SOUTH AFRICA RENEWABLE ENERGY POLICY SCAN

Critical insights and questions for localisation and decent employment

Institute for Economic Justice
COSATU
ACEP Africa Centre for Energy Policy
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International Development Research Centre
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BBBEE	Broad-Based Black Economic Empowerment
BESIPPPP	Battery Energy Storage Independent Power Producer Procurement Programme
BESS	Battery energy storage systems
COP	Conference of the Parties
COSATU	Congress of South Africa Trade Unions
DHET	Department of Higher Education and Training
DMRE	Department of Mineral Resources and Energy
DSBD	Department of Small Business Development
DTIC	Department of Trade Industry and Competition
DWA	Decent Work Agenda
DWCP	Decent Work Country Programme
ED	Enterprise development
EIA	Environmental Impact Assessment
EPP	Electricity Pricing Policy
EPR	Extended Producer Responsibility
ERA	Electricity Regulation Act
ESI	electricity supply industry
ESRC	Economic and Social Research Council
EWSETA	Energy and Water Sector Education and Training Authority
FBE	Free basic electricity
FTE	Full-time equivalent
GDWG	Gender Diversity Working Group
GHG	Greenhouse gas
IDC	Industrial Development Corporation
IEP	Integrated Energy Plan
ILO	International Labour Organisation
IPAP	Industrial Policy Action Plan
IPG	International Partners Group
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ITAC	International Trade Administration Commission of South Africa
JET IP	Just Energy Transition Investment Plan
JETP	Just Energy Transition Partnership
LEDS	Low Emission Development Strategy
LSF	Localisation Support Fund
MEC	Minerals-energy complex

NCCAS	National Climate Change Adaptation Strategy
NCCETC	North Carolina Clean Energy Technology Center
NDP	National Development Plan
NRA	National Energy Act
NECOM	National Energy Crisis Committee
NEDLAC	National Economic Development and Labour Council
NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
NIPF	National Industrial Policy Framework
NIPP	National Industrial Participation Programme
NTCSA	National Transmission Company of South Africa
OEM	Original Equipment Manufacturer
PARI	Public Affairs Research Institute
PCC	Presidential Climate Commission
PPA	Power Purchase Agreement
RE	Renewable energy
REFIT	Renewable Energy Feed-In Tariff
REI4P	Renewable Energy Independent Power Producer Procurement Programme
RMIPPP	Risk Mitigation Independent Power Producers Programme
SAFEE	Southern African Females in Energy Efficiency
SANEDI	South African National Energy Development Institute
SAPVIA	South African Photovoltaic Industry Association
SAREM	South African Renewable Energy Masterplan
SAWEA	South African Wind Energy Association
SED	Socio-economic development
SMME	Small, medium and micro enterprises
SOE	State-owned enterprise
SPLUMA	Spatial Planning and Land Use Management Act
SSEG	Small-scale embedded generation
STEM	Science, Technology, Engineering, and Mathematics
TDP	Transmission Development Plan
TVET	Technical and Vocational Education and Training
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VRFB	Vanadium redox flow battery
WEF	World Economic Forum

SECTION ONE: **Introduction**

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1.1 CONTEXT

Concerns of just transition have framed South Africa's energy policy landscape, as the country has articulated several progressive climate change commitments. In 2009, President Jacob Zuma announced a commitment to reduce national greenhouse gas (GHG) emissions by 34% by 2020, and 42% by 2025 (Baker et al., 2015).

Because more than half of these emissions were attributed to the electricity sector, this commitment entailed decarbonisation of the country's coal-fired power generation, while the coal mega-projects of Medupi and Kusile were being developed. The country was, and remains, dependent on coal, with Eskom, the state-owned power utility company at the heart of the coal-to-power value chain, tied to the industrial development of the country, including a significant share of employment and economic value addition (Baker, 2015; Montmasson-Clair et al., 2022; Patel et al., 2020).

The jobs and economic value (including different forms of income and government revenues) at stake in the transition, particularly in the coal value chain, pose serious risks and challenges for the country, with workers, coal-dependent communities, local economies, and municipal governments disproportionately exposed to the immediate negative impact (Hermanus et al., 2021; Hermanus & Montmasson-Clair, 2021; Patel et al., 2020). Other carbon-intensive industries, such as steel and concrete, critical to the built environment, are also at risk (Rissman, 2024). In 2018, recognising the complexity of the unfolding climate-driven transition, the World Economic Forum (WEF) ranked South Africa 114th out of 115 countries it reviewed for preparedness for a sustainable energy transition (WEF & McKinsey, 2018).

Just transition advocacy was first driven by the labour movement in South Africa, with a strong focus on workers' vulnerability to transition dynamics (COSATU, 2012). Over time, a broad range of civil society organisations have joined the debate, as has business. Expectations range from the narrow management of selected contradictions and vulnerabilities of the transition, focused on energy only, to calls for sweeping economic transformation. The just transition has, at times, also been used as a smoke screen for interest groups seeking to undermine decarbonisation efforts. In general, however, those advocating for justice to be considered in the country's transition planning also advocate for climate action, mitigation and adaptation.

South Africa's climate policy development has steadily progressed through, for example, the country's first Nationally Determined Contribution (NDC) under the Paris Agreement in 2016, updated in 2021, the Climate Change Bill of 2018, which passed into law in 2024, and the Low Emissions Development Strategy (2020). In parallel, renewable energy has been enabled through the Renewable Energy Independent Power Producer Procurement Programme (REI4P), with rounds of recent policy development and related amendments to the Electricity Regulation Act 2006 (ERA).

Against this backdrop, by 2020, not only renewable energy, but an energy transition and the just transition, had become a robust area of policy debate and formulation. At the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) in 2021, President Ramaphosa launched the Just Energy Transition Partnership (JETP). The JETP is the first of such partnerships, which seek to advance decarbonisation efforts in low and middle-income countries (called "developing countries" in UNFCCC texts) through finance delivered from the International Partners Group (IPG), comprising high-income countries, under a 'just transition' umbrella (The Presidency, 2022). Given South Africa's high unemployment rates, racial and gendered "persistent and obscene inequality" (Mohamed, 2024), high poverty rates (both energy and general), a lack of economic opportunity for youth, and a highly concentrated economic structure, the gap between the promise and the reality of justice in the transition and its various mechanisms is stark.

Efforts to align energy policy to climate ambitions have had to respond simultaneously to supply constraints and rounds of rolling scheduled blackouts, termed 'loadshedding', which have plagued Eskom and the country intermittently since 2007. An ageing and mismanaged coal power station fleet failed to meet the country's energy needs. The economic pressure of loadshedding, exacerbated by the impacts of the Covid-19 pandemic, accelerated the implementation of power system reform, the restructuring of Eskom, and amendments to the ERA, all with the aim of increasing the share of renewable energy on the grid (and, to a much smaller extent, in off-grid energy poverty interventions).

