling in selected sectors – specifically on employment, gross fixed capital formation (GFCF) and ultimately GDP – we adopt a five-year outlook. This time horizon is chosen deliberately: while green wheeling will likely have long-run structural effects, the reliability of quantitative estimates related to employment multipliers, investment responses and broader GDP impacts diminishes beyond a five-year window. In our view, five years strikes a balance between providing time for firms to internalise future expected cost savings and recapitalise and maintain robustness in the modelling assumptions.

We simulate three tariff saving scenarios resulting from green wheeling – 10%, 20% and 30% reductions in annual electricity costs. These reflect realistic cost reductions based on existing case studies and market conditions, while capturing the diversity of outcomes across industries and wheeling configurations.

We acknowledge that tariff savings vary substantially across sectors, depending on factors such as the firm's renewable energy penetration level, the structure of its energy demand profile (eg, peak vs flat load), the type of generation technology (eg, solar PV, wind, hybrid) and the curtailment risk and storage capacity. A key distinction between renewable and utility-supplied electricity is that renewable energy is typically paid for based on generation rather than consumption. This creates a critical relationship between price and renewable coverage – beyond a certain threshold, excess generation cannot be consumed and may be curtailed or wasted. Consequently, the marginal benefit of additional coverage declines, leading to industry-specific limits on achievable cost savings. Nonetheless, we apply the same savings rates consistently over the five-year period, based on the following rationale: after accounting for sector-specific cost-to-coverage dynamics across the representative portfolio of industries in our baseline, we found that average long-run tariff savings cluster around the 10% to 30% range. While the exact savings for any given firm and industry may deviate, the scenarios we use reflect credible central estimates. This assumption allows us to focus the analysis and enhances comparability across macroeconomic channels without materially compromising plausibility.

Figure 4: Estimated savings from tariffs under each scenario (ZARbn)



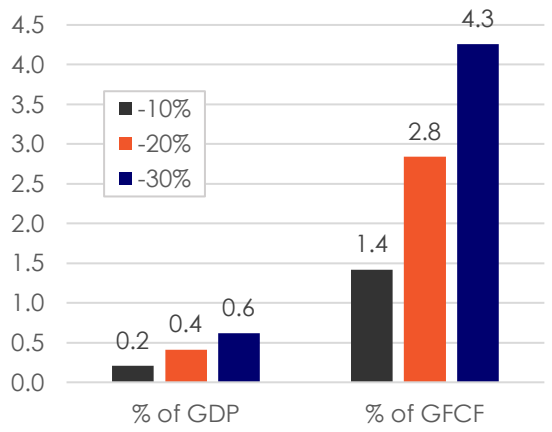
Source: Krutham calculations.
Note – 20% tariff reduction assumed as baseline

The estimated annual savings (in billions of rand) for the subset of companies considered – based on the average electricity expenditure per enterprise and number of companies are presented in ***Figure 4.*** Alongside these annual savings, we also report the present value of

cumulative savings over a five-year horizon. These present values are calculated as the discounted sum of annual savings, using Krutham's forecasted inflation rates. The results indicate substantial potential gains, with the five-year present value of savings estimated at approximately R69bn, R138bn and R208bn under the 10%, 20% and 30% tariff reduction scenarios, respectively.

To gauge the relative scale of these savings ***Figure 5*** expresses the five-year present value under each scenario as a share of South Africa's 2024 nominal GDP and gross fixed capital formation (GFCF). The findings are striking. Even under the most conservative savings scenario – a 10% reduction in electricity tariffs – the present value of savings equates to 1.4% of GFCF and 0.2% of GDP. Under the highest savings scenario – a 30% reduction – these figures rise to 4.3% of GFCF and 0.6% of GDP. These are significant gains. For context, GFCF is a core driver of long-run economic growth, and a stimulus of this magnitude warrants serious policy consideration.

Figure 5: Aggregate savings from tariffs under each scenario for tariff saving per GDP and GFCF (%)



Source: Krutham calculations.
Note – 20% tariff reduction assumed as baseline

Importantly, these savings are not static. They represent resources that can be reallocated into the broader economy, particularly through new investment, job creation, or increased consumption. This is especially relevant for energy-intensive sectors, where reduced electricity costs may be significant enough to enable firms to expand operations, upgrade equipment, or develop new production capacity. We use the present value of five years' worth of savings – rather than focusing solely on the first year – to reflect the fact that firms are forward-looking. Their current investment and hiring decisions are based on anticipated future cash flows. In this context, green wheeling functions not only as a cost-saving measure, but also as a predictable and bankable shift in a business's cost structure.

Table 8 presents estimated annual employment gains under each tariff savings scenario. These figures are based on an adjusted employment-to-revenue multiplier, calibrated from TIPS (2015) and Schröder and Storm (2020), and refined to reflect the size, sector, and energy intensity of the firms considered. A logarithmic elasticity is applied to the multiplier path – a standard approach that accounts for diminishing marginal employment gains as revenue increases. This reflects observed patterns in firm behaviour: smaller firms tend to scale employment more rapidly in response to cost savings, while larger firms typically reinvest more conservatively.

Table 8: Estimated employment gains per year resulting from tariff savings scenario (number)

Categories	-10%	-20% (baseline)	-30%
Microenterprises	8,593	17,186	25,780
Small enterprises	2,323	4,646	6,970
Medium enterprises (non-energy intensive)	5,970	11,940	17,910
Medium energy-intensive enterprises	6,923	13,846	20,769
Large energy non-intensive enterprises	2,551	5,102	7,653
Total	**26,360**	**52,721**	**79,081**

Source: Krutham calculations

The overall multiplier for 2025 is estimated at 2.1, comprising a direct effect (1.2), an indirect effect (0.7) and an induced effect (0.2). The direct effect assumes that 100% of electricity savings are redirected into employment, specifically new hires. This assumption is intended to illustrate the maximum potential

employment impact from savings alone. The indirect and induced effects capture jobs created along the supply chain and through increased household spending, respectively.

