Navigating the Shift: An Analysis of South Africa's Power Sector in Transition (2024-2025)

I. Executive Summary

The South African power sector is currently navigating a period of profound transformation, characterized by persistent operational challenges, ambitious policy interventions, and a fundamental restructuring of its electricity supply industry. The pervasive issue of load shedding continues to cast a shadow over economic activity and public life, with conflicting forecasts for Winter 2025 underscoring the system's ongoing fragility despite reported improvements in Eskom's operational performance. The national response, spearheaded by the Energy Action Plan (EAP), aims to address these challenges through a multi-pronged strategy focused on stabilizing Eskom, accelerating private investment in new generation capacity—particularly renewables and battery storage—and reforming the legislative and market framework.

Key legislative reforms, notably the Electricity Regulation Amendment (ERA) Bill and the establishment of the National Transmission Company of South Africa (NTCSA), are laying the groundwork for a more competitive and diversified electricity market, including the introduction of a Day-Ahead Market. This transition is occurring alongside a critical national imperative: the Just Energy Transition (JET). The decommissioning of coal-fired power stations, exemplified by the Komati power station, has brought the socio-economic complexities of this transition into sharp focus, highlighting the need for comprehensive planning and genuine stakeholder engagement to mitigate negative impacts on affected communities.

Investment in renewable energy is accelerating, driven by policy support, declining technology costs, and the urgent need for new capacity. Rooftop solar installations have seen exponential growth, and significant utility-scale projects are underway. However, this rapid deployment of new, often intermittent, generation sources is placing immense strain on an aging and inadequate transmission grid. Addressing these transmission bottlenecks has emerged as a paramount challenge, critical to unlocking the full potential of new investments and ensuring system stability.

The mining sector, a critical component of the South African economy and a major energy consumer, has been severely impacted by rising electricity costs and unreliable supply, compelling many mining houses to invest heavily in their own generation capacity. This trend underscores the broader economic consequences of the power crisis and the adaptive strategies being adopted by industry.

Major infrastructure projects, supported by national funding initiatives like the Infrastructure Fund and significant contributions from Development Finance Institutions (DFIs), are underway to bolster energy security. However, the scale of the required investment and the historical challenges in project execution necessitate sustained focus and institutional capacity.

Overall, the South African power sector presents a dynamic and complex picture. While significant progress is being made on multiple fronts – from policy reform to renewable energy deployment – the path to sustained energy security is fraught with challenges. These include ensuring Eskom's long-term financial and operational viability, rapidly expanding and modernizing the grid, effectively managing the socio-economic dimensions of the JET, and maintaining policy consistency to foster investor confidence. The successful navigation of these interconnected issues will be pivotal in determining South Africa's energy future and its broader economic trajectory.

II. The South African Power Crisis: Current Landscape (2024-2025)

A. Load Shedding: Reality, Projections, and Underlying Causes

The persistence of load shedding remains a defining feature of South Africa's power crisis, with significant uncertainty clouding the outlook for Winter 2025. Projections regarding the severity of power cuts diverge considerably, creating a challenging environment for economic planning and public confidence. One forecast for June 2025 anticipates an intensified load shedding schedule, with potential daily blackouts of up to 14 hours in provinces such as Gauteng, Northern Cape, Limpopo, and Mpumalanga. This scenario suggests the possibility of reaching Stage 6 or even Stage 8 load shedding, which could entail up to 16 hours of power outages per day.[1] The primary drivers cited for this severe outlook include anticipated spikes in winter energy demand, persistent maintenance backlogs at Eskom's power stations, shortages of coal, and the overarching issue of aging infrastructure. This intensive phase of load shedding is projected to continue throughout June 2025 and potentially extend into July, contingent on weather patterns and the performance of Eskom's generation fleet.[1]

In stark contrast, Eskom's official Winter 2025 outlook, announced in May 2025, presents a more optimistic scenario. The utility stated that load shedding is not expected if unplanned outages can be maintained below a threshold of 13GW. Should these unplanned outages increase to 15GW, Eskom anticipates that load shedding

would be limited to a maximum of 21 days throughout the 153-day winter period, and restricted to Stage 2.[2] This more positive forecast is predicated on a reported 3.1GW year-on-year decrease in unplanned outages and general improvements in operational performance, with Eskom noting it delivered power 96% of the time during the 2025 financial year.[2]

However, operational data from early June 2025 indicates that the system remains under significant pressure. For the period of May 30 to June 5, 2025, Eskom reported that unplanned outages averaged 14,644MW (14.64GW).[4] This figure surpasses the 13GW base case for avoiding load shedding and approaches the 15GW threshold where Stage 2 load shedding would be considered, according to Eskom's own winter outlook. This recent performance data suggests that Eskom's more optimistic scenario is facing considerable challenges. The substantial discrepancy between the severe forecast outlined in [1] and Eskom's official, more hopeful, projections introduces a high degree of uncertainty. This divergence likely stems from different assumptions regarding plant performance, the effectiveness of demand management strategies, and the impact of various external factors. The operational reality of unplanned outages exceeding the 13GW target in early June 2025 lends credence to concerns that the power system's stability remains fragile, making the more severe load shedding scenarios a continued possibility should conditions deteriorate further. This volatility severely hampers economic planning, erodes investor confidence, and impacts public trust.

The underlying causes of load shedding are multifaceted and deeply entrenched. A primary contributor is the aging fleet of coal-fired power stations, which are prone to frequent breakdowns and require extensive maintenance, leading to reduced generation capacity.[1] This is compounded by logistical challenges, including delays in coal deliveries and shortages of diesel for Eskom's open-cycle gas turbines (OCGTs).[1] Systemic issues such as corruption, mismanagement within Eskom, acts of sabotage targeting power infrastructure, and the influence of criminal syndicates have further exacerbated the crisis by undermining operational efficiency and financial stability.[5] Moreover, a persistent imbalance between electricity supply and demand, worsened by delays in the transition to renewable energy sources, continues to strain the grid.[6] Even newer power stations like Medupi and Kusile have faced significant construction delays and cost overruns, often attributed to poor planning, mismanagement, and corruption, indicating that the problems extend beyond merely old assets.[5] The persistence of these varied challenges, despite numerous interventions, points towards the systemic nature of the crisis, requiring more than just technical fixes to achieve a sustainable resolution.

Table 1: Load Shedding Outlook Comparison (Winter 2025)

Source	Date of Forecast	Projected Load Shedding Stages	Key Stated Reasons/Conditions
Riseupwv.org [1]	Undated (refers to June 2025)	Up to Stage 6 or Stage 8 (14-16 hours/day in some areas)	Winter demand spikes, maintenance backlogs, coal shortages, aging infrastructure. Expected to last June-July 2025.
Eskom [2]	May 5, 2025	No load shedding if unplanned outages < 13GW. Max 21 days Stage 2 if unplanned outages at 15GW.	3.1GW decrease in unplanned outages year-on-year, improved operational performance.
Eskom (Operational Data) [4]	June 6, 2025	Unplanned outages averaged 14.64GW (May 30 - June 5, 2025)	System stable but constrained. This average is above the 13GW threshold for no load shedding and near the 15GW for potential Stage 2.