The main thrust of these reforms was to unleash private investment in small-, medium-, and utility-scale renewables in business-to-business transactions, embedded in Eskom's transmission in distribution grids, as well as municipally-owned and -operated distribution grids. Localisation efforts, first embedded in public procurement mechanisms within the REI4P, have also had to be revisited.

The South African Renewable Energy Masterplan (SAREM) (not yet launched) is one of a series of industrial masterplans, and the foremost framework for localisation efforts. While it has drawn in significant government and business participation in its formulation, brokering consensus between them, there has been pushback, notably from labour, on a number of related issues (Institute for Economic Justice & COSATU, 2022).

1.2. OBJECTIVE

This paper aims to determine the extent of support for the integration of renewable energy, the space and commitment to localisation, and sensitivity to issues of decent work, small, medium and micro enterprises (SMMEs), and gender and youth inclusivity. South Africa's energy policy landscape is comprehensive. While there have been delays in finalising guiding energy planning documents, the framework exists for renewable energy investment by Eskom, public entities, or private companies and individuals. The levers for enabling and driving localisation are constrained, however, by several international and national dynamics. In the context of these constraints, there have been several attempts at fostering localisation using various mechanisms.

1.3. METHOD

This analysis was conducted through a systematic desktop review of legislation, regulations, policies and standards relevant to renewable energy, notably covering energy, climate and transition, and industrial policy areas.

Energy policy: Review of changes to electricity sector legislation, renewable energy procurement frameworks, energy planning documents, and other specific regulations.

Climate and transition policy: Analysis of just transition frameworks, climate change legislation, and sectoral emission reduction pathways.

Industrial policy: Examination of local content requirements, manufacturing incentives and other industry support, and skills development frameworks.

In addition to characterising South Africa's broad approach to energy transition planning in the context of systemic constraints, the review also focused particularly on how these instruments address:

- Local manufacturing and SMME participation requirements and support mechanisms in renewable energy value chains
- Decent work provisions, including labour standards, skills development, and worker protection
- Gender equality measures and women's economic empowerment in the energy sector
- Energy poverty.

We also consulted secondary research, including policy analysis by a range of local stakeholder organisations, as well as academic literature.

1.4. STRUCTURE

The analysis begins with an overview of South Africa's electricity sector, covering the following: the evolving structure of South Africa's power system; the country's electricity output; Eskom's supply crisis and the role of renewable energy in the generation mix; and energy poverty and issues of affordability. The paper then moves onto a critical analysis of relevant policies related to electricity, localisation, decent work and gender. This section also deals with industrial capabilities, localisation and SMME capability development. Finally, we make concluding observations and recommendations.

SECTION TWO: **CONTEXT OF ENERGY SECTOR DEVELOPMENTS**

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2.1 HISTORY AND CHALLENGES OF SOUTH AFRICA'S POWER SYSTEM

South Africa's electricity system is currently evolving from its history of a centralised configuration of institutional arrangements, processes and actors. Until 2019, Eskom functioned as a vertically integrated monopoly, dominating the generation, transmission and distribution of electricity.

A small share of generation came from Independent Power Producers contracted under the REI4P, and municipalities distributed approximately 40% of electricity to 60% of electricity users, both residential and commercial.

This dominant role has been critiqued from various points of view, focusing on the monopoly power that Eskom can exert over other electricity supply industry (ESI) actors. Criticism of Eskom's excessive control and lack of accountability gained momentum when revelations of grand corruption and 'state capture' at Eskom and across other state-owned enterprises (SOEs,) and public entities were made through legislative and judicial interventions post 2018 (Bhorat et al., 2017; Godinho & Hermanus, 2018). These revelations would see years of public mobilisation, coordinated civil society action, and political remediation measures. After two years of reprieve, 2018 was also the year in which loadshedding recommenced after two years of reprieve. There is a longer history of co-causal factors behind the mismanagement of power stations, including insufficient maintenance and corrupt procurement practices.

The history of load shedding dates back to 2007, with the institutional and financial issues characterising the utility rooted in its apartheid history, as well as in post-apartheid energy planning and investment decisions (Baker, 2015, 2019; Marquard, 2006; Van der Heijden, 2013). Nonetheless, its convergence with other dynamics, including the utility's burgeoning debt, the recommencement of loadshedding, and the national state capture response, gave rise to the reinvigoration of sector reform proposals first proposed in 1998 (White Paper on the Energy Policy of the Republic of South Africa, 1998). Eskom's failure become emblematic of state dysfunction and economic underperformance.

Following announcements by newly inaugurated President Ramaphosa in the State of the Nation address in 2018, a set of power sector and Eskom reforms was developed and published in Roadmap for Eskom in a Reformed Electricity Supply Industry, published by the now-defunct Department of Public Enterprises (Department of Public Enterprises, 2019). This document outlined a pathway toward functional and legal separation of the utility into its transmission, generation and distribution divisions, each with their own boards. The goal of this splitting was that,

> Over time, the generation market will become more competitive and decentralised with new public, private and other generators entering this market as well as the [Integrated Resource Plan's] (IRP) energy mix, including Eskom's 'new build power stations' under the New Generation Regulations. This will introduce the appropriate level of competition and efficiencies in the Eskom fleet and in the power market generally (Department of Public Enterprises, 2019).

A series of changes to electricity legislation and regulation followed, along with internal strategic reorientation within Eskom. A plan was developed to operationalise the government's policy shift (for a summary snapshot of the evolving market structure and institutional environment, see Figure 6 in Appendix A: Institutional arrangements).

In 2022, the National Treasury commissioned an independent report, the Opera Assessment Report (VGBE et al., 2023), to evaluate Eskom's operational challenges amidst the country's persistent electricity crisis, characterised by frequent loadshedding and declining energy availability. Prepared by the VGBE-led consortium, the report provides an independent analysis of the coal fleet's performance, maintenance practices, skills development, and state of the transmission grid.

The report found that, at a technical level, the loadshedding crisis was primarily driven by the poor performance of Eskom's coal fleet, which was operating at a low Energy Availability Factor (EAF) of 50.83%, due to years of deferred maintenance, ineffective operational practices, and a highly centralised, bureaucratic management system. Equipment failures, such as the long-term unavailability of key units at Duvha, Medupi, and Kusile, exacerbated the situation. Complicated procurement processes further delayed critical repairs and maintenance, while newer plants like Kusile and Medupi faced significant capacity constraints, due to incomplete coal-handling systems and insufficient water treatment facilities. Unresolved defects in coal plants contributed to partial load losses of up to 6 000 MW.