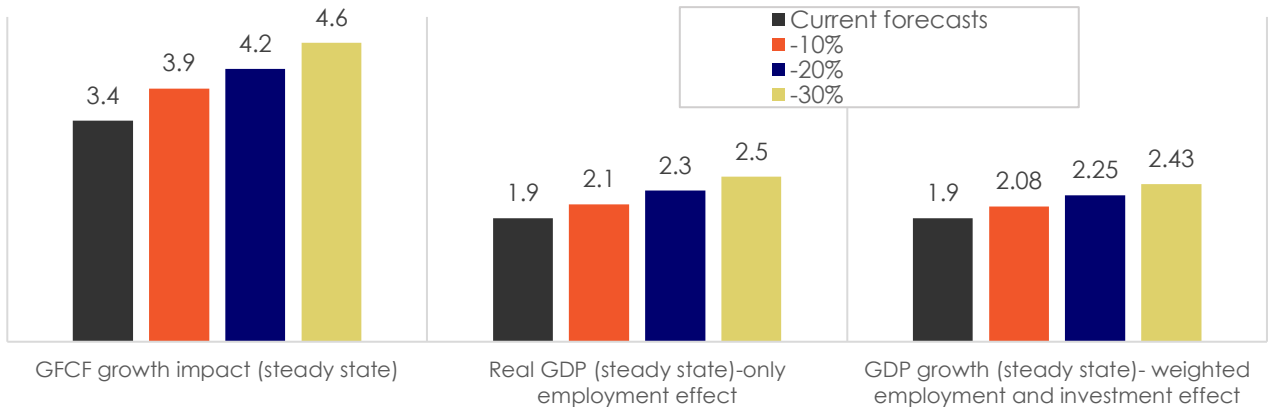
The estimates show that microenterprises drive the bulk of job creation, generating between 8,593 and 25,780 new jobs across the scenarios, due to their high labour intensity and cost sensitivity. Small and medium-sized non-energy-intensive firms also contribute significantly. In contrast, larger and more energy-intensive firms create fewer jobs, in line with their capital-intensive nature and lower employment responsiveness.

In total, the tariff reductions are estimated to create 26,360, 52,721 and 79,018 new jobs per year under the 10%, 20% and 30% savings scenarios respectively. Relative to South Africa's employed population of 17.08 million (Q4 2024), these represent 0.15% to 0.44% of total employment. While modest in percentage terms, the absolute gains are material – particularly given that they stem purely from cost savings, with no fiscal stimulus required. These are annual employment effects – and over a multi-year horizon, the cumulative impact as a share of total employment would be considerably larger.

Introducing green wheeling as a core component of South Africa's energy strategy offers far-reaching benefits for both growth and competitiveness. By directly linking end-users to renewable power sources through bilateral contracts, enterprises gain access to cheaper, more reliable electricity. This, in turn, strengthens the investment case for new capital projects and drives structural improvements in productivity and employment.

Figure 6 shows the estimated long-run impact on real GDP and GFCF, expressed as changes in their steady-state growth rates. These forecasts are produced using our semi-structural DSGE model, with each tariff savings scenario introduced as a shock through higher employment and stronger investment. The model then resolves a new long-run equilibrium under each scenario.

Figure 6: Impact on long-run (steady state) real GDP growth and GFCF (%yoy) - by reduction in tariff achieved



Source: Krutham calculations

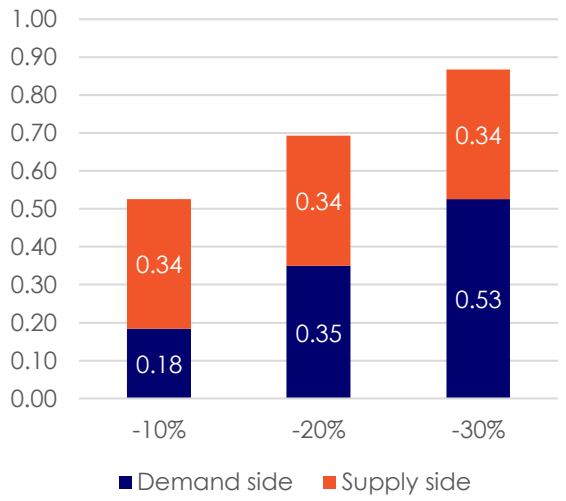
GFCF growth increases from a current steady-state rate of 3.4% to 3.9%, 4.2%, and 4.6% under the 10%, 20%, and 30% savings scenarios, respectively. Considering only the employment effect, that is, when enterprises respond to savings by hiring more workers, steady-state real GDP growth rises from 1.9% to 2.1%, 2.3%, and 2.5%. When both investment and employment effects are included, GDP growth increases more moderately, rising from 1.9% to 2.08%, 2.25%, and 2.43% under the respective scenarios. This weighted outcome assumes that not all tariff savings are channelled directly into hiring or capital formation. Rather, firms may take a cautious approach, using a portion of the gains to strengthen balance sheets or offset other cost pressures.

These estimations capture shifts in demand dynamics driven by more reliable and affordable electricity. Demand-side gains arise from higher household incomes due to employment creation and cost savings,

secondary job creation in sectors such as maintenance, logistics, and professional services, and increased business-to-business (B2B) demand. Additionally, lower electricity costs may allow firms to reduce prices, boosting consumer demand through improved affordability.

When supply-side gains are taken into consideration, our estimates suggest a GDP growth impact of 0.53%; 0.69% and 0.87% in the 10%, 20% and 30% savings scenarios, respectively, as illustrated in ***Figure 7.*** The supply-side contribution to long-run GDP growth is driven by investment in renewable energy capacity and the broader economic benefits of reduced load shedding**.** These estimations take into account the investment requirements and job creation generated by renewable energy generation, transmission and distribution, discussed in greater detail in the following section. Our estimations assume that electricity demand grows at 2.5% annually over the next five years, requiring an estimated R308bn in renewable energy generation infrastructure. Based on an employment multiplier of 14,000 jobs per GWh, this investment supports significant job creation and expands GFCF, particularly in construction, manufacturing and related services.

Figure 7: Supply and demand impact on potential GDP growth - by reduction in tariff scenario



Source: Krutham calculations
Note: *20% tariff reduction assumed as baseline*

The long-run GDP growth impact takes into account demand-side impacts discussed above, such as higher employment and income, capital deepening as businesses reinvest into productive capital and improved productivity. For both the demand and supply-side employment impacts, these effects are weighted assuming that 33% of savings go toward employment and 67% toward investment. Additionally, we considered improved economic sentiment and operational efficiency due to reduced loadshedding. Fewer power cuts lower business interruptions, reduce operating costs, and improve investor confidence. We quantify this benefit as a 0.29 percentage point boost to long-run growth.