B. Eskom: Operational Performance, Financial Health, and Turnaround Efforts

Eskom has reported notable improvements in its operational performance for the financial year (FY) 2025 compared to previous years. Key indicators suggest a positive trend, with unplanned outages showing a significant decrease of 3.1GW year-on-year, from 18GW in May 2023 to 13.5GW in April 2025.[2] Planned maintenance activities were also ramped up, reaching 12.8% in FY25, an increase from 12% in the prior year.[2] These efforts contributed to an improvement in plant availability, which rose to 61% in FY2024/25 from 54.6% in the previous year.[3] A significant consequence of this enhanced performance has been a reduction in the reliance on expensive diesel-fired OCGTs, which saw usage decrease by approximately 50% in FY2025. This reduction translated into substantial cost savings, estimated at around R14.6 billion to R16 billion.[2] Furthermore, progress has been made in returning key generation units to service. Kusile Units 1, 2, and 3 have been reconnected to the main stacks with their flue gas desulphurisation (FGD) systems operational or in the process of returning to

service. Kusile Unit 6, contributing 800MW, was synchronized to the grid in March 2025, and the return of Medupi Unit 4, also with 800MW capacity, was anticipated by the end of May 2025.[2]

Despite these operational gains, Eskom's financial health remains a serious concern. For the six months ending September 2024, a period characterized by no national load shedding, Eskom reported a rise in revenue by 15.8% year-on-year to R183.71 billion, leading to a substantial increase in profit before tax to R23.03 billion from R2.24 billion in the corresponding period of 2023.[7] However, the financial results for the full year FY2023/24 paint a more troubling picture: while revenue grew by 14% to R295.8 billion, primarily due to an 18.7% tariff increase, Eskom's losses doubled to R55 billion. These losses were attributed to tariffs that did not adequately cover costs, poor operational performance during that period, escalating non-payment by municipalities, and high finance costs.[7] The burden of municipal debt is particularly acute, having risen from R74.4 billion at the end of March 2024 to R94.8 billion by the end of December 2024.[7] Compounding these financial pressures, the National Energy Regulator of South Africa (NERSA) approved a 12.74% tariff increase for the 2025/26 financial year, significantly below Eskom's request for a 36.15% increase.[7] This disparity raises concerns about Eskom's ability to close its revenue gap and fund its operational and capital expenditure needs without resorting to further government bailouts.

Eskom is actively pursuing a turnaround strategy aimed at achieving both operational stability and financial sustainability. The Generation Recovery Plan focuses on employing data-led analysis to improve the turnaround times for returning generation units to service.[3] Eskom Group Chief Executive, Dan Marokane, has articulated a vision of "pivoting Eskom into a sustainable and competitive company while ensuring security of supply".[8] Efforts continue to bring additional generation capacity online, such as the planned return of 2,550MW to service ahead of the evening peak on June 9, 2025, to further stabilize the grid.[4] However, the path to recovery is not without setbacks. The Unplanned Capacity Loss Factor (UCLF) for the financial year to date (April 1 to June 5, 2025) stood at 28.93%, a slight increase of approximately 0.8% compared to the 28.17% recorded over the same period in the previous year.[4] This uptick, though marginal, indicates that achieving consistent improvement across the entire generation fleet remains a formidable challenge. The success of Eskom's turnaround is therefore contingent not only on sustained technical performance improvements but also on addressing its deep-seated financial vulnerabilities, including the critical issues of cost-reflective tariffs and the resolution of the municipal debt crisis. Without these, operational gains may prove insufficient for

long-term stability, potentially perpetuating a cycle of underinvestment and performance challenges.

Table 2: Eskom Key Performance Indicators (FY2024-FY2025)

Indicator	FY2024 (or relevant period)	FY2025 (or relevant period)	Change (%) / Status	Source Snippet(s)
Plant Availability Factor (EAF)	54.6% (FY23/24)	61% (FY24/25)	+6.4 percentage points	3
Unplanned Outages (Generation Capacity)	18GW (May 2023)	13.5GW (April 2025)	-4.5GW (25% reduction)	2
Planned Maintenance	12% (FY24)	12.8% (FY25)	+0.8 percentage points	2
Diesel OCGT Spend	-	~R16bn saving (FY25 vs FY24)	~50% reduction in usage	3
Revenue (6 months to Sept 2024)	R158.65bn (to Sept 2023)	R183.71bn	+15.8% (Period of no load shedding)	7
Profit/Loss Before Tax (6 months to Sept 2024)	R2.24bn (to Sept 2023)	R23.03bn	Significant increase	7
Net Loss (Full Year)	R23.9bn (FY22/23)	R55bn (FY23/24)	Doubled	7
Municipal Debt to Eskom	R74.4bn (Mar 2024)	R94.8bn (Dec 2024)	+R20.4bn (+27.4%)	7
UCLF (FYTD: 1 Apr - 5 Jun 2025)	28.17% (same period 2024)	28.93%	+0.76 percentage points (slight	4

			increase)	

III. National Response: Policy and Strategic Interventions

A. The Energy Action Plan (EAP): Pillars, Progress, and Impact

In response to the escalating energy crisis, President Cyril Ramaphosa announced the Energy Action Plan (EAP) in July 2022, a comprehensive strategy coordinated by the National Energy Crisis Committee (NECOM).[9] The EAP is structured around five key pillars designed to address both immediate supply shortages and long-term energy security:

1. Fix Eskom and improve the availability of its existing supply.
2. Enable and accelerate private investment in new generation capacity.
3. Accelerate the procurement of new capacity from renewables, gas, and battery storage.
4. Unleash investment in rooftop solar by businesses and households.
5. Fundamentally transform the electricity sector to achieve long-term energy security.[9]

NECOM plays a pivotal role in this national effort, bringing together relevant government departments, state-owned entities, and key stakeholders to oversee and drive the implementation of the EAP.[9] Business technical teams have also been mobilized through NECOM to provide critical support to Eskom, including optimizing the diesel supply chain at Ankerlig, assisting with the return of additional units at Kusile, and supporting turnaround plans at four key power stations. These collaborative efforts aimed to recover approximately 5.4GW of capacity over a 12-month period from August 2023.[11]

An 18-month progress report on the EAP, released in March 2024, highlighted several tangible achievements across its various interventions.[10] Key milestones included the return to service of three units at the Kusile power station ahead of schedule, which, combined with intensive maintenance, contributed to increased availability of Eskom's fleet. A significant surge in decentralized generation was noted, with the amount of rooftop solar installed by businesses and households more than doubling to exceed 5,000 MW, largely driven by the introduction of tax incentives and financing mechanisms. On the procurement front, three additional bid windows were released in December 2023, targeting a total of 7,615 MW of new generation capacity from diverse sources including solar, wind, gas, and battery storage. Progress was also reported in the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), with seven preferred bidders reaching financial close and the first three

projects—described as some of the largest solar and battery storage hybrid projects globally—already connected to the grid.

Further initiatives under the EAP include the launch of Eskom's Cross Border Standard Offer Programme (CBSOP) to procure up to 1,000 MW of additional power from neighboring countries for a three-year period, and the successful implementation of the Eskom Standard Offer Programme, which approved 1,136.5 MW, surpassing its initial 1,000 MW target. In the realm of energy storage, the first project from Eskom's Battery Energy Storage System (BESS) programme, providing 100 MWh of storage capacity, was connected to the grid, with seven other projects, set to provide a total of 833 MWh, under construction as part of Phase 1. Grid capacity in the constrained Cape region was also enhanced, with an additional 3,400 MW unlocked through the implementation of curtailment strategies. Foundational structural reforms are also advancing: an independent board was appointed for the National Transmission Company of South Africa (NTCSA), which is nearing full operational status. The critical Electricity Regulation Amendment (ERA) Bill was passed in the National Assembly and, as of March 2024, was under consideration in the National Council of Provinces. Additionally, the National Wheeling Framework was finalized and submitted to NERSA in December 2023, setting out principles for non-discriminatory access to wheel electricity.[10]

While the EAP demonstrates a comprehensive strategic intent and the progress report indicates positive momentum in several areas, the overall impact on definitively ending load shedding is still materializing. This underscores the sheer scale of the energy challenge and the considerable time required for these multifaceted measures to mature and yield their full benefits. The success in accelerating private investment and bringing new capacity online, for instance, is heavily reliant on parallel progress in other EAP pillars, particularly grid expansion and the efficient implementation of regulatory reforms like the ERA Bill. The rapid expansion of rooftop solar, while a notable success in reducing demand on Eskom's grid, also introduces new complexities for grid management and stability. This necessitates accelerated development and implementation of frameworks for wheeling, net billing, and the registration of these distributed energy resources to ensure their orderly integration.[8] The EAP's ultimate success will depend on sustained political will, effective inter-governmental coordination by NECOM, and the ability to navigate the interdependencies between its various strategic thrusts.