Eskom's crisis management had not meaningfully altered the declining plant performance. While the transmission grid remained in relatively good condition, much of its infrastructure is ageing, and slow progress in grid modernisation threatens the future reliability of the system. The assessment identified high workload, staff demotivation, and lack of leadership development as factors that exacerbate infrastructure performance issues, limiting Eskom's ability to recover lost capacity (VGBE et al., 2023).

While the detailed regulatory changes are specified below, what is important to note about the structure of the power system is that, prior to this reform, the only private participation in the power system was through Eskom's procurement in services for its coal power stations (coal purchases, build and maintenance, etc), and through REI4P energy auctions administered by the Department of Mineral Resources and Energy (DMRE). The restructuring has opened a variety of options for private participation, through energy wheeling arrangements and onsite generation, in business-to-business transactions, and public procurement (Hermanus & Foster, 2023; Kamanzi & Hermanus, 2022). REI4P still exists, but it has been outpaced by increasing embedded generation, both small-scale embedded generation (SSEG) and utility-scale (Hermanus & Foster, 2023).

In a significant step towards unbundling, Eskom announced the appointment of its first-ever National Transmission Company of South Africa (NTCSA) board on 9 January 2024 (Eskom, 2024). This marks a milestone in the operationalisation of the NTCSA, a separate entity envisioned to manage the national electricity grid, independent of Eskom's generation and distribution functions. It was confirmed in June 2024 that the NTCSA had started trading.

This gradual reconfiguration of the electricity system brings it closer to the "standard model" promoted by development finance institutions in the 1990s, aligned to structural adjustment packages (Association of Power Utilities of Africa (APUA) & The African Development Bank, 2019). The standard model includes the unbundling of generation, transmission and distribution, independent sector regulation, private sector participation, competition (in generation and other areas), and the development of electricity markets.

Within the electricity system as it stands, municipalities sit at an interface between the electricity sector and broader society. The relationship between municipalities and Eskom is contested. This political contest is further pressurised by the national utility's spiralling debt, increasing costs and electricity tariffs, and a profound and enduring governance crisis. Eskom's loadshedding threatened to undermine the national and individual municipal local economic development planning. Adding to this complexity is the centrality of electricity surcharges to municipal fiscal models, local equitable service delivery, and political autonomy.

While municipalities play an essential role in the electricity distribution industry (EDI), they have limited authority and scope of duties and responsibilities in the ESI, as defined through cascading legal and institutional prescriptions and conventions. The Constitution of the Republic of South Africa, Section 215 (1) and Section 229 (1), empowers municipalities with executive authority over electricity reticulation, which the Electricity Regulation Act (4 of 2016), as amended in 2017, defines as "trading or distribution of electricity and includes services associated therewith" (Plaatjies et al., 2018). However, the liberalisation of generation has spurred the interest of municipalities in direct energy investment and energy procurement, with larger municipalities developing policies and projects to enable this (Hermanus & Foster, 2023).

There has also been a policy discussion developing regarding community ownership of renewable energy generation (Groundwork et al., 2022; Presidential Climate Commission, 2024), connected to other international debates on the same topic of "energy democracy" (Bauwens, 2016; Becker et al., 2019; Fairchild & Weinrub, 2017; Szulecki, 2018). The proposed benefits of community ownership, typically applicable to small-scale projects, are unclear and untested. While there is a minority local ownership requirement attached to REI4P projects (a minimum 2.5% shareholding in bid windows 1 to 4 is allocated for community ownership, defined by distance from the infrastructure, and typically facilitated through a loan and managed through a trust), it has generated limited and contested benefits (Mthembi et al., 2019; Wlokas et al., 2017).

Additional noteworthy institutional arrangements include the following:

- The National Energy Regulator of South Africa (NERSA) is an independent legal body that regulates the electricity sector, in line with the Electricity Regulation Act (ERA) and the National Energy Regulator Act (2004), and is responsible for developing and enforcing a range of regulations, including for pricing and tariffs, licensing and compliance, infrastructure planning (including the promotion of alternative generation, notably renewables), and regulatory development and reform. NERSA has faced significant capacity constraints in responding to the changing power sector dynamics and developing appropriate regulations for new developments.

- The DMRE is responsible for policy development, notably the IRP and the Integrated Energy Plan (IEP). In 2023, a Minister of Electricity was appointed for the first time, in addition to the existing portfolio of the Minister of Mineral and Energy Resources (now the Minister of Mineral and Petroleum Resources). Eskom was previously overseen by the Minister and Department of Public Enterprises, which no longer exists. Eskom is now located under the Department of Planning, Monitoring and Evaluation (DPME) and is overseen by the Minister of Energy and Electricity. This is the case while it is undergoing restructuring and the implementation of a new, centralised shareholder model, which is not yet public.

- The Presidency also convened a National Energy Crisis Committee (NECOM) in 2022, aimed at "fixing Eskom and adding new sources of power" (National Energy Crisis Committee, 2023). Its primary intervention is the liberalisation of the generation market, including pushing for the diversification of the country's generation assets, and increasing IPP (Independent Power Producer) and other private energy investments.

2.2. ELECTRICITY INFRASTRUCTURE AND THE CONTRIBUTION OF RENEWABLE ENERGY

South Africa is currently home to Africa's largest generation capacity, with over 55GW installed, and the most extensive national grid network. Data sourced from the draft 2023 IRP (Eskom, 2023) provides an energy mix as follows: coal (38.8GW); gas (2.83GW); nuclear (1.86GW); hydro (1.6GW); pumped storage (2.73GW); concentrated solar PV (500MW); solar PV (2.3GW); wind (3.44GW); estimated SSEG (mainly solar with some battery storage) (5GW). Eskom, IPPs, and SSEG projects from commercial and industrial users provided this capacity. Over this period, electricity demand decreased by 1.3%, reaching 226TWh, while access to electricity increased from 85.3% in 2015 to 90% in 2020. Energy poverty increased during the economic recessionary period caused by the COVID-19 response measures. By 2022, access rates fell to 86.5%, resulting in a demand of only 215TWh in 2023, with an estimated 5.91% of unmet demand due to loadshedding (Eskom, 2023). Demand levels were negatively impacted by the declining performance of South Africa's coal-fired generation fleet, which precipitated high levels of load shedding.