The business rationale for wheeling rests on four pillars. First, cheaper and predictable power costs unlock capital for equipment upgrades, embedded generation and expansion in energy-intensive sectors such as manufacturing, mining and agri-processing. Second, lower electricity outlays free up resources for research and development, allowing enterprises to invest in clean-tech innovation, process optimisation and new product development. Third, these investments generate multiplier effects across the economy, enhancing cost efficiency, boosting labour absorption and stimulating downstream industries. Fourth, firms that procure electricity via renewable-energy wheeling would likely benefit from improved access to finance, particularly in manufacturing, as many lenders now prioritise net-zero portfolios and offer more favourable terms to low-carbon projects.

The uplift in real GDP growth reflects downstream effects: improved productivity, enhanced cost efficiency and stronger labour absorption. As tariff savings climb beyond 20%, growth gains begin to taper, reflecting that once energy risk is sufficiently mitigated, further reductions deliver smaller marginal benefits. This pattern underscores that while deeper cuts continue to support expansion, the most pronounced uplift occurs as firms move past critical thresholds of cost certainty. Yet the employment and GDP gains could reflect permanent shifts in South Africa's growth trajectory. By embedding wheeling within the energy mix, policymakers and businesses can generate a reinforcing cycle of investment, productivity and employment – making green wheeling a strategic lever for long-run economic transformation.

While the focus of this white paper is on the opportunities created by enabling wheeling for smaller businesses, it is important to acknowledge the growing risks for those who remain outside the energy transition. As carbon pricing frameworks tighten, including South Africa's own carbon tax, businesses that

continue relying on carbon-intensive energy sources face steep and rising operational costs. In addition, a high carbon footprint will increasingly become a liability when it comes to accessing finance – credit terms may become less favourable, or entirely inaccessible, for businesses perceived as lagging in their decarbonisation efforts. On the international front, export-oriented enterprises risk being locked out of key markets due to carbon border adjustment mechanisms (CBAMs) introduced by the EU and other trading partners. These mechanisms penalise carbon-intensive products, making them less competitive globally. In sum, without access to affordable green electrons via mechanisms like wheeling, many SMMEs risk being stranded, facing higher costs, reduced competitiveness and declining access to both capital and markets.

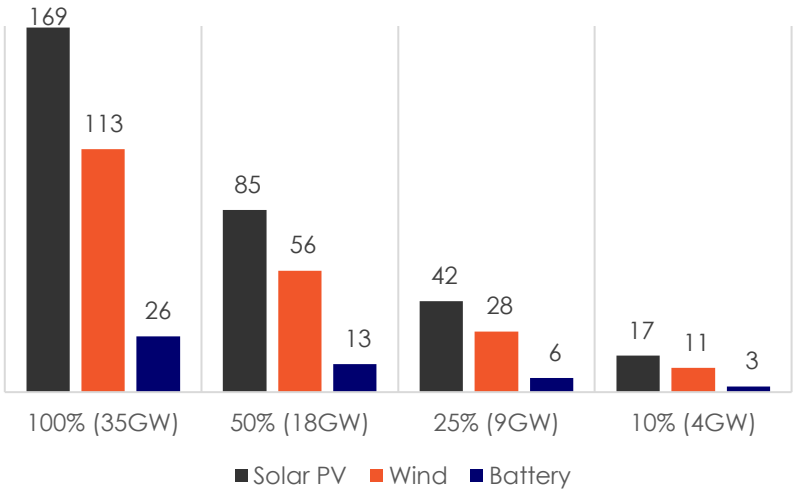
Development upside: scaling renewable supply

Scaling investment in renewables and batteries

In a future where South Africa's energy market has overcome key barriers (see appendix for more information), ensuring stable demand and a functioning electricity market with robust supply-side support becomes essential to build competitive local manufacturing in renewable energy and battery storage. In 2025, market demand has been too inconsistent to support meaningful industrialisation, whereas in the future state, stable and predictable demand forms the backbone of a successful industrial development strategy, enabling sustained investment and localisation.

In our baseline scenario (100%), SMMEs and large energy non-intensive companies will require 35TWh of renewable energy, supported by battery storage. This equates to renewable energy demand of 4GW, which will need the supply of 16.9GW of total energy, with 11.3GW coming from solar PV and 5.6GW from wind. This will require R282bn in investment for renewables (***Figure 8***) – R169bn for solar and R113bn for wind. In addition, we are adding 3.7GWh of battery storage, which will require an investment of R26bn. This goes beyond the required battery storage to meet demand, as our modelling intentionally builds in an oversupply of 19GWh per day. We estimated daily SMME electricity demand at 96GWh and projected supply at 115GWh.

Figure 8: Investment required (R'bn) over four scenarios (for amount of penetration of business customers changing to wheeled renewables)



Source: Krutham, 2025

This deliberate design choice supports a broader strategic objective: to enable storage that strengthens the grid, mitigates load shedding risk and enhances the role of aggregators in the energy system. Rather than sizing supply to match demand exactly, we see clear value in enabling surplus generation that can be stored and deployed when renewable output is low or when demand spikes. This positions aggregators not just as capacity providers but as active contributors to grid stability. There are also marketing and commercial gains to be made. Aggregators that can demonstrate meaningful contributions to dispatchability – through stored energy – are likely to gain credibility with regulators, customers and financiers. While we don't subscribe to outdated notions of "baseload" power, we recognise that Eskom and parts of the political economy will increasingly expect market actors to offer quasi-dispatchable services. This creates a kind of soft social licence to operate, where participants are rewarded for strengthening the system, not just supplying electrons. The inclusion of batteries also enhances project bankability. Storage makes renewable projects more investable, particularly in rand terms, by smoothing revenue profiles and enabling value stacking, such as arbitrage, grid support and backup.