Table 3: Energy Action Plan: Key Interventions & Reported Progress (as of March 2024)

EAP Pillar	Specific Intervention	Reported Progress (as of March 2024)	Key Source(s)
1. Fix Eskom & improve existing supply	Return Kusile units to service; Intensive maintenance	3 Kusile units returned ahead of schedule; Increased fleet availability	[10]
2. Enable & accelerate private investment in generation	Rooftop solar incentives; Remove licensing thresholds	Rooftop solar >5000 MW (doubled); Substantial private investment unlocked	[9]
3. Accelerate procurement of new capacity (renewables, gas, BESS)	New bid windows; Risk Mitigation Programme; CBSOP; Eskom Standard Offer; BESS Programme	3 bid windows for 7615 MW released; 7 RMIPPPP bidders at financial close (3 connected); CBSOP (1000MW) launched; SOP (1136.5MW) approved; First BESS (100MWh) connected, 833MWh in construction	[10]
4. Unleash rooftop solar investment	Tax incentives, financing mechanisms	Rooftop solar capacity more than doubled to over 5000 MW	[10]
5. Fundamentally transform the electricity sector	Establish NTCSA; Pass ERA Bill; Finalise Wheeling Framework	NTCSA board appointed, nearing full operation; ERA Bill passed National Assembly; National Wheeling Framework submitted to NERSA	[10]

B. Broader Economic Recovery and Infrastructure Initiatives

The South African government's response to the energy crisis is deeply intertwined with its broader national strategies for economic revival and infrastructure development. The Economic Reconstruction and Recovery Plan (ERRP), formulated to

address prevailing economic challenges and the impacts of the COVID-19 pandemic, explicitly identifies "a new paradigm for energy" as a core element and a key action for recovery.[12] This plan underscores the critical importance of achieving a sufficient, secure, and reliable energy supply, initially aiming to do so within two years of its launch, as a fundamental prerequisite for the broader recovery agenda.[12] Key energy-related priorities outlined within the ERRP include the swift implementation of the 2019 Integrated Resource Plan (IRP), the finalization of agreements with Independent Power Producers (IPPs), the execution of the Risk Mitigation Power Procurement Programme (RMPPP), and the crucial restructuring of Eskom.[12] The ERRP detailed specific commitments with timelines, such as fast-tracking the licensing of generation projects for own use, issuing Requests for Proposals (RFPs) for new generation capacity, and achieving the operational and financial stabilization of Eskom, including its unbundling, within a 12-month timeframe.[12] This demonstrates that energy security was recognized as a critical economic enabler even before the formalization of the EAP.

Complementing these policy frameworks is a significant national drive for infrastructure investment. The government has announced plans for over R1 trillion in public infrastructure investment over the next three years, signaling a strong commitment to infrastructure-led growth.[14] A key tool in this initiative is the "Construction Book 2024/2025," which, according to various reports, lists between 180 and 250 fully funded, procurement-ready projects with a combined value ranging from over R238 billion to R268 billion.[14] These projects span multiple sectors, including transport, water, digital infrastructure, and critically, energy. Infrastructure South Africa (ISA) has been established as a central coordinating body to manage this ambitious undertaking, with a mandate to oversee project preparation, streamline regulatory processes, and ensure projects are "viable and bankable".[17] ISA currently oversees a portfolio of 305 projects, of which 171 are in the energy sector.[17] In the past financial year alone, ISA's Projects Preparation Fund supported the development of 34 infrastructure projects with an estimated capital value of R259 billion.[14] Furthermore, seven new nationally significant infrastructure projects were unveiled for the 2025/2026 cycle, including Eskom's Tubatse Pumped Storage Scheme and Transnet's Port of Ngqura Liquefied Natural Gas (LNG) project, both directly contributing to energy security goals.[14]

The emphasis on energy security as a cornerstone of economic recovery is evident. The substantial financial allocations and the extensive project pipeline demonstrate a clear understanding that reliable power is indispensable for economic growth, job creation, and industrialization. Consequently, the success of the broader ERRP is

heavily contingent on resolving the energy crisis; delays in achieving energy security will inevitably have cascading negative impacts on all other economic reconstruction efforts. The establishment and strengthening of institutional capacity for infrastructure delivery, particularly through ISA, is a critical development. The focus on "bankable project preparation" and the commitment of over R600 million to prepare projects [14] reflect an acknowledgment of historical shortcomings in infrastructure delivery, often plagued by poor planning, lack of coordination, and bureaucratic delays—such as the reported requirement of almost 85 permits for a single renewable energy project.[17] The effectiveness of ISA in navigating these complexities and facilitating the efficient execution of the R1 trillion investment drive will be a key determinant of whether these ambitious infrastructure goals, especially within the intricate energy sector, are successfully met. Failure in this regard would not only mean wasted resources but also continued economic stagnation.

IV. Transforming the Electricity Supply Industry

A. Market Restructuring: Towards Competition and Efficiency (ERA Bill, DAM, NTCSA)

A fundamental transformation of South Africa's electricity supply industry is underway, driven by key legislative and structural reforms aimed at fostering competition, efficiency, and attracting investment. Central to this overhaul is the Electricity Regulation Amendment (ERA) Bill, which is considered crucial for ending load shedding, expediting energy development, expanding transmission infrastructure, and establishing a competitive electricity market.[9] The ERA Bill proposes the establishment of an independent Transmission System Operator (TSO) responsible for managing the national electricity grid, encompassing both a System Operator and a Market Operator. A core objective is the creation of a competitive electricity market where multiple generators can compete on a level playing field, moving away from the historically Eskom-dominated single-buyer model.[9] As of March 2024, the ERA Bill had been passed by the National Assembly and was under consideration in the National Council of Provinces.[10] The successful passage and, critically, the robust and transparent implementation of this bill, including the operationalization of the TSO and Market Operator, will significantly influence the pace of private investment and the effectiveness of the new market structure.

The establishment of the National Transmission Company of South Africa (NTCSA) is another pivotal step in this restructuring. Legally separated from Eskom [19], with an independent board appointed and nearing full operational status [10], the NTCSA is designed to create a level playing field for all electricity generators and to enable

increased investment in essential transmission infrastructure.[9] Its independence from Eskom's generation interests is vital for building IPP confidence and ensuring non-discriminatory access to the grid, which is also critical for facilitating cross-border energy trading within the Southern African Power Pool (SAPP).[20]

The introduction of a Day-Ahead Market (DAM) is anticipated to mark a paradigm shift in energy trading, creating a pricing system driven entirely by supply and demand dynamics.[20] This mechanism aims to address current inefficiencies, such as Eskom's reliance on costly diesel-fired peaker plants while selling electricity at a fixed regulated wholesale price. Under the DAM, real-time price signals are expected to enable the market to respond dynamically, ensuring that the lowest-cost generation is dispatched first. This system is also designed to provide an immediate market for power, thereby creating much-needed liquidity and mitigating market risk for suppliers. Furthermore, the DAM is expected to incentivize efficient generation practices and encourage investments in flexible solutions such as battery storage and demand-side response technologies.[20] The successful functioning of both the NTCSA and the DAM requires careful orchestration, significant technical and regulatory expertise, and capacity building across the sector. NERSA's role in overseeing this new market structure and the TSO will be paramount.

The evolving market structure is also witnessing the rise of energy traders, who are increasingly managing the supply from IPPs. These traders offer flexible contracting terms and risk mitigation strategies that are viewed favorably by financial institutions, potentially leading to lower financing costs for energy projects.[20] By aggregating demand and supply, traders can also make energy more accessible to smaller businesses, allowing them to benefit from utility-scale pricing in a "low friction" transactional environment, thereby democratizing access to affordable and clean energy.[20] This signifies a maturing market, diversifying away from traditional bilateral agreements and introducing new commercial models and potential for innovation in energy products and services. This development also necessitates appropriate regulatory oversight of trading activities to ensure market integrity.