In 2023, there were 6 838 hours of loadshedding, meaning that loadshedding was implemented somewhere in the country 78% of the time (Centre for Renewable and Sustainable Energy Studies, 2024). The stated ambition of the Presidency's initiative, led by the National Electricity Minister, is to address this national conundrum using private sector renewable energy investment as a critical lever, while improving public coal generation performance in parallel. This strategy was informed by a foundational assessment developed by the reports of the Eskom medium-term system adequacy outlook (MTSAO); the latest iteration for the 2024-2028 period provides reviews of the adequacy of available, committed, and anticipated electricity generation resources to meet South Africa's forecast electricity demand in the upcoming five years (Eskom & Sigwebela, 2023). The MTSAO highlighted scenarios relating to performance levels of the public coal fleet and the anticipated uptake of new private power generation plants, the majority of which are anticipated to be wind and solar projects. The review found that none of the current scenarios under review met all the full system adequacy requirements for all years. However, the closest positive outcomes included a combination of high performance from the existing public coal fleet, alongside the execution of the planned renewable procurement programmes, and plateauing electricity demand. New renewable energy projects are shown to have a positive impact on system adequacy needs but are ultimately constrained by the availability of capacity on the grid. The energy system is anticipated to remain severely constrained, which places pressure on the need to continue the operation of even some of the country's older coal plants facing prospective decommissioning. By 25 November 2024, Eskom achieved a milestone of 240 days without loadshedding. Several recommendations related to the reduction of procurement bottlenecks, decentralisation of plant management, and initiatives implemented at several high priority coal plants yielded significant improved performance from the coal generation fleet. Decreased domestic demand and the uptake of renewable energy systems have also played a role in the suspension of loadshedding conditions.

In this context, renewable energy projects are also shown to play a vital role in reducing the usage of diesel-based generators across the scenarios, which could play a role in lowering overall generation sector costs during periods when coal fleet performance deteriorates. The latest renewable energy performance report compiled by NERSA (NERSA et al., 2023) states that total energy produced by grid-tied, utility-scale renewable energy plants stood at approximately 8 774 GWh, with 95% deriving from projects in the REI4P[1] from January to June 2023 (see Table 1). This cumulatively accounted for 7% of the total electrical energy produced over the reporting period. Loadshedding has varied in intensity and has been managed in stages.Click or tap here to enter text.

Table 1: DMRE-facilitated procurement of renewable energy generation projects by 30 June 2024, recorded by NERSA Click or tap here to enter text.

Bid Window	Total Projects	Procured Capacity	Installed Capacity (MW)	Commercial Operation (MW)	Status	Expected annual energy (GWh) of all IPPs at P50[2]
1	28	1425	1425	1415	All operational	3712
2	19	1040	1040	1036	All operational	2982
3	17	1452	1433	1430	16 operational; one under construction	4805
3.5	2	200	100	100	One operational	485
4	26	2205	2182	2168	All operational	7213
Small-scale 1	10	50	0	0	Delayed signing of PPAs	175
Small-scale 2	10	49	0	0	Delayed signing of PPAs	106

[1] The Renewable Energy Power Producers Programme (REI4P) is a public procurement programme conducted by the DMRE. Capacity prescriptions and technical requirements are outlined in a request for proposals, and a competitive bidding process is facilitated by the Independent Power Producers' Office. The lowest set of bids which meet the qualification criteria are awarded project bids, and a process is undertaken to secure power purchase agreements between Eskom and the bidding consortium, with contracts underwritten by the National Treasury.

[2] P50 means there is a 50% chance in any given year that production will be at least a specific amount.

5	28	2600	0	0	11 under construction; remaining awaiting Financial Close	7121
6	5	860	0	0	Awaiting Financial Close	1883
7	To be confirmed after bidding process	To be confirmed from 5 000 MW	0	0	Awaiting Procurement outcome (end Quarter 1, 2024)	-
Risk Mitigation	9	850	150	150	Three Operational	-
TOTALS	**145**	**10731**	**6330**	**6299**	**-**	**28482**

Source: (NERSA et al., 2024)

These projects were shown to provide support equivalent to one stage of load shedding during the peak of Stage 4 rationing in March 2023. This situation could be further improved by addressing curtailment[3] dynamics. For REI4P plants over this period, curtailment amounted to 4 606GWh, impacting 18 plants, with the majority occurring in March, correlated to a high wind speed period.

Eskom paid approximately R6.95 million to IPP projects as part of a 'take-or-pay' clause stipulated in the REI4P power purchase agreements. This curtailment value could be eliminated by the increased deployment of flexible, fast-ramping power plants and energy storage solutions, which could displace some energy currently provided by coal- and diesel-based generators.

One further additional cost challenge is the average price for these renewable energy projects. Currently, it stands at R1.99/kWh, well above the average bid prices[4] of the 5th and 6th bidding windows of the REI4P, which came to less than R0.50c/kWh (Bellini, 2022). This discrepancy is due to the high cost of early procurement rounds.

As noted above, embedded generation projects outside of REI4P are growing, yet neither municipalities nor Eskom have a complete view of the extent of commercial or residential embedded generation (Hermanus & Foster, 2023). There is tracking of embedded generation, however, by both NERSA and the South African Photovoltaic Industry Association (SAPVIA) (see Table 2).

[3] Production curtailment occurs when a generator is requested to prevent available energy from being delivered to the network, due to issues identified by the system operator, in prevailing network conditions. Curtailment events are to be found in the unforeseeable or unforeseen behaviour of power generation or power consumption assets, e.g. in forecast deviations of renewable energies. These events then cause imbalances in the grid, or lead to local congestion issues that are solved by curtailing excess power generation, either locally with single generators (e.g. one windmill) or even on a broader basis (e.g. a couple of wind farms in a certain region). So, in most cases, the underlying cause of curtailment is not the variability of renewable energy generation, but rather the inability of current electricity grids to transport the excess electricity from renewables to consumers (Next Kraftwerke, 2024).

[4] Final PPA prices often come in higher than the winning bid prices for a variety of reasons, including changing component costs, supply chain issues, and fluctuations in exchange rates and interest rates, among others.

Table 2: Installed solar PV capacity as tracked by SAPVIA Click or tap here to enter text.

Market segment	System size	Total capacity
Residential	0 - 30 kWp	620.89 MWp
Commercial and Industrial (C&I) – SSEG	30kWp - 1MWp	1 247.63 MWp
C&I Large Scale and utility scale	1MWp - 50MWp	1 925.53 MWp
Utility Scale	> 50MWp	1 865.03 MWp
TOTAL		**5 659.08 MWp**

Source: (SAPVIA, 2024)

Table 2 shows that there are 5 659.08MW of embedded generation, of which SSEG (including residential installations) stands at 1 868.52MW.There remains some uncertainty about the figures for residential installations as many systems may not have been legally registered with the relevant municipality.

Figures 1 and 2 illustrate the annual present capacity statistics for solar and wind plants from 2018 – August 2024. From 2021 to 2023, the number of solar installations increases significantly in response to changes in law and regulations.