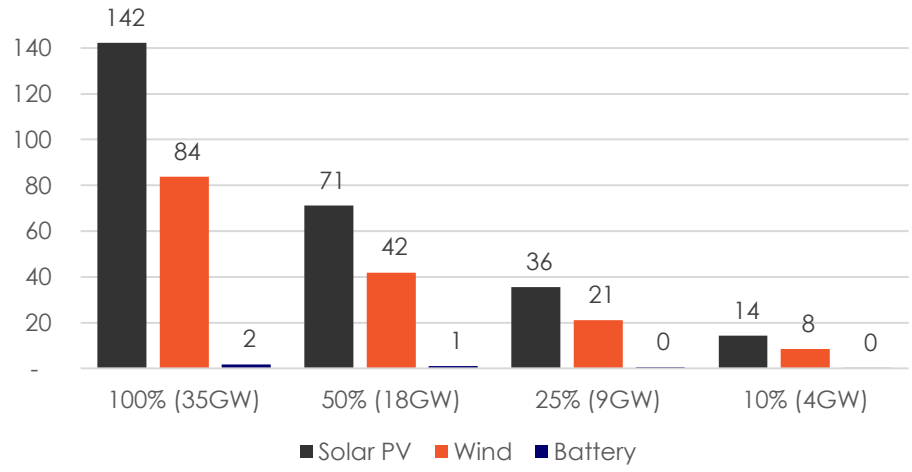
Investment in the value chain (see appendix on SAREM) spans panels, towers, batteries, transformers and inverters, underpinned by inputs from metals to R&D and certification. Existing industrial capabilities across solar, wind and battery segments, supported by mining, steel and automotive sectors, offer a solid foundation. Solar PV assembly already exists for modules and mounting structures, though cell and wafer production remains limited. Wind capabilities include tower and rotor assembly, with the potential to revive blade production. Battery value chains are more developed in mineral processing and assembly, with rising momentum in vanadium-redox flow technologies, despite imported cells dominating the market. As energy market reform unlocks consistent demand, underutilised capabilities in cables, inverters and transformers could scale. This would create opportunities to localise higher-value components like solar cells and wind blades, especially with OEM partnerships and targeted support.

Job creation across the energy value chain

The South African Renewable Energy Masterplan (SAREM) has set targets for employment in the renewable energy and storage manufacturing sector to grow tenfold, from 2,500 jobs in 2023 to 25,000 jobs in 2030. Half of these jobs would be for youth. Procurement from black- and woman-owned manufacturers is targeted to grow from less than 1% to 5% each, and women are expected to make up half of the workforce. Youth empowerment is being prioritised through programmes like Yes4Youth, with participation targeted to rise from under 5% to 75%. Meanwhile, R&D funding in the sector is set to double in real terms. Setting aside for a moment the general problem with centralised master plans – the key to sustainable jobs in the sector is sustained demand.

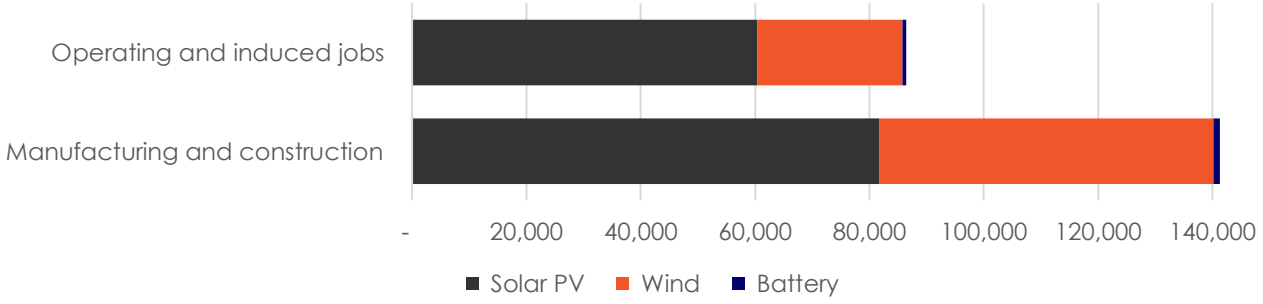
Employment in renewable energy and battery storage spans the full value chain and is set to grow. Early-stage projects need white-collar roles like project developers and engineers, while construction and manufacturing phases create demand for blue-collar workers. Technical roles such as electricians, welders and turbine technicians are especially sought after. Growth will also drive jobs in recycling and dismantling. However, skills shortages and limited inclusion of women and previously disadvantaged groups constrain potential.

Figure 9: Jobs required ('000) over four scenarios – depending on share of businesses switching to green electrons



Source: Krutham, 2025

Figure 10: Jobs by sector per type at 100% (baseline – maximum penetration)



Source: Krutham, 2025

A more inclusive, tech-savvy workforce is key to unlocking future job opportunities. In our baseline (100%), the requirement for jobs is much higher than SAREM's target, as our baseline will require about 228,000 jobs to be created in the sector (***Figure 9***), with 62% working in the construction and manufacturing phase of the projects (***Figure 10***). This is reflected across energy technologies. Solar PV dominates with 62% of all jobs focused on this sector, with wind creating 37% of new jobs and battery creating the least at 1% of total jobs. Of the 142,203 jobs in the solar PV industry, about 58% will be in manufacturing and construction compared to 42% in operations and induced jobs. The split between construction and operations is similar in the wind and BESS, with 70% of wind jobs located in manufacturing and installation and 62% in the BESS projects. We should note that most of the jobs here are about getting to a renewables capacity similar to current installed capacity of Eskom and hence the scale. There is obviously a question – left unanswered in this paper – on the pace of how that scale is reached – which is ultimately dependent on the speed of solving skills constrains and the underlying availability of labour which may take some time – not to mention the constraints in timeline on the supply side itself.

Skills development and training requirements

Achieving the required future state will require a highly skilled, responsive workforce and a dynamic, inclusive industrial base. Technical capabilities must span the full value chain and new skills will be needed for battery system deployment, end-of-life management and circular economy solutions. These must be supported by demand-led training, strong industry-education collaboration and improved qualification completion rates (see appendix for more information). Beyond technical roles, capabilities in policy, governance, regulation and public engagement are essential to shape an enabling environment. At the same time, deepening local manufacturing and supplier participation requires investment in supplier development, transformation programmes and firm-level upgrading to meet OEM standards.

Contribution to South Africa's Nationally Determined Contribution

By SMMEs switching 35TWh of electricity use from Eskom's coal-heavy supply to renewable energy, the resulting emissions reduction would be about 30.6MtCO_2e, based on 2022 emissions data. This shift would represent a material contribution toward meeting the lower end of South Africa's Nationally Determined Contribution (NDC) target range of 350 to 420MtCO_2e by 2030. Beyond the economic and social dividends, enabling wheeling access for SMMEs is therefore also a climate imperative – unlocking emissions reductions at scale while supporting national commitments under the Paris Agreement.

South Africa's decarbonisation trajectory is anchored in these NDC targets and reinforced by policy instruments such as the 2024 IRP, the Climate Change Act and the JET IP. Eskom's accelerated coal decommissioning – 28GW by 2042 – will eliminate a major emissions source, with planned renewables (48GW wind, 28GW solar by 2042) displacing retired coal plants and aligning with 1.5°C-compatible pathways. From 2041 to 2051, a further 11.4GW of coal power will be phased out, leaving only 9.4GW of residual coal generation from Medupi and Kusile until 2073.