B. The Role of Independent Power Producers (IPPs) and Private Sector Investment

The South African government has unequivocally signaled a strategic shift towards greater reliance on Independent Power Producers (IPPs) and private sector investment to address the country's energy deficit and drive the transition to a cleaner energy mix. Pillar 2 of the Energy Action Plan is explicitly focused on enabling and accelerating private investment in generation capacity.[9] A key enabler for this has been the removal of the licensing threshold for private generation facilities, a move

that has reportedly unlocked substantial private investment.[9] This policy change allows businesses to develop their own generation projects for own use or to sell to private consumers, significantly expanding the avenues for private participation beyond the traditional state-led procurement programs.

The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) continues to be a cornerstone for large-scale IPP involvement, with the Development Bank of Southern Africa (DBSA) having committed approximately R18 billion to 36 projects across the first four bid windows, encompassing a range of technologies including solar PV, concentrated solar power (CSP), wind, small hydro, and biomass.[21] The dynamism of private sector engagement is further evidenced by the explosive growth in rooftop solar installations, with businesses and households having invested in over 5,000 MW of capacity by March 2024, spurred by tax incentives and supportive financing mechanisms.[10]

Beyond direct generation, the private sector is also contributing expertise and resources. Business technical teams are actively supporting NECOM and Eskom in critical areas such as optimizing diesel supply chains and assisting with power station turnaround plans, with over 115 leading CEOs having pledged their support for national recovery efforts.[11] Eskom itself is embracing private sector collaboration, having issued a tender inviting private sector partners to support the establishment of a new, standalone Renewable Energy Business. This subsidiary aims to accelerate the rollout of clean energy projects, with Eskom reporting a ready pipeline of at least 2GW of renewable energy projects scheduled for development by 2026 and a longer-term ambition for over 20GW.[8] International finance is also playing a role, with a $1 billion World Bank loan approved in September 2023 specifically aimed at catalyzing private investment in renewables by supporting Eskom's restructuring and removing licensing barriers for projects selling electricity directly to private consumers. This has reportedly contributed to a 40% annual increase in capital deployment in the renewables sector.[19]

This multi-faceted engagement signifies that the private sector is no longer viewed merely as a supplement but as a central pillar in constructing South Africa's energy future. This increased reliance necessitates a stable, predictable regulatory environment, efficient procurement processes, and fair, non-discriminatory access to the grid—all of which are objectives of the ERA Bill and the establishment of the NTCSA. The diversification of private sector involvement, from large IPPs to individual households and corporate off-takers, and even potential partnerships in Eskom's new ventures and transmission infrastructure (via Independent Transmission Projects [19]), can enhance resilience and spur innovation. However, it also requires a nuanced and

agile regulatory approach to effectively accommodate and govern these varied forms of participation, ensuring that the benefits of private investment are maximized for the entire economy.

V. The Imperative of a Just Energy Transition (JET)

A. Navigating the Shift from Coal: The Komati Case Study

The decommissioning of the Komati Power Station (KPS) in 2022, a decision communicated pre-2019 as part of the Integrated Resource Plan, serves as a critical and challenging case study in South Africa's Just Energy Transition (JET).[23] Eskom has articulated a set of JET principles intended to guide this process, including the decoupling of repurposing and repowering initiatives from decommissioning schedules; embodying principles of distributive, restorative, and procedural justice; balancing the energy trilemma (security, access, and sustainability); and furthering Eskom's "5 E's" of Employment, Environment, Economic Growth, Equity, and Energy.[23]

However, the experience at Komati has exposed significant gaps between these admirable principles and their practical implementation. Before its final shutdown, KPS employed approximately 900 people. This number was reduced to 437 post-shutdown and currently stands at around 160.[23] The socio-economic consequences have been severe and widespread. Beyond the direct job losses at the power station, the local economy suffered due to the downturn in businesses reliant on the plant and its workforce. The concurrent closure of three coal mines in the vicinity exacerbated the job losses, leading to economic decline, skills migration out of the municipality, increased strain on social services, and rises in poverty and crime.[23]

A major point of criticism highlighted by the Portfolio Committee on Electricity and Energy (PCEE) was the inadequacy of communication and consultation processes. Stakeholders, including employees, labor unions (NUM and NUMSA), the local municipality (Steve Tshwete Local Municipality - STLM), and the broader community, reported that communication was often delayed, insufficient, and not transparent, leading to uncertainty and mistrust. Decisions were frequently perceived as having been imposed without meaningful input, with consultations often occurring after key decisions had already been made.[23] Organized labor reported that employees were often left uninformed about their future, fostering dissatisfaction. The STLM specifically noted Eskom's lack of proper consultation with the local community, expressing a desire for greater involvement and the leveraging of local ideas.[23] The Presidential Climate Commission (PCC) also acknowledged that engagements should have commenced earlier and been more inclusive, with insufficient transparency and

information sharing, especially in local languages.[23]

The lack of a comprehensive transition plan for employees was identified as a significant oversight.[23] While Eskom stated no permanent jobs were lost (implying redeployment for some), unions reported that many jobs were shifted to contractors whose contracts ended with the plant's decommissioning, severely impacting local communities.[23] New job and economic opportunities have been slow to emerge, leading to a perception among workers that the "just transition" had not delivered on implied promises of immediate job replacement.[23]

Efforts to repurpose the Komati site are underway, supported by a US$497 million World Bank project (July 2023-December 2028). This funding is allocated for decommissioning activities, demolition, site rehabilitation, repurposing the site with renewable energy projects (including a containerized microgrid and a 500 kW agrivoltaic pilot plant), and mitigating socio-economic impacts.[23] A planned training facility on the property, intended to offer courses for Eskom employees and community members in collaboration with renewable industry associations, had not yet been operationalized at the time of the PCEE visit.[23]

The Komati experience underscores the immense challenge of managing the decline of coal-dependent regions. Many local stakeholders expressed a preference for coal to remain a key part of the energy mix, viewing renewable energy as unreliable and perceiving the plant's closure as being driven by "outside influence".[23] This sentiment highlights the critical need for building trust and ensuring that the transition is, and is seen to be, genuinely just and beneficial for affected communities. The repurposing initiatives, while positive, must be implemented effectively and complemented by broader regional development strategies to address the scale of job losses and economic disruption. If the negative consequences observed at Komati are not adequately learned from and addressed, it could significantly erode public and political support for the broader JET, making future coal plant decommissioning processes even more fraught with difficulty.

B. Socio-Economic Considerations and Mitigation Strategies

The lessons learned from the Komati decommissioning process have led to a series of recommendations from the Portfolio Committee on Electricity and Energy (PCEE), aimed at improving the management of future power station shutdowns and ensuring a more equitable Just Energy Transition.[23] These recommendations emphasize a fundamental shift towards proactive, integrated socio-economic development rather than focusing solely on the technical aspects of plant closure and site repurposing.

A central theme is the critical need for robust transition plans to be developed well in advance of any decommissioning, with meaningful input from all relevant stakeholders, especially the local communities directly affected. This includes prioritizing regular, transparent communication and information sharing with workers, community members, and local leaders regarding job prospects, timelines, and transition strategies. To address potential trust deficits and ensure balanced engagement, the PCEE suggested the use of an external neutral facilitator to work with communities in identifying assets and opportunities for local economic development, employing an Asset-Based Community Development (ABCD) approach.[23]

The scope of transition projects, it is recommended, should extend beyond the physical boundaries of the power station to include more social partners and focus on developing new training and livelihood opportunities that benefit the entire community. This could involve conducting feasibility studies for initiatives such as the large-scale manufacture of mini-grids at former power station sites or piloting community-owned renewable energy projects. Furthermore, the establishment of Special Economic Zones (SEZs) dedicated to renewable energy value chain components in affected regions, like the Nkangala District and Steve Tshwete Local Municipality, should be explored in collaboration with Eskom.[23]

Crucially, the recommendations call for the upgrade and improvement of infrastructure in affected villages and informal settlements, with municipalities taking responsibility for services previously provided by Eskom, and integrating these into their Integrated Development Plans. This includes transformative infrastructure such as footbridges, health clinics, high schools, libraries, and recreational facilities, as well as essential services like reconnecting water supplies and assigning social workers to communities. Unused property could also be repurposed for community use and development.[23]

The PCEE also stressed the importance of learning from international best practices in coal plant decommissioning to refine South Africa's approach. The realistic lessons from Komati are deemed vital for informing the decommissioning of other power stations slated for closure by 2030, such as Hendrina, Grootvlei, and Arnot.[23]

Implementing these comprehensive recommendations requires a paradigm shift from a reactive, utility-centric approach to a proactive, community-focused, and development-led strategy. This implies a significantly larger and more coordinated role for various government ministries beyond just those directly responsible for energy and public enterprises, alongside local authorities. A unified government

position and consistent public messaging regarding the transition are also essential to avoid confusion and build trust, particularly given the sentiments observed at Komati where the necessity of the transition was questioned.[23] Ultimately, the success of the JET hinges on this whole-of-government approach, backed by dedicated funding, clear roles and responsibilities, and a genuine commitment to ensuring that the transition is not only environmentally sustainable but also socially just and economically inclusive for all affected South Africans.