Figure 1: The number of solar projects installed and registered in South Africa, by year, 2018-2024

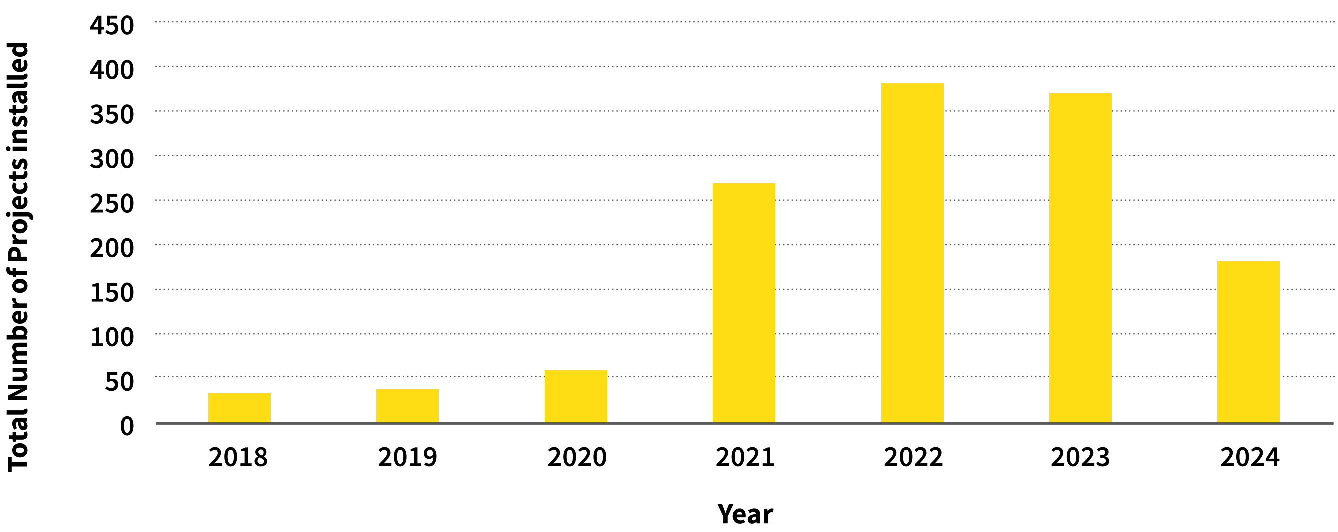
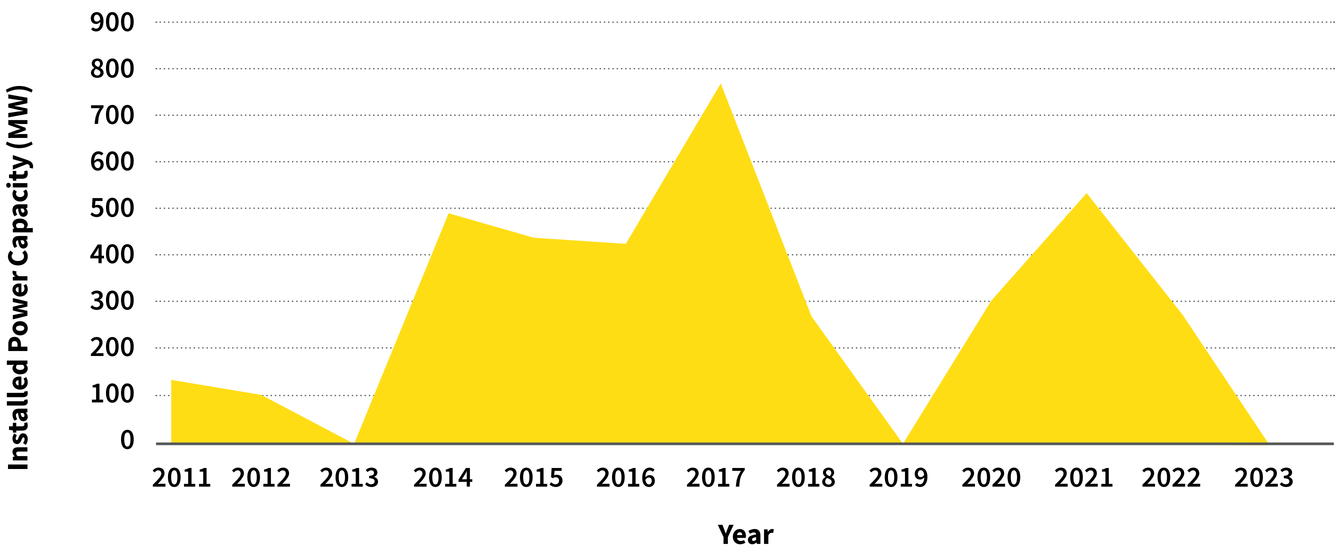
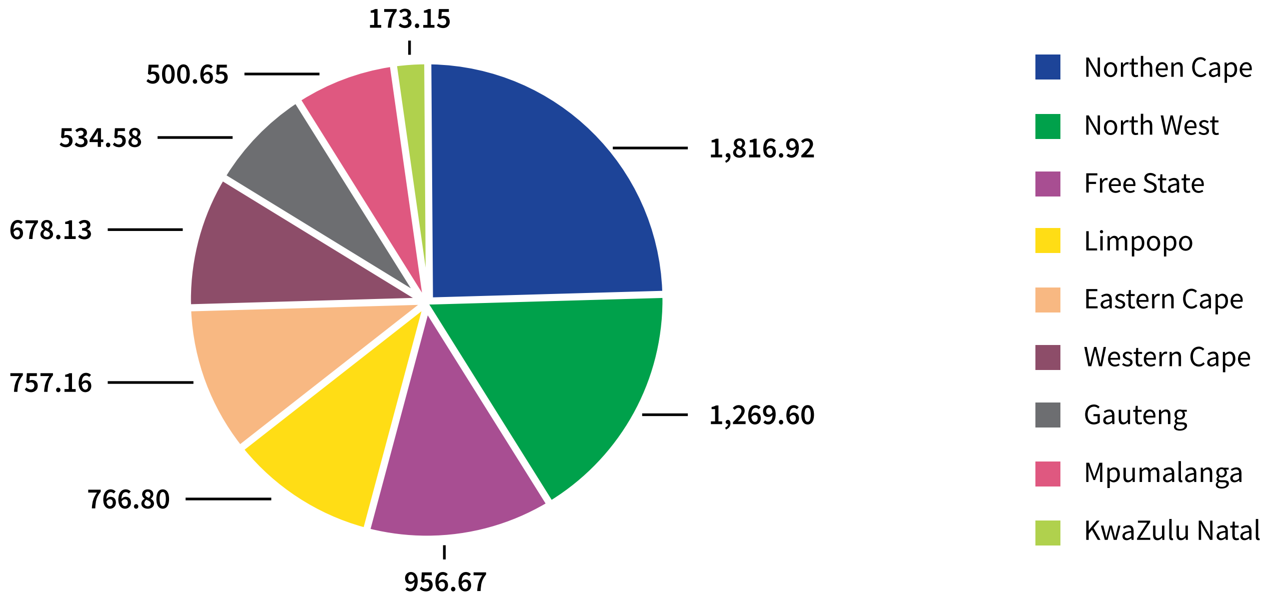