Wheeling reforms that empower distributed renewable energy supply, especially through SMME adoption, directly support this decarbonisation pathway. Grid diversification and decentralised infrastructure enhance resilience to climate-induced risks like drought, while reducing dependence on water- and emissions-intensive coal plants. This transition will also mitigate local air pollution and water contamination linked to coal operations, improving public health outcomes in vulnerable communities. According to the South African Medical Research Council, residents near coal plants face higher risks of mortality, pneumonia and birth defects – all of which can be reduced as coal exits the energy system. The 2024 IRP's exclusion of new coal projects, combined with binding carbon budgets, climate legislation and carbon pricing under the Carbon Tax Act, creates a policy environment that supports accelerated mitigation. Wheeling reform, by unlocking emissions reductions in the SMME sector, complements these national levers and ensures that decarbonisation is not limited to large-scale industrial players. It provides a practical mechanism for a broader share of the economy to participate in meeting South Africa's climate targets, helping ensure that emissions peak soon and then decline in line with the long-term low-emissions development strategy.

Systemic dependencies and enablers

Regulatory and policy frameworks are pivotal dependencies for scaling South Africa's renewable energy sector, aligning investments and grid developments with the twin goals of secure, affordable green power and broader socioeconomic aims such as job creation and energy access. Additionally, achieving these goals will require strengthened institutional arrangements. For instance, the recently established Department of Electricity and Energy (DoEE) requires additional capacity to ensure policy certainty that will eventually drive investments. At the same time, Necom and OV need to keep the momentum going to drive the outstanding key reforms in resolving the energy crisis, specifically laying the necessary groundwork to make way for the liberalised electricity market.

Critical statutes awaiting finalisation or implementation include:

- The Climate Change Act (promulgated in 2025 but with over 20 sections deferred until 2026–27)
- The Electricity Regulation Amendment Act (promulgated January 2025 without a reticulation definition and now requiring the establishment of the ITSMO by 2030)
- Significant investments into resolving the grid constraints issues through the independent transmission projects (ITP) (first phase to be on the market by November)
- The establishment of the ITP office to facilitate the grid expansion investments
- Amendments to the Carbon Tax Act (phasing in tighter rates to reach US$20/t by 2026, US$30/t by 2030 and up to US$120/t post-2050),
- The Omnibus Energy Security Bill (criminalising electricity theft and empowering Eskom's unbundled entities), the draft TSO SOC Bill (key to launching the ITSMO, due for public comment in 2025/26)
- The Eskom Conversion Amendment Bill (entering public consultation and parliamentary processes in 2025/26)

Key reforms range from Nersa's March 2025 wheeling framework establishing third-party network charges, the annually updated Transmission Development Plan outlining ten-year network expansion, the IRP 2024 and overarching Integrated Energy Plan providing the country's future energy mix and sector roadmap, to the South African Renewable Energy Masterplan steering equitable job creation, laying the technical, planning and market foundations for reliable, cost-reflective access and procurement.

Complementary measures include the JET-IP's funding mechanisms, the DTIC's review of import tariffs on renewable components, and updated NDCs and sectoral emissions targets to mobilise finance, skills and emissions accountability, while ongoing reforms to tariff methodology and the market code underpin sector liberalisation.

Targeted interventions collectively drive South Africa's just energy transition. These include the Electricity Distribution Industry roadmap to resolve municipal debt and grid investment gaps, Eskom's coal decommissioning plan to manage transition risks and interim grid capacity allocation rules to streamline IPP integration.

Successful transmission reform depends on transparent, unbundled tariffs and bilateral agreements to secure funding, removing restrictive guarantee structures, delivering a timely ITP pilot, establishing a credit guarantee model by Q1 2026, launching a dedicated ITP Office to streamline procurement and securing a market-operator licence and a smooth ITSMO launch (April 2026–2030) to catalyse IPP growth and energy trading. *See the appendix for a full breakdown of all dependencies.*

Conclusion and strategic considerations

South Africa is at a critical point in its energy transition. Legislative reform, technological progress and market liberalisation are reshaping the electricity sector, with major implications for economic growth and inclusion.

National imperatives

Three national imperatives emerge from the future scenarios and accompanying analysis:

1. Affordable, reliable electricity is essential to protect business competitiveness, especially for SMMEs. A transition to renewables, backed by grid reform, offers more stable and cost-effective power.
2. Inclusive growth and decarbonisation require scaling up renewable deployment to 6-7GW annually to meet net-zero targets while driving industrial development and job creation.
3. Investor confidence must be restored through predictable power supply and cost savings (eg, via wheeling), unlocking new investment and economic expansion.

Unlocking scale and systemic change

Achieving these imperatives calls for a coherent strategy to unlock both scale and systemic transformation:

1. Grid investment and open-access markets must be accelerated to resolve infrastructure bottlenecks.
2. Regulatory changes should enable SMME participation through aggregation and financial support.
3. Local manufacturing and skills must be developed to support industrialisation and job creation.
4. Policy certainty is critical to attract capital – finalising key laws and plans will support long-term investment.

The scenarios presented in this white paper make it clear that South Africa's energy transition is both urgent and achievable. The opportunity to unlock scale and systemic transformation lies in coordinated action across policy, regulation, investment and market design. If the country can overcome grid constraints, democratise access to renewable energy and build local industrial capability, it will not only address the electricity crisis but also lay the groundwork for a more dynamic, inclusive and climate-resilient economy.

Table 9: Supply and demand summary – Renewable energy wheeling for South African SMMEs and non-energy-intensive tertiary sector firms