VI. Accelerating Renewable Energy Deployment

A. Progress in Solar, Wind, and Battery Storage

South Africa is witnessing a significant acceleration in the deployment of renewable energy technologies, driven by a combination of policy support, declining costs, and the urgent need to address the ongoing power crisis. Rooftop solar installations have experienced remarkable growth, with capacity more than doubling to exceed 5,000 MW by March 2024, largely due to the introduction of tax incentives and dedicated financing mechanisms.[10] Recognizing the scale of this distributed generation, Eskom has initiated a drive to encourage the registration of all grid-tied rooftop solar systems to ensure safety, compliance, and effective grid management.[8]

In terms of utility-scale procurement, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) remains a key vehicle. The Development Bank of Southern Africa (DBSA) has been a significant financier, committing approximately R18 billion across the first four bid windows to 36 projects, encompassing Solar Photovoltaic (PV), Concentrated Solar Power (CSP), wind, small hydro, and biomass technologies.[21] To further expand capacity, three new bid windows for a total of 7,615 MW from solar, wind, gas, and battery storage were released in December 2023.[10] Additionally, the Risk Mitigation Independent Power Producer Procurement Programme has seen its first three projects, notable for their large scale as solar and battery storage hybrids, connected to the grid.[10]

Eskom is also actively increasing its own renewable energy footprint. The utility is planning a standalone Renewable Energy Business and is seeking private sector partners to develop a pipeline of at least 2GW of projects by 2026, with a longer-term ambition exceeding 20GW.[8] Eskom has already secured licenses for 125MW of solar capacity and has tendered for an additional 72MW of PV at the repurposed Komati Power Station site.[8]

Battery Energy Storage Systems (BESS) are emerging as a critical component of the renewable energy strategy. Eskom's BESS programme is substantial, with the first 100

MWh project connected and an additional seven projects, totaling 833 MWh, under construction as part of Phase 1.[10] The overall Eskom BESS rollout aims for 1,440MWh of storage capacity, often co-located with 60MW of Solar PV.[24] BESS is viewed as crucial for stabilizing the grid, enhancing the reliability of intermittent renewable sources, providing ancillary services, and potentially deferring some costly grid infrastructure upgrades.[24]

The national Integrated Resource Plan (IRP) targets 26GW of new renewable capacity by 2030, with an indicative annual goal of 6GW from wind and solar combined, although it is acknowledged that the IRP 2019 is now considered outdated.[25] Investment is flowing into the sector, with nearly $450 million in Climate Investment Funds (CIF) investments reportedly leveraging approximately $2 billion in co-financing for Eskom's renewable energy and storage projects.[25] To accommodate more wind power, particularly from the resource-rich Eastern and Western Cape provinces, 3.47 GW of wind capacity has been made available through curtailment strategies.[3] This multi-faceted approach to deploying renewables—through utility-scale procurement, Eskom-led initiatives, and a burgeoning distributed generation market—demonstrates significant momentum. However, this rapid influx of varied and often intermittent generation sources amplifies the need for sophisticated grid management, substantial expansion of transmission infrastructure, and updated regulatory frameworks to ensure their effective and stable integration into the national power system. The pace of generation addition risks outstripping the grid's capacity, making the prioritization of grid upgrades paramount.

B. Policy Support and Investment in Green Technologies

The acceleration of renewable energy deployment in South Africa is significantly underpinned by a suite of policy support mechanisms and targeted investments in green technologies. The remarkable success of the rooftop solar market, which saw capacity more than double to over 5,000 MW by March 2024, is a direct consequence of powerful tax incentives and dedicated financing mechanisms implemented by the government.[10] This demonstrates a clear link between well-designed policy interventions and rapid market response. Another crucial policy enabler has been the removal of the licensing threshold for embedded generation projects, a move that has unlocked substantial private investment by allowing businesses and industries to develop their own power solutions more freely.[9]

Financial support from both national and international Development Finance Institutions (DFIs) is also playing a vital role. The Development Bank of Southern Africa (DBSA) is heavily involved through its continued support for the REIPPPP and its

management of specialized programs like the Climate Finance Facility (CFF) and the Embedded Generation Investment Programme (EGIP).[21] The EGIP, developed with funding from the Green Climate Fund (GCF) and the DBSA, specifically supports the implementation of solar PV and wind embedded generation projects by IPPs, aiming to add 330 MW of capacity (280 MW Solar PV and 50 MW Wind).[21]

International partners are also contributing significantly. The World Bank approved a $1 billion loan in September 2023 aimed at catalyzing a low-carbon transition by supporting the restructuring of Eskom and unlocking private investment in renewable energy.[19] This is complemented by initiatives like the nearly $450 million in Climate Investment Funds (CIF) investments, which have reportedly leveraged close to $2 billion in co-financing for Eskom's renewable energy and storage projects.[25] To streamline the often complex approval processes for renewable energy projects, the government is also working towards fully operationalizing a One Stop Shop designed to fast-track authorizations and reduce lead times to construction.[11]

These policy and financial interventions are powerful catalysts. However, the stability and predictability of this supportive environment are crucial for sustaining long-term private sector investment. While current actions like new bid windows are proceeding, a notable concern is that the IRP 2019 is now widely considered "outdated".[25] The IRP is intended to guide the country's long-term power generation needs and investment decisions. An outdated plan may not accurately reflect current technology costs (especially for rapidly evolving renewables and storage), updated demand forecasts (considering factors like post-COVID recovery and the potential growth of electric vehicles [25]), or the increasing urgency of decarbonization commitments. This lack of an updated, officially gazetted IRP creates uncertainty for long-term investment planning, particularly for large-scale projects with extended development timelines. Finalizing and publishing an updated IRP is therefore a critical step to provide the necessary long-term policy certainty and ensure that the ongoing energy sector development aligns coherently with national economic and climate objectives. This clarity is essential for attracting the sustained, large-scale investment required to successfully navigate the energy transition.