Figure 2: Installed capacity (MW) for wind energy plants in South Africa, 2011 - August 2024



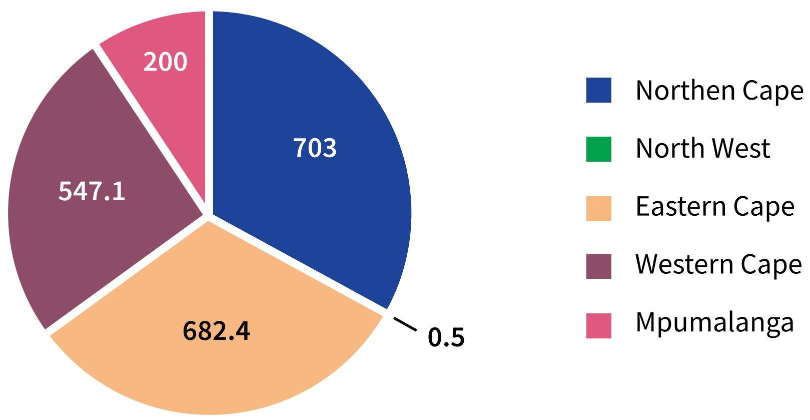
Figures 3 and 4 reflect the installed capacity statistics for solar and wind plants, disaggregated by province, as of August 2024.

Figure 3: Installed solar energy capacity (MW) by province by August 2024



Source: (SAPVIA, 2024)

Figure 4: Installed wind energy capacity (MW) by province in 2024



Source: (SAPVIA, 2024)

The Northern Cape has the highest share of capacity for both solar and wind projects. While all provinces have a share of solar capacity in 2024, wind is more concentrated in the Northern Cape, Eastern Cape, and Western Cape, with a smaller share in Mpumalanga, and less than 1% in North West Province.

The largest utility-scale wind plant project is currently located in the Mpumalanga province and is valued at R4.8bn. When it is completed in July 2026, it will have a total capacity of 155MW. The project is an initiative of domestic coal giant Seriti, which currently supplies just short of one-third of the coal feedstock into Eskom's coal generation fleet. The project, an initiative of its subsidiary, Seriti Green, forms part of a broader 900MW renewable energy construction plan valued at over R25bn, to green the company's emissions profile (Khumalo, 2024). Small niche applications for building energy decarbonisation exist, as demonstrated by the small turbine system installed at the V&A Waterfront in Cape Town under the Renewable Energy Solutions (RES) Programme of the German Federal Ministry for Economic Affairs and Climate Action's Energy Solutions initiative (V&A Waterfront, 2024).

South Africa is home to Africa's most extensive transmission and distribution networks, consisting of over 400 000 km of cabling. Technical energy losses increased from 2015 to 2022 by 4 907GWh, rising to 11% system wide. High levels of loadshedding have increasingly resulted in outages at the distribution level, due to equipment stress failures. Given a lack of capacity, especially in areas of high renewable energy potential, there is recognition of an urgent need to prioritise transmission and distribution grid investment (Eskom, 2022). More than 3GW of renewable energy generation projects proposed under the REI4P failed to be approved because of constraints related to transmission lines, substations, and distribution lines (The Presidency, 2022). Demand for wind plants remains severely constrained by the limited capacity of the existing transmission network and is primarily driven by large-scale public procurement. Factors such as large-scale land use requirements, construction complexity, and the locations of high wind yield areas, collectively result in a lower level of adoption of wind energy plants for application in small-scale embedded generation projects.

2.3. ENERGY POVERTY AND ISSUES OF AFFORDABILITY

South Africa has made impressive progress in electricity access since 1994. However, access declined from 90% in 2020 to over 86% in 2022 (World Bank, 2024). Responsibility for connecting households is split between Eskom and municipalities in their roles as licensed distribution utilities. Challenges frustrating universal access include the cost and complexity of grid extension in particular areas, especially in rural areas and informal settlements, as well as the legal status of land on which households reside. Again, this is especially relevant for informal settlements. Even where households do have electricity access in the form of a grid connection, energy poverty remains a serious issue, impacting poor households in both urban and rural settings (Fakier, 2018; Ledger, 2021; Mohlakoana & Wolpe, 2021; SEA, 2014). Various estimates and methodologies are used to measure energy poverty, typically focusing either on the percentage of household income spent on energy or on the actual levels of modern energy consumption. A 2021 statistical analysis paper (Ye & Koch, 2021) estimated over 50% of South Africans live in energy poverty, a figure likely to have increased in the aftermath of the Covid-19 pandemic lockdown period and the associated economic recession.

A 2015 study, Determinants of Energy Poverty in South Africa (Ismail & Khembo, 2015), drew on the 2012 National Income Dynamics Study to develop an influential analysis of the sectoral trends. The study found that large households were more likely to be energy-poor, as were those with higher transport, schooling, and food expenditures. These findings, affirmed by NERSA, emphasise the relationship between spending on transport, food, and energy.

Energy poverty has racial, gendered and spatial characteristics. 'Black African' households were more likely to experience energy poverty than other race groups, and the Northern and Eastern Cape had higher energy poverty rates, impacted by comparatively lower rates of electrification. Black African households are also more likely to use less efficient energy sources for cooking and lighting, such as paraffin, firewood and coal, which are associated with health risks, due to pollution, as well as fire risks.

Compounding the income and racial disparities, gender dynamics have been shown to have severe impacts on energy poverty. A recent 2022 study, Gender and Ethnic Disparities in Energy Poverty: The Case of South Africa (Ngarava et al., 2022), found that households headed by women are likely to be more vulnerable to energy poverty. Survey results show that women also face more significant challenges in accessing and affording energy, partly due to lower income levels and traditional gender roles that place a higher burden on women to manage household energy needs.