Demand side: enterprise benefits	Supply-side: renewable energy requirements (maximum impact scenario)
Electricity consumption & costs	**Required renewable capacity**
Total enterprise electricity: 35TWh/year	**Total capacity needed:** 16.9GW
Current annual electricity spend: R151bn	• ***Solar*** PV: 11.3GW (67%)
Microenterprises account for 29% of spend	• ***Wind***: 5.6GW (33%)
Tariff Savings (20% baseline - 10-30% scenarios range)	**Battery storage requirements**
Annual savings: R30.2bn (R15bn – R45bn)	**Total storage capacity:** 3.7GWh
Represents 0.4% of GDP / year	**Equivalent** to 4% of annual demand
Equals 2.8% of gross fixed capital formation	
Employment impact (20% tariff baseline - 10-30% scenarios range)	**Investment requirements**
New jobs per year: 52,721 (26,340 – 79,081)	**Renewable generation**: R282bn (solar and wind)
• ***Microenterprises*** generate 48% of new jobs	• ***Solar PV***: R169bn
• ***Small and medium enterprises***: 44% of jobs	• ***Wind***: R113bn
• ***Large enterprises***: 8% of jobs	• ***Battery storage***: R26bn
	Total investment: R308bn
Macroeconomic benefits (supply and demand)	**Job creation in renewable sector**
Long-run GDP growth increase from demand: 1.9% → 2.1-2.4% - baseline scenario 2.3% (20% tariff saving)	**Total jobs created**: 227,804
Long-run GDP growth increase from supply: 0.34% under all scenarios (10%, 20% and 30%)	
Long-run investment growth (GFCF): 3.4% → 4.2% baseline scenario (3.9-4.6%)	• ***Solar PV***: 142,203 jobs (62%)
Majority of growth stems from **employment gains**	• ***Wind***: 83,798 jobs (37%)
• **Reduced vulnerability** to load shedding	• ***Battery storage***: 1,803 jobs (1%)
• Improved **investor confidence**	• ***Manufacturing/construction***: 62% of jobs
• Enhanced business **competitiveness**	• ***Operations and indirect***: 38% of jobs

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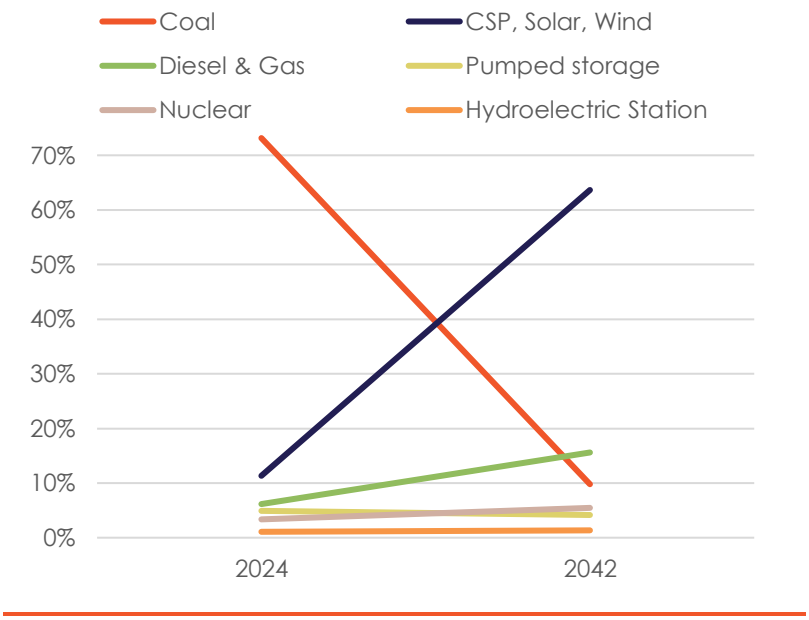
Appendix 1: Research supporting findings

Enabling more renewable energy builds

South Africa's energy sector is undergoing a transformative shift, with renewable energy poised to dominate the grid by 2042. As of 2024, coal accounts for 73% of the country's 55.4GW, utility-linked installed capacity, while solar PV and wind contribute 11%. However, under the draft IRP2024 plan and Eskom's coal decommissioning schedule, this mix is projected to reverse dramatically: coal will drop to 10% and wind/solar PV will surge to 64% of a vastly expanded 163GW total capacity by 2042. This represents a sixteen-fold increase in renewable generation over 17 years, driven by market liberalisation, regulatory reforms and strategic investments.

Figure 11: Change in energy mix – 2024 to 2042 (% of total)



Source: DMRE, Eskom, Krutham (2025)

Of the IPP projects that have reached financial close in South Africa, 10.6GW are through the Renewable Energy Independent Power Producer Producers Procurement Programme (REIPPPP), while 5.8GW are privately registered IPPs. While the REIPPPP has been in place since 2011, the energy aggregator and trader model responsible for private IPPs is a more recent development. This shift follows the lifting of regulatory restrictions on private generation in 2022 and the advance of electricity wheeling through the National Transmission Company of South Africa (NTCSA), the transmission company unbundled from Eskom. This trend is expected to continue as IPPs move away from the REIPPPP model, which requires power purchase agreements with Eskom. The shift is driven by ongoing regulatory changes and reforms, including the Electricity Regulation Amendment Act. This act sets out a legal pathway to unbundle Eskom into three separate entities: Eskom Generation, NTCSA and the National Electricity Distribution Company of South Africa (NEDCSA). It also mandates the creation of an Independent Transmission and System Market Operator (ITSMO), which is set to launch in April 2026. As a result, the IRP's planned uptake in renewables will not depend on the REIPPPP but mostly on energy aggregators and traders. These players will engage with the ITSMO to form bilateral agreements (initially long-term PPAs), which will evolve into a day-ahead market and, eventually, an intraday market. This market is expected to be fully established by 2030.

A key blockage to success is the constraint on transmission, as the country's power lines are built around coal power plants rather than wind and solar PV generators. To enable the scale of renewable energy required, this blockage must be resolved. The NTCSA has identified 14,500km of lines and 210 transformers, providing 133,000MVA that need to be installed by 2035. Its current approach is slow and an independent transmission project (ITP) pilot will launch in November 2025 to bring in the private sector through a public-private partnership (PPP). Drawing from the early success of REIPPPP, the hope is that this will accelerate efforts to resolve the blockage and increase generation capacity from 48GW to 78GW by 2035. In the future state, renewable energy will dominate all new builds in South Africa. A modern, independent transmission grid and a fully operational competitive market will remove barriers to entry, unlocking a steady pipeline of wind and solar projects. With expanded grid access and embedded bilateral trading, new capacity will be added faster, more efficiently and across a wider geographic spread. IPPs, aggregators and traders will drive this growth, confident in a stable, rules-based system that rewards innovation and speed.

System stability, wheeling and diversified energy supply

By 2031, South Africa's electricity sector will be markedly different, driven by the full implementation of the Electricity Regulation Amendment (ERA) Act, the operationalisation of the ITSMO and a mature third-party wheeling framework.

The ITSMO will manage the national grid independently, overseeing the real-time balancing of electricity supply and demand and operating an open-market platform for competitive electricity trading. IPPs, which currently enter the market through ministerial determinations and long-term Eskom PPAs, will in future respond directly to market signals – entering freely based on potential profitability, with electricity prices set through competitive mechanisms. This shift from central planning enables a willing buyer, willing seller market, where generators can trade with large customers or distributors through both physical and financial bilateral contracts. Short-term markets like day-ahead and intraday trading platforms will support immediate delivery and balance responsibility, while long-term tools such as capacity remuneration mechanisms and hedging instruments will secure future supply and investment.