VII. Grid Modernization and Stability

A. Addressing Transmission Bottlenecks and Infrastructure Deficits

A critical impediment to South Africa's efforts to enhance energy security and integrate new generation capacity is the state of its transmission infrastructure. Reports indicate that the country is approximately two decades behind in implementing its necessary transmission expansion plans.[27] This significant backlog

has resulted in severe grid constraints, particularly at the transmission and substation levels, which limit the effective integration of Independent Power Producers (IPPs) and alternative energy sources, thereby exacerbating grid instability.[20] The existing infrastructure, much of which is aging, has not been adequately renewed or maintained to keep pace with demand growth and the evolving generation mix. This failure to expand and modernize the grid prevents it from efficiently accommodating additional power generation sources and transporting electricity to where it is needed.[27] Renewable energy projects, often located in areas with high resource potential but distant from major demand centers (such as the Northern, Western, and Eastern Cape provinces), are particularly affected, as they require reserved grid capacity, and their intermittent nature, combined with insufficient existing capacity, poses a significant challenge for connection and dispatch.[20]

The establishment of the National Transmission Company of South Africa (NTCSA) is a crucial step aimed at addressing these challenges by enabling increased and more focused investment in transmission infrastructure.[9] The NTCSA's primary mandate will be to plan, develop, and operate the national high-voltage grid in a non-discriminatory manner. Recognizing the scale of the required investment, Eskom's transmission division is projected to see a significant increase in expenditure dedicated to grid expansion.[7] Furthermore, initiatives like the Independent Transmission Projects (ITP) program, which targets the development of 1,164 km of new transmission lines by private entities, are being pursued to supplement Eskom's efforts.[19]

In regions like the Cape, which are rich in renewable resources but face significant grid constraints, Eskom has employed strategies such as curtailment to unlock approximately 3,400 MW of grid capacity for renewable energy projects.[10] Curtailment involves instructing generators to reduce their output during periods of grid congestion. While this allows more renewable capacity to be nominally connected to the grid, it is essentially a management technique for existing limitations rather than a capacity expansion. It is an inefficient approach as it leads to the deliberate reduction of available clean energy, representing lost generation and potentially impacting the revenue and bankability of IPP projects. Over-reliance on curtailment underscores the urgent need for proactive and substantial investment in actual grid expansion and strengthening to maximize the utilization of South Africa's abundant clean energy resources. The transmission backlog is arguably the Achilles' heel of the energy transition; without concurrently unlocking transmission capacity, investments in new generation risk becoming stranded assets, and the goal of a reliable power supply will remain elusive. Grid expansion and modernization must therefore be elevated to a top national priority, receiving the same level of strategic focus and urgency as the efforts

to increase generation capacity. This will require streamlined regulatory approvals for new lines, innovative financing models that encourage private participation, and robust, forward-looking planning.

B. Innovations in Grid Management and Distributed Generation

Alongside efforts to expand traditional transmission infrastructure, South Africa is also exploring and implementing innovations in grid management and leveraging the potential of distributed generation to enhance stability and resilience. Distributed energy solutions, such as rooftop solar and embedded generation at commercial and industrial sites, are increasingly seen as an immediate opportunity to alleviate pressure on the centralized grid system.[27] The rapid growth in these installations necessitates new approaches to grid operation. Hybrid energy solutions, which balance renewable generation with dispatchable sources like thermal power or battery storage, are being deployed by private entities to ensure reliable power for their operations while integrating cleaner energy.[27]

Emerging technologies like Battery Energy Storage Systems (BESS) and Artificial Intelligence (AI)-driven grid optimization tools are recognized for their potential to significantly enhance grid resilience.[27] Eskom's own BESS program is a testament to this, with deployed systems intended not only for energy arbitrage but also for providing critical ancillary services such as frequency regulation and voltage support. These capabilities can help stabilize the grid, improve power quality, and in some cases, defer the need for costly upgrades to distribution networks.[24] The aggregation of Distributed Energy Resources (DERs)—including fleets of PV systems, batteries, and even electric vehicle (EV) chargers—can create Virtual Power Plants (VPPs). These VPPs can be controlled to provide a range of grid services, including demand response, congestion management, and frequency and voltage regulation, thereby contributing to overall system stability and efficiency.[28]

Microgrids are also gaining traction as a reliable solution for integrating DERs and managing local demand, particularly for commercial and industrial sites that are heavily impacted by unreliable grid supply.[29] While many microgrids in regions with poor grid quality have historically operated in isolation, there is a growing recognition of the benefits of grid-interactive microgrids. These systems can dynamically engage with the main grid, drawing power when it is stable and affordable, and potentially providing services back to the grid during times of stress.[30] This symbiotic relationship can enhance reliability for the microgrid users while also contributing to the flexibility of the broader power system.

However, the increasing decentralization and digitization of energy systems bring new

challenges, with cybersecurity emerging as a critical concern.[27] Protecting these interconnected systems from cyber threats is essential to maintain operational integrity and public safety. Realizing the full potential of these innovations requires more than just technological advancements; it necessitates the development of new regulatory frameworks, market mechanisms that appropriately value and compensate ancillary services provided by DERs, and significant investment in digital infrastructure, smart grid technologies, and robust cybersecurity measures. The National Wheeling Framework [10] and the development of the Day-Ahead Market [20] are steps in this direction, but continued evolution of the regulatory and market landscape will be crucial to foster a grid that is not only capable of accommodating a high penetration of renewables but is also smarter, more flexible, and more resilient.

VIII. Sectoral Impacts: The Mining Industry Case

A. Energy Challenges and Adaptation Strategies in Mining

The South African mining sector, a cornerstone of the national economy, is a significant consumer of electricity, accounting for approximately 14% of Eskom's total electricity sales. When smelters and refineries are included, this figure rises to about 30%.[31] Within the mining industry itself, the platinum group metals (PGM) sector is a particularly intensive user, responsible for around 40% of the mining industry's total energy consumption.[32] This high energy demand makes the sector acutely vulnerable to the dual challenges of escalating electricity tariffs and the unreliability of supply due to load shedding.

Electricity costs for the mining industry have seen a dramatic increase, rising eightfold since 2008, a stark contrast to the twofold increase in the consumer price index (CPI) over the same period. By the end of 2024, electricity was projected to constitute approximately 12.5% of total South African mining costs, up from about 9% previously.[31] The share of energy in the intermediary input costs for specific commodities is also set to rise significantly: for gold mining, from 24% to 38%; for iron ore mining, from 22% to 37%; and for the PGM sector, from 13% to 19%.[31] These escalating costs, compounded by the operational disruptions and lost production caused by load shedding—which cost the South African economy an estimated R481 billion in 2024 (down from a staggering R2.9 trillion in 2023 during record blackouts) [33]—place immense pressure on the profitability and long-term viability of mining operations. Gold miners, for instance, have reported grappling with rising input costs, with energy being a significant factor.[34]

In response to this challenging energy landscape, the mining industry has become a proactive leader in developing private power generation solutions and adopting

renewable energy technologies. The sector reportedly has a pipeline of approximately 7.5GW of private electricity generation projects, representing an investment of over R150 billion. Of the 9GW of private sector electricity generation projects across all industries, an estimated 3GW was expected to be completed by the end of 2024, with a significant portion attributable to mining.[31] The industry as a whole aims to reduce its own grid consumption by roughly 30% through the implementation of 73 self-generation projects.[32] These initiatives often involve distributed renewable energy solutions, such as solar-diesel hybrid systems for off-grid or grid-supplementation purposes. For example, Cronimet Mining utilized a 1MW solar PV plant as part of a solar-diesel hybrid system, which successfully reduced its annual diesel fuel consumption by 24%.[35] There is also growing interest in models that involve community-owned renewable energy projects located near mining operations, which could potentially supply power back to the mines while also benefiting local communities.[36]

The government's Critical Minerals Strategy further contextualizes the energy needs of the sector. While acknowledging the role of coal for near-term energy security, the strategy also aims to balance this with forward-looking ambitions involving green hydrogen, renewable energy technologies, and components for electric vehicles, all of which rely on minerals produced by the sector.[37] The strategy emphasizes local beneficiation, research and development, and regional integration.[37]

The energy crisis has thus acted as both an existential threat and a powerful catalyst for strategic change within the mining industry. The proactive shift towards self-generation and renewable energy adoption is fundamentally reshaping the sector's energy profile and demonstrates the potential for large industrial users to drive significant renewable energy uptake. This transition, however, also means a potential reduction in reliance on Eskom, which could impact the utility's future revenue from this key customer segment. Effective policy and planning will be needed to coordinate this industrial energy transition with national grid development. Furthermore, the "Just Transition" narrative within mining extends beyond the national shift away from coal for power generation; it also encompasses the energy transition occurring within mining operations themselves. The move from grid electricity or diesel to renewable and hybrid solutions has implications for the mining workforce and surrounding communities. The call for community-owned renewable projects linked to mines [36], potentially leveraging mining companies' Social and Labour Plan (SLP) obligations, offers a promising pathway to ensure that local populations derive tangible benefits from this shift, aligning the industry's decarbonization efforts with broader social development and empowerment goals.