South Africa does apply energy subsidies, with Eskom Distribution and municipalities providing a Free Basic Electricity (FBE) allocation of 40-50 kWh to qualifying households (using a municipality-specific means test). Additionally, electricity tariffs are divided between 'lifeline' and 'domestic' tariffs for residential electricity users, using electricity consumption as a proxy for income, with significantly subsidised pricing. Challenges arise, however, where households are poor and large, and there is growing complexity as higher-income household consumption declines because of energy efficiency and SSEG (Hermanus et al., 2022). Still, significant issues persist:

- The allocation of 40-50 kWh is low, which means that households need to supplement it in the context of unaffordable escalating electricity tariffs.

- A broader crisis in municipal funding and governance has led municipalities to prioritise revenue generation from electricity sales over the imperative for affordable electricity provision (Ledger, 2021). Poor accountability systems between local and national governments have resulted in one estimate of 30% of eligible households failing to access their FBE allowance, despite the national government allocating funds specifically for this purpose. In some municipalities, notably in Mpumalanga province, most affected by the coal phaseout, this is closer to 80% (Hermanus et al., 2023).

- The municipal finance crisis is inextricably linked to 'surpluses' from electricity sales, one of the few sources of autonomous revenue generation. Despite this, many municipalities do not know what the cost of supplying this service is, an issue which is being prioritised through the JETP (Hermanus et al., 2022; The Presidency, 2022).

- An appropriate pricing structure is a critical intervention to allow for more efficient cost recovery and to facilitate cross-subsidisation in the contest of a transitioning power system. Despite the severity of the energy poverty crisis, this issue has not received prominence in the tariff pricing reform process (as defined by the draft Electricity Pricing Policy), which is more oriented toward cost recovery. While the process is still evolving, the reforms imply the phasing in of cost-reflective pricing, which raises prices across user groups. This approach relies on "target subsidies" for low-income users and vulnerable industries rather than relying on intra-user cross-subsidies, as in the legacy inclining block tariff (IBT) system. ESKOM has also previously cautioned that, in the absence of a national subsidy framework, there remains some ambiguity about how NERSA will manage protections for low-income households (Eskom, 2022).

Renewable energy projects are cited by the listed studies, as well as the JETP's Just Energy Transition Investment Plan (JET IP) (The Presidency, 2022), as playing a pivotal role in addressing remote rural access. There are several pilot projects operational, and Eskom has a deployment project to promote rural access.

Eskom has developed a design for containerised microgrid solutions for domestic applications, as well as potential export to the rest of the continent. A demonstration pilot has been installed at the decommissioned coal plant, Komati, in Mpumalanga province (Urban-Econ Development Economists & Eskom, 2023). Eskom has planned a microgrid assembly line capable of manufacturing a maximum of 1 000 units per annum, purporting to create up to 500 employment opportunities (Eskom Holdings, 2023; Presidential Climate Commission, 2023). The plans proposed that Eskom distribution would be the main off-taker for the demand for the Microgrids; the overall project targeted developing 10 assembly lines over a three-year period.

The Komati project has been significantly criticised and achieved few of its stated ambitions to date (Presidential Climate Commission, 2023). Criticised aspects include stakeholder engagement, implementation timelines, and contentions around the quantity and quality of employment opportunities generated to date. Furthermore, the role of microgrids in achieving measurable progress against energy access targets also needs to be clarified, given Eskom's offtake commitments (Groundwork, 2022).

SECTION THREE: **CRITICAL ANALYSIS OF EXISTING POLICIES**

SECTION THREE: CRITICAL ANALYSIS OF EXISTING POLICIES

South Africa has a comprehensive suite of policies governing electricity (for a list of relevant policies, see Table 3 in Appendix B). Below, the following are considered: climate and just energy transition policy, electricity policy, industrial policy, decent work, sustainable livelihoods and gender equity, and policy related to SMMEs.

3.1 POLICY ON CLIMATE AND THE JUST ENERGY TRANSITION

Climate and just energy transition policy provides a framework within which electricity policy is contested and advanced. South Africa has comprehensive climate (and broader environmental) policy and legislation, although its implementation is often challenged. There is also significant just transition policy development, which has allowed for consultation and contestation of energy-related policymaking. South Africa's climate change commitments have been formalised in law in the Climate Change Act 22 of 2024.

Prior to the Act being passed into law, the preceding Climate Change Act (2018) was already a significant policy framework for energy stakeholders. Even as a Bill, it was the basis for the establishment of the Presidential Climate Commission (PCC), which is a multistakeholder planning platform in which climate and energy matters are discussed. It is also the basis for sector resilience planning (for example, for the coal value chain) that will be impacted by decarbonisation dynamics (Patel et al., 2020). The Bill took six years to finalise while different stakeholders fed in various drafts.

Nonetheless, despite the political complexity of the energy transition, including pushback against the coal phase-out gaining momentum at various stages, the climate is an important issue in South Africa across government policy, private sector responses, and civil society (Baker, 2015, 2019). Climate action informs energy planning in South Africa, which has an ambitious Nationally Determined Contribution and related policy, with national commitments informing the IRP and municipal energy plans, for example (Department of Environmental Affairs, 2020; Hermanus et al., 2022; South Africa, 2021). Provincial and municipal governments can, and many do, develop their own local climate mitigation and adaptation policies. Changes to electricity laws and regulations (outlined below) allow for proactive alignment between climate and energy goals (Hermanus et al., 2022).

Additionally, through the PCC, a national just transition framework was developed, in a process of consultation, that seeks to operationalise justice in the transition, including the coal phase-out and the upscaling of renewable investment (Presidential Climate Commission, 2022; Secretariat of the Presidential Climate Commission, 2021). Given the financial pressures on Eskom, investment in the power sector and related infrastructure is also central to the Just Energy Transition Investment Plan (JET IP), which attempts to address and cost the management of vulnerabilities to workers, communities and municipalities in the energy transition (The Presidency, 2022). However, mobilising finances from the IPG for these needs has been largely unsuccessful, with the bulk of the negotiated \$8.5 billion comprising infrastructure loans.

3.2. ELECTRICITY POLICY

Alongside the ERA, mentioned above, other important policies and regulations include the IRP, which is in draft,. the Electricity Pricing Policy (EPP), which is under review, and a range of regulations enforced by NERSA (see Appendix B). These notably include NERSA's draft guidance to distributors on how to develop net-billing tariffs for energy users that also generate and export electricity. South Africa's IRP for 2020-2030 has been highly contested since the first iteration was published in 2011. The only ratified revision was published in 2018, and it is currently being revised in line with current conditions and anticipated policy impacts on private generation.

The most impactful electricity policy development has been a series of successive amendments to the

ERA since 2021[5] and 2022[6] (Electricity Regulation Act (4/2006): Amendment of Government Notice No. 737, 2021; Electricity Regulation Amendment Bill, 2022). As noted above, these amendments allow private electricity generators to sell electricity directly to private or public (for example, municipal) electricity off-takers, representing a dramatic shift from the previous single-buyer market. There is no licensing requirement.