The wheeling framework approved by Nersa in March 2025 further strengthens this new energy market. This promotes non-discriminatory access, transparent and cost-reflective tariffs and unbundled pricing structures. It ensures that generators across all voltage levels can participate, provided they comply with access agreements and system-use charges, while network service providers may impose fair administration or capacity fees and act as intermediaries in certain cases. Electricity wheeling will allow renewable energy generated in resource-rich areas like the Northern Cape to flow efficiently to industrial and commercial users nationwide.

By 2035, with an improved network of transmission lines and more affordable battery energy storage systems (BESS), renewable IPPs will be able to scale significantly to meet the growing demand for green electrons and provide a secure supply of electricity. Auxiliary services – including batteries and gas-to-power – will play a vital role in this transition, offering critical flexibility and stabilisation. This is becoming evident in Europe, where countries are recognising that the push for renewables and electrification will falter unless more is invested in grid infrastructure and fast-acting energy sources.

Aggregator consolidation will be strong, with full-service, many-to-many models and effective risk pooling in place. Initial guarantees will roll over, and sector expansion will require minimal support. Distribution sector reforms will be largely complete, especially for Eskom and large metros, though challenges remain for smaller municipalities. As the market and wheeling access expand, smaller customers, including households, will benefit from aggregation. Ultimately, those with the strongest balance sheets and lowest operational costs will dominate.

Aggregators and traders will enable renewables to scale by unlocking market access, optimising energy portfolios, managing risk and allowing verifiable emissions reduction through credible Renewable Energy Certificates (RECs). Their role will improve pricing transparency and investor confidence, supporting decarbonisation while enhancing reliability. A more integrated grid – combining renewables with flexible sources like pumped storage and gas – will reduce reliance on coal, strengthen supply security, and lower carbon costs for SMMEs. With key barriers removed, the ITSMO will ensure more affordable, flexible access to clean energy.

Localisation thinking behind SAREM

South Africa's JET Implementation Plan (2023) and the SAREM aim to harness the growing demand for renewable energy and storage technologies to drive inclusive industrial development across associated value chains. The initial focus – solar, wind, lithium-ion and vanadium-based batteries – aligns with both global and domestic market trends and South Africa's existing supply-side strengths.

Targets set for 2023 to 2030 in the SAREM strategy include raising local content in solar projects from 45% to 50%, and in storage from 20% to 60%, while wind remains steady at 47%. Cumulative investment in the manufacturing of key components is set to rise from R2.5bn to R15bn. The strategy also aims to improve

trade competitiveness, shifting from a negative to a neutral or positive trade balance in products like lithium-ion batteries, inverters and solar panels.

The ball has started rolling. The International Trade Administration Commission of South Africa (Itac) tariff review announced in April 2025 flows directly from the SAREM, which aims to drive localisation by aligning tariffs with industrial capacity. It proposes tariff hikes across 82 product lines – from panels and wind towers to batteries and mounting structures – potentially raising duties from R37m to R7.2bn if WTO-bound rates are applied. Industry supports localisation but warns the process must be phased, backed by demand certainty and aligned to a clear industrial strategy.

Skills development requirements

South Africa also needs stronger innovation and technology commercialisation capabilities to improve skills required for the just transition. While it cannot match global R&D leaders, the country has niche strengths in areas like batteries and inverters. To scale these, barriers to market entry must be reduced through targeted funding, technology pilots and improved incubation support. Skills, technology readiness and inclusive industrial development must advance in tandem to secure a resilient and competitive green energy future.

Completion rates for energy engineering studies in 2021 were just 29-30% at TVETs and under 22% at universities, well below the NDP's 75% target. Although over 5,800 electricians (28% women) qualified through artisan training in 2021/22, persistent skills mismatches and weak academia-industry links hinder youth retention. Initiatives like PowerUp, Yes4Youth and the JET-IP's R2.7bn skills fund aim to align education, industry and government to build a competitive, inclusive workforce.

Regulatory and policy frameworks

Regulations and policies linked to scaling renewable energy are key dependencies that ensure the country aligns its resources to meet the demand for secure, affordable and green electricity, while at the same time meeting the country's socioeconomic ambitions, including job creation and energy inclusion. The regulations below that require finalisation or implementation are critical for these objectives to be realised.

Table 10: Legislation tracker

Regulation	Importance of dependency	Responsibility
Climate Change Act	Although the act was promulgated in 2025, more than 20 sections were deferred to a later date so that the DFFE can lay the groundwork to implement these sections. This process could drag on into 2026 to 2027.	DFFE, PCC
Electricity Regulation Amendment (ERA) Act	The act was promulgated without the reticulation definition in January 2025 (critical that this is resolved for distribution reform) and is now in implementation. The act requires the ITSMO to be established by 2030.	DoEE, DMPR
Carbon Tax Act Amendment	The Carbon Tax (2019) follows a phased approach: initially modest rates with allowances, which will gradually tighten. Government aims to increase the carbon price annually by at least $1 to reach $20 by 2026, $30 by 2030, and up to $120 post-2050. Amendments will take effect in 2026 with tax design options for 2026 to 2035 to provide policy certainty.	NT
Omnibus Bill (Energy Security Bill)	The bill will criminalise electricity theft, will make Eskom and its unbundled entities expropriating authorities (important for transmission rollout) and will set up an appeals tribunal. This bill could include other issues not yet resolved through the ERA Act and can resolve other key legislative issues.	DoEE, JET PMU

Regulation	Importance of dependency	Responsibility
Draft Transmission System Operator (TSO) SOC Bill	The draft TSO SOC Bill is expected to be released for public comment in 2025/26 and is key to launching the ITSMO.	Eskom, Nersa
Eskom Conversion Amendment Bill	The Eskom Conversion Amendment Bill will start its public consultation and parliament process 2025/26 – a key legislative reform for Eskom's restructuring.	Eskom, DoEE

Source: Krutham, 2025

Table 11: Reform tracker (plans, frameworks, tariffs, etc)