Table 4: Mining Sector Energy Profile & Adaptation

Aspect	Data/Examples	Source Snippet(s)
Eskom Consumption Share	~14% (mining only), ~30% (with smelters/refineries). PGM mining ~40% of mining's share.	31
Key Cost Driver	Electricity tariffs (8-fold increase since 2008). Electricity ~12.5% of mining costs by end 2024.	31
Self-Generation Capacity (Pipeline/Projects)	~7.5GW in mining project pipeline (>R150bn cost). Aim to reduce own consumption by ~30% via 73 projects.	31
Key Technologies Adopted for Self-Generation	Solar PV, Wind, Solar-Diesel Hybrids, Battery Storage.	31
Example of Adaptation	Cronimet Mining: 1MW solar PV + diesel hybrid reduced diesel use by 24%.	35
Critical Minerals Strategy Alignment	Recognizes coal for near-term energy security but pushes for green hydrogen, renewables, EV component minerals.	37

IX. Key Infrastructure Projects and Funding Landscape

A. Overview of Major Energy-Related Infrastructure Developments

South Africa has embarked on an ambitious infrastructure development program, with energy-related projects forming a significant component, aimed at addressing chronic shortages and supporting economic growth. A key instrument in outlining these initiatives is the "Construction Book 2024/2025," which, as of May 2025, lists between 180 and 250 fully funded, procurement-ready construction projects with an estimated combined value ranging from R238 billion to R268 billion.[14] This publication serves as a

signal to the construction sector and supplier industries about anticipated demand for local materials, components, and services. The portfolio of Strategic Integrated Projects (SIPs) has also seen substantial growth in capital value, from an initial R340 billion in 2020 to over R1.3 trillion in 2025.[14] This value is bolstered by significant demand for privately funded projects that primarily require expedited regulatory approvals to reach financial close.

Several specific energy projects have been highlighted as part of this national infrastructure drive. These include the Eskom Tubatse Pumped Storage Scheme, designed to provide large-scale energy storage capacity, and Transnet's Port of Ngqura Liquefied Natural Gas (LNG) project, aimed at diversifying the energy mix and providing fuel for gas-to-power initiatives.[14] A notable completed project is the 100 MW Redstone Concentrated Solar Power (CSP) plant in the Northern Cape, which is now supplying clean energy to over 400,000 people daily.[14]

Infrastructure South Africa (ISA) plays a central coordinating role in this extensive infrastructure rollout. ISA is tasked with overseeing project planning, management, and delivery, with a particular focus on project preparation to ensure bankability and on unblocking bureaucratic hurdles such as the numerous permits and licenses required—for instance, a single renewable energy project can require almost 85 different authorizations.[17] ISA currently oversees a total of 305 projects, with a substantial 171 of these falling within the energy sector. As of May 2025, ISA was reportedly preparing and packaging 34 specific projects, with an estimated combined capital value of R259 billion, to be brought to market over the subsequent 12 to 18 months.[17] This concerted effort, marked by an increase in the capital value of SIPs and detailed project pipelines, signals a shift towards a more coordinated and large-scale approach to infrastructure development. The emphasis by ISA on rigorous project preparation and streamlining approvals is critical, as the success of this ambitious program hinges on the ability to translate strategic plans and allocated funding into operational assets in a timely and efficient manner. The credibility of this national infrastructure drive will ultimately be measured by demonstrable progress in project execution.

B. Role of Development Finance Institutions (DFIs) and Public-Private Partnerships (PPPs)

Development Finance Institutions (DFIs) and Public-Private Partnerships (PPPs) are integral to funding and implementing South Africa's extensive energy infrastructure agenda, given the scale of investment required and the fiscal constraints on the public sector. The Development Bank of Southern Africa (DBSA) has been a prominent

player, particularly in the renewable energy sector. It played a key role in the establishment and success of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP), committing approximately R18 billion to 36 projects across the first four bid windows.[21] The DBSA also manages the Embedded Generation Investment Programme (EGIP), co-funded by the Green Climate Fund (GCF), which supports the implementation of solar PV and wind projects by IPPs, targeting 330MW of capacity (280MW Solar PV and 50MW Wind).[21] Beyond South Africa, the DBSA is involved in financing regional energy projects, including hydropower in Zambia, thermal power in Ghana, and LNG development in Mozambique.[21] The DBSA's 2024 Integrated Annual Report is available, and Mr. Bongani Nqwababa, a figure with past experience as Eskom's CFO, serves as an Independent Non-Executive Director and Chairman of the Audit and Risk Committee at the DBSA, and also chairs South Africa's Infrastructure Fund Strategic Advisory Committee (IFSAC).[40]

The World Bank Group is another major DFI contributor. In June 2025, it approved a $1.5 billion loan to support South Africa's structural reforms and infrastructure development, with a focus on enhancing energy security through strengthening Eskom's electricity grid, supporting renewable energy integration, and improving Transnet's freight transport capacity.[46] This follows a $1 billion loan approved in September 2023 aimed at catalyzing the country's low-carbon transition, which included support for Eskom's restructuring and measures to unlock private investment in renewables.[19] The World Bank is also funding a US$497 million project for the decommissioning of the Komati coal-fired power plant and its repurposing with renewable energy technologies and socio-economic mitigation measures.[23] The International Finance Corporation (IFC), the World Bank Group's private sector arm, is actively investing in distributed generation solutions in emerging markets, including projects like Solengy Haiti (a solar and storage initiative) and Project Zafiri, which aims to scale Africa's private sector-led Distributed Renewable Energy (DRE) sector.[47]

The South African government's Infrastructure Fund (IF), managed by Infrastructure South Africa (ISA) and operationalized by the DBSA, is a key national initiative designed to leverage blended finance. The government has committed R100 billion to the IF over a ten-year period to co-invest in public infrastructure projects and programs, with the objective of mobilizing commercial, international, and institutional investment, thereby alleviating fiscal pressure.[9] The IF has reportedly packaged around 26 blended finance projects across various sectors with a combined capital value of approximately R102 billion.[15] While its top-level pipeline in some documents emphasizes areas like student housing and water, ISA's broader oversight includes a

large number of energy projects.[17]

Public-Private Partnerships (PPPs) are also being actively promoted. The government is implementing reforms to make PPP processes easier, faster, and more predictable, particularly for projects valued under R2 billion, to reduce procedural complexity.[15] Eskom itself is seeking PPPs for its new standalone Renewable Energy Business, inviting private sector partners to collaborate in developing its extensive renewable project pipeline.[22]

DFIs are thus playing a crucial catalytic role, not only by providing direct funding but also by supporting program development (like REIPPPP and EGIP), de-risking investments through blended finance structures, and often tying financial support to necessary policy and institutional reforms. Their involvement lends credibility to projects and helps attract further private capital. The emphasis on blended finance via the Infrastructure Fund and the streamlining of PPPs reflects the necessity of these models to bridge the significant investment gap in the energy sector. However, the success of these collaborative approaches hinges on robust institutional capacity within government bodies and state-owned entities to structure, procure, and manage complex projects transparently and effectively, ensuring fair risk allocation and value for money to attract reputable private partners.