Reform document	Importance of dependency	Responsibility
Wheeling framework	Nersa approved the wheeling framework (Regulatory rules on network charges for third-party wheeling of energy) in March 2025. It promotes fair access to electricity networks with cost-reflective, transparent tariffs; supports reliability, renewable energy uptake, and regulatory consistency to enable a just transition.	Eskom, Nersa
Transmission Development Plan (TDP)	The TDP is updated annually and outlines the NTCSA's transmission and transformer development plan for the next 10 years. This informs both the own build programme and the emerging ITP programme.	NTCSA, DoEE
Integrated Resource Plan (IRP) 2024	The IRP, a blueprint of the country's future energy mix, is at Nedlac for consultations and is expected to be finalised by June 2025. It replaces the 2019 IRP and will inform future rounds of procurement, especially related to wind and solar PV.	DoEE
Integrated Energy Plan (IEP)	The IEP sits at the apex of our energy planning framework, providing a holistic roadmap for the sector. It guides all subsector plans, including electricity, liquid fuels and gas. The deadline to finalise has moved from April 2025 to September 2026.	DoEE
South African National Renewable Energy Master Plan (SAREM)	The plan was approved and released by the DoEE in 2025. Aligned with the JET-IP, the plan will steer the energy sector to create equitable jobs.	dtic, DMPR, DoEE, PPC
Custom tariffs on renewable components	The International Trade Administration Commission of South Africa (Itac) in April 2025 launched a review of import tariffs on solar, wind and other battery components that will increase the cost of doing business for IPPs and will affect electricity prices.	dtic
JET Implementation Plan (JET-IP)	The development of funding supply through JET-IP registers and the Just Transition Finance Mechanism will drive private sector transmission development linked to the NTCSA, skills development linked to the SAREM and the development of IPP projects.	JET PMU, DBSA
Nationally Determined Contributions (NDCs)	South Africa's first NDC (2016) set a low-carbon path. The 2021 update tightened targets to 398–510 $MtCO_2e$ by 2025 and 350–420 $MtCO_2e$ by 2030, with emissions peaking by 2025. A further update is due by October 2025. Meeting these targets depends on faster renewable energy rollout and supporting infrastructure.	DFFE
Sectoral Emissions Targets (SETs)	Accountability is required for companies, state-owned entities and departments tasked with reducing emissions. Poor enforcement of the targets could have an impact on JET funding and carbon taxes, delaying progress in renewable energy rollout.	DFFE
Electricity distribution industry (EDI) roadmap	The development and implementation of a roadmap to resolve municipal debt to Eskom, lack of grid investment, unaffordable tariffs and energy theft will enable municipal reform, which is a critical part of the overall electricity reform process. There is no draft at this stage.	DoEE, Cogta, Salga

Reform document	Importance of dependency	Responsibility
Gas master plan	The plan aims to ensure the security of gas supply by diversifying local and international supply options. It also seeks to guide investments into the gas industry. The 2024 draft plan is currently being reworked as it does not plan for the short-term urgency of the gas cliff and does not align with the Climate Change Act.	DoEE
Nersa gas strategy	Nersa released a gas strategy in April 2025 that will guide the gas industry. It includes mitigating the gas cliff impacts by approval of the gas master plan, which is being reworked. The DoEE will refer to this in updating its gas master plan.	Nersa
Nersa tariff methodology	Nersa plans to review the pricing methodology for the electricity industry by March 2026. This may result in cost-reflective tariffs, which will be important for the liberalised energy state, but which may be excessively high, resulting in fiscal subsidies to ensure electricity affordability.	DoEE, Nersa, NT, NTCSA
Market code	The market code is the blueprint for the ITSMO and will ensure it is fully operational and adopted by energy traders by 2030. A 2024 draft is being reworked and must undergo a Nersa review and approval process ahead of the market operator launch in April 2026. This code can still be refined after the launch.	DoEE, Nersa, NTCSA
Eskom coal decommissioning plan	From 2027 to 2030, Eskom plans to rapidly reduce its output by removing units across its coal fleet, but not by shutting down entire plants. Key risks include missing the national climate goal targets, as well as increased costs in terms of running coal plants inefficiently – thus adding to Eskom's debt burden.	Eskom, DoEE, DFFE, PCC
Grid capacity allocation rules	Grid access remains unresolved for IPPs. The interim grid access rules were meant to resolve this, but they are flawed. Despite a "non-discriminatory grid access" policy, many private developers struggle with opaque, inconsistent and sometimes discriminatory grid allocation rules. The Interim Grid Capacity Allocation Rules were meant to introduce a fair "first-ready, first-served" approach, but in practice, the process has suffered from inconsistent implementation, lack of transparency in queue management, arbitrary delays and unclear criteria for approvals.	NTCSA, DoEE, Nersa

Grid infrastructure and system operator capacity

Key dependencies that will enable transmission reform to be implemented at scale and speed include organisational, regulatory and financing considerations, which are outlined in the table below.

Table 12: Key dependencies for grid and ITSMO enhancements

Topic	Dependency	Impact	Stakeholder
Tariff review outcome	A Nersa tariff methodology that results in an unbundled and transparent pricing regime.	Enables improved financing and planning of projects for NTCSA, Eskom, IPPs, aggregators and traders.	Nersa
Bilateral tariff agreements	Transmission-focused tariff decisions that meet NTCSA's funding requirements.	Enable NTCSA to source funding to implement its transmission plan.	Nersa & NTCSA

Topic	Dependency	Impact	Stakeholder
Lazard Structure	Removal of the Lazard upward guarantee finance structure that exists between Eskom and NTCSA.	Free NTCSA from Eskom's problematic balance sheet, enabling it to source funding on its own terms to scale and speed up the transmission plan.	Eskom & NTCSA
ITP pilot	Successful and timely implementation of pilot project.	Resolution of issues with future IPT procurement programme.	NT and DoEE
Credit guarantee vehicle (CGV)	CGV – which will focus on payment and termination risk of PPPs, including ITPs – is expected to be operational by Q1 2026.	An escrow-type account to enable money from users of the grid to flow directly to lenders.	NT
Launch of IPT Office	Launch and recruit a best-of-breed team to run the IPT Office to launch the IPT procurement programme.	Enable smooth roll-out of bid windows that emulate the success of early REIPPPP rounds.	NTCSA, DoEE and DBSA
Market operator licence	A market operator licence (along with market code and TSO Act) is required for ITSMO to launch.	Successful and timely launch of ITSMO in April 2026.	Nersa, DoEE and NTCSA
ITSMO transition	The successful launch and transition period of ITSMO from 2026 to 2030 will be critical to ensure adoption and growth in the IPP and energy trading sector to meet growing demand.	Smooth transition will result in an initial growth in energy traders, but these will merge to form fewer but larger companies in time.	NTCSA, ITSMO, DoEE