Table 5: Key Funding Mechanisms & DFI Involvement in SA Energy Sector

Funding Source/Mechanism	Key Projects/Focus Areas	Announced Funding/Targets	Key Source(s)
DBSA / REIPPPP	Financing IPP projects (Solar PV, CSP, Wind, Hydro, Biomass) - Rds 1-4	~R18bn committed by DBSA to 36 projects	21
DBSA / EGIP (with GCF)	Supporting solar PV and wind embedded generation IPPs	Aiming for 330MW (280MW Solar, 50MW Wind)	21
World Bank Loans	Structural reforms, Eskom grid/restructuring, renewable integration, Komati	$1.5bn (June 2025); $1bn (Sept 2023); $497m (Komati)	19

	decommissioning & repurposing, private investment in renewables		
Infrastructure Fund (Govt, ISA, DBSA)	Blended finance for public infrastructure projects across sectors (including energy via ISA's portfolio)	Govt committed R100bn over 10 years; 26 projects packaged (R102bn capital value across sectors)	[15]
Eskom PPPs (Renewable Energy Business)	Development of Eskom's renewable energy project pipeline	Seeking private partners for 2GW by 2026, >20GW long-term pipeline	[8]
IFC (World Bank Group)	Distributed Renewable Energy (DRE) in Africa (e.g., Project Zafiri), specific project finance (e.g., Solengy Haiti)	$10m Rockefeller investment in Zafiri; $13.5m (IFC & IDB Invest) for Solengy Haiti	[47]
Climate Investment Funds (CIF)	Co-financing for Eskom renewables and storage	~$450m CIF investments leveraged ~$2bn co-financing	[25]

X. Outlook, Challenges, and Strategic Recommendations

A. Synthesized Outlook for the South African Power Sector

The South African power sector is at a critical juncture, characterized by both persistent challenges and significant opportunities for transformation. The immediate outlook regarding load shedding remains subject to considerable volatility, as evidenced by conflicting forecasts for Winter 2025 [1] and recent operational data indicating ongoing system constraints.[4] However, the underlying improvements in Eskom's plant performance metrics during FY2025, such as increased energy availability and reduced unplanned outages [2], coupled with the accelerating influx of new generation capacity from private investments and rooftop solar [10], offer a potential pathway towards gradual stabilization, provided this positive momentum can

be sustained and built upon.

The structure of the electricity supply industry is set for a profound shift. The anticipated full operationalization of the National Transmission Company of South Africa (NTCSA) [10] and the legislative progress of the Electricity Regulation Amendment (ERA) Bill [10] are foundational steps. These reforms, alongside the planned introduction of a Day-Ahead Market (DAM) [20], point towards the emergence of a more competitive, transparent, and diversified market structure by 2025 and in the subsequent years. This evolving market is expected to facilitate greater private sector participation and improve overall system efficiency.

Renewable energy sources, complemented by battery storage solutions, are unequivocally positioned to dominate new capacity additions. This trajectory is supported by clear policy direction, significant investment flows, and Eskom's own strategic pivot towards incorporating more clean energy into its portfolio, including partnerships with the private sector for its renewable energy subsidiary.[8] The continued decline in technology costs for renewables and storage further strengthens their economic viability.

However, this transformative journey is not without considerable hurdles. The successful integration of these new, often variable, energy sources is heavily dependent on overcoming the substantial deficit in transmission infrastructure. Furthermore, the socio-economic implications of the Just Energy Transition, particularly in coal-dependent regions, require careful and empathetic management to ensure that the shift is equitable and does not exacerbate existing inequalities.

B. Overarching Challenges and Risks

Despite the positive developments, the South African power sector faces a number of overarching challenges and risks that could impede progress:

1. **Eskom's Financial and Operational Sustainability:** While operational metrics have shown improvement, Eskom's long-term financial viability remains precarious. The utility is burdened by significant debt, a history of reliance on government bailouts, escalating municipal arrears that reached R94.8 billion by December 2024 [7], and tariffs that may not be fully cost-reflective. The struggle to consistently meet ambitious plant performance targets across its entire fleet also poses an ongoing operational risk.[4]
2. **Grid Infrastructure Deficit:** The inadequacy of the existing transmission and distribution networks is arguably the most critical bottleneck. Decades of underinvestment have left the grid ill-equipped to accommodate new generation

capacity, particularly renewables located far from demand centers, and to ensure reliable electricity supply across the country.[20]

3. **Pace and Efficacy of Regulatory Reforms:** The successful transformation of the electricity market hinges on the full and effective implementation of the ERA Bill and the establishment of robust market codes and regulatory oversight. Delays in this process or weaknesses in the institutional capacity of new entities like the TSO and Market Operator could stall progress and deter investment.[9]
4. **Socio-Economic Impacts of the Just Energy Transition (JET):** Managing the decline of the coal industry involves significant socio-economic challenges, including large-scale job losses, the need for extensive reskilling programs, and the creation of alternative livelihoods in affected communities. Ensuring community buy-in and addressing legitimate concerns, as highlighted by the Komati experience, is a massive and complex undertaking.[23]
5. **Policy Consistency and Investor Confidence:** Attracting and retaining the vast private sector investment required for new generation and grid infrastructure depends critically on a stable, predictable, and transparent policy environment. Any perceived policy uncertainty or reversals could significantly dampen investor appetite.[19]
6. **External Factors and Governance:** The power sector remains vulnerable to external shocks, including global economic volatility impacting financing and input costs. Furthermore, issues such as sabotage of infrastructure, corruption, and broader governance challenges within state-owned entities can undermine recovery efforts and operational stability.[5]

C. Strategic Recommendations

Based on the analysis of the current landscape, ongoing initiatives, and identified challenges, the following high-level strategic recommendations are proposed for consideration by policymakers and industry leaders to navigate South Africa's energy transition effectively:

1. **Prioritize and Fast-Track Grid Investment as a National Imperative:**
    - Elevate the expansion and modernization of the transmission and distribution networks to a national emergency footing, on par with efforts to increase generation capacity.
    - Develop and implement a fully funded, time-bound plan to address the transmission backlog, particularly in renewable energy development zones.
    - Actively leverage private sector participation through mechanisms like Independent Transmission Projects (ITPs) and explore innovative financing models to accelerate grid development. Streamline regulatory approvals for

critical grid infrastructure projects.

2. **Ensure Full, Swift, and Resourced Implementation of the ERA Bill and Market Codes:**
    - Expedite the finalization and enactment of the ERA Bill.
    - Provide NERSA, the NTCSA, and the future Market Operator with the necessary resources, expertise, and clear mandates to establish and oversee a functional, transparent, and competitive electricity market rapidly and effectively.
    - Develop clear and fair market rules, including those for ancillary services and wheeling, to encourage broad participation and build investor confidence.
3. **Develop Comprehensive, Funded, and Participatory Regional Just Energy Transition (JET) Plans:**
    - Move beyond site-specific power plant repurposing to create integrated socio-economic development strategies for coal-affected regions, developed in genuine partnership with local communities, labor, and businesses.
    - Establish dedicated funding mechanisms and institutional structures to support these regional JET plans, focusing on skills development for new industries, attracting diverse investments, and providing social safety nets.
    - Ensure transparent communication and clear metrics for success in JET initiatives, learning comprehensively from the Komati experience.
4. **Strengthen Eskom's Governance and Implement Sustainable Solutions for its Financial Viability:**
    - Continue to reinforce governance structures and operational efficiencies within Eskom.
    - Urgently implement a credible and sustainable plan to address the escalating municipal debt owed to Eskom, potentially involving debt restructuring, improved revenue collection mechanisms at municipal level, and support for smart metering.
    - Work towards a tariff methodology that ensures Eskom's financial sustainability while protecting vulnerable consumers and supporting economic competitiveness.
5. **Maintain Policy Stability and a Conducive Environment for Renewable Energy and Storage Investment:**
    - Provide long-term certainty regarding renewable energy procurement programs, incentive structures (such as tax benefits for rooftop solar and embedded generation), and grid access rules to sustain the current investment momentum.
    - Finalize and regularly update the Integrated Resource Plan (IRP) to provide a clear, evidence-based roadmap for future energy sector development,

reflecting current technology costs, demand projections, and climate commitments.

6. **Enhance Inter-Governmental Coordination and Stakeholder Engagement:**
    - Strengthen the coordinating role of NECOM to ensure alignment and collaboration between different government departments, state-owned entities, regulators, and the private sector in implementing the Energy Action Plan, JET initiatives, and the broader infrastructure rollout.
    - Foster continuous and transparent dialogue with all stakeholders, including industry, labor, civil society, and affected communities, to build trust and ensure shared ownership of the energy transition pathway.

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