In September 2023, Parliament's Portfolio Committee on Mineral Resources and Energy published the Electricity Regulation Amendment Bill [B 23 – 2023], which sought to clarify some of the ambiguity and confusion surrounding regulatory changes, including specifying the roles and obligations of different actors (Electricity Regulation Amendment Bill [B 23—2023], 2023). Significantly, it grants generators non-discriminatory access to both the transmission and distribution grids, where there is grid capacity. An important mechanism to enable transactions between generators, off-takers, and grid operators in this regulatory framework is energy wheeling. Eskom has taken the lead in the development of wheeling frameworks, and the utility's virtual wheeling platform further enables this diversified transactive energy system (George Municipality, 2022; Kamanzi & Hermanus, 2022; SALGA et al., 2023).

This 2023 Bill creates a clear legal framework for a liberalised energy market in which off-takers can transact with one or multiple public (Eskom or municipal) or private energy providers connected to the national transmission grid or embedded in distribution networks and where they can do this directly or through a mediator such as an energy trader or aggregator. Across public and private stakeholders, several complementary regulatory interventions are still required, including (Hermanus & Foster, 2023):

- The finalisation of amendments to the ERA and EPP;
- The finalisation of NERSA's guidelines on a net billing methodology;
- The adoption of a national energy wheeling framework (SALGA et al., 2023);
- Clarification on the legal process for large embedded energy procurement by municipalities, in terms of ministerial determination under Section 34 of the ERA; and
- Updating technical compliance standards under SANS 10142 to ensure compliance of new technologies to appropriate standards (including metering, storage, and connections).

3.3. RENEWABLE ENERGY INDUSTRIAL CAPABILITIES AND LOCALISATION

Given this project's overall orientation towards employment in renewable energy value chains, it is critical to understand that the South African government has, from the outset, seen these value chains as an opportunity to drive local manufacturing and job creation, under the REI4P. This ambition remains within the current more complex environment. However, the new context affords the government less direct control, necessitating greater consultation and negotiation with businesses, both on the demand and the supply side, to further industrial ambitions.

Renewable energy-specific industrial policy builds on South Africa's more foundational industrial policy. The National Industrial Policy Framework (NIPF): 2007 laid the groundwork, focusing on reindustrialisation, reducing dependence on primary commodity exports, and fostering labour-intensive growth. Renewable energy was not a core focus initially (and not prioritised in electricity policy either). Renewables became relevant as the framework acknowledged the need for transitioning to sectors with long-term competitive advantages (Rivett-Carnac, 2008). The NIPF called for aligning industrial development plans with environmental sustainability practices, in line with international trends. One of the challenges that emerged was a lack of policy coherence.

3.3.1. Development of RE policy

- From 2007, the subsequent Industrial Policy Action Plans (IPAPs) began to translate the NIPF objectives into programmes seeking to leverage renewable technologies, in critical initiatives for the nation's industrial development. Growth in the renewable energy sector was framed as part of an important shift to diversify the nation's energy mix away from coal, as well as a key tool to address the medium-term security of supply concerns (Krupa & Burch,

[5] Independent power generation projects up to 100MW, supplying private electricity consumers, are exempted from a licensing requirement stipulated in the Amended ERA Schedule 2.

[6] The most recent Electricity Regulation Act (4/2006): 2nd Amendment Bill enables multiple buyers and sellers of electricity to transact directly.

2011). Some emphasis was placed on developing early-stage industry development along solar water heating and wind energy value chains. During this time, however, renewable energy would not be advanced in parallel, through national electricity policy.

This changed in 2009 with the Renewable Energy Feed-In Tariff (REFIT) system and was reinforced in 2011 with the commencement of REI4P. Between 2009 and 2013, the IPAPs leveraged the growth in deployment of solar and wind energy systems, through utility-scale plants developed under the successive REFIT and REI4P initiatives. The REI4P, in particular, was intended to form the backbone of facilitating private investment in the sector, and anchoring demand for renewable energy technologies in order to develop local industry (Zalk, 2014).

Recommendations to this end were deepened from 2013-2018, where the importance of aligning renewable energy industrial policy with broader developmental goals, including job creation, skills development, and transformation of the Minerals-Energy Complex (MEC) was emphasised (Waxa, 2023). While the REI4P policy itself had several requirements for IPPs to drive local procurement, thereby stimulating local manufacturing, the programme was undermined by the IPPs circumventing requirements by obtaining post-bid exemptions issued by government, as well as by corruption at Eskom. The latter resulted in long lags between builds and the failure of local companies supplying the industry. Some of this capacity has never been recovered, despite reinvigorated demand.

The 2018 electricity policy reforms effectively began to make the localisation levers within REI4P redundant, as it became clear that this programme would be the main vehicle for private renewable energy investment for a much longer period. In July 2019, the process to develop the SAREM was initiated by the Department of Trade Industry and Competition (DTIC), as one of 14 industry-specific masterplans. The SAREM aimed to develop an industrial plan through a consensus-building process developed between industry, government and labour (Greencape, 2024).

The draft plan focuses on the following key areas: localisation policy, skills development, infrastructure development, sectoral financing, and regulatory policy reform. The South African government has framed its renewable energy industrial policy focus as anchored in the development of industrial capabilities for solar, wind and battery energy storage systems (BESS). The SAREM is intended to guide the sector development strategy "aligned with global and domestic demand dynamics as well as South Africa's supply-side capabilities" (Department of Trade Industry and Competition et al., 2023).

3.3.2. Problems with RE policy

It is useful to consider this ambition alongside the current realities and projected trends in the sector. For example, drawing from an extensive local industry survey and research supported by the Economic and Social Research Council (ESRC), L. Baker and B. Sovacool (2017) identified several key trends in the solar photovoltaic (PV) and wind technology value chains in South Africa. The study found that the norms, standards and attitudes to risk of debt financiers and equity investors in REI4P projects significantly shape the contracting decisions made during the engineering, procurement and commissioning phases.

An additional consideration is the contradictory incentives and mandates of different government departments shaping the sector's trajectory (Baker & Sovacool, 2017). Tensions were found to exist between national priorities for local manufacturing and job creation and the commercial priorities of international investors and technology suppliers. International norms of project finance, which require proven technologies and experienced contractors, often exclude local manufacturers, especially for key components, based on risk. There has been a legacy of inconsistent policy within government departments, particularly between the National Treasury (which emphasises cost) and the DTIC (which historically prioritised local content). An example of these dynamics can be clearly seen through the policy debates surrounding localisation of solar module manufacturing in South Africa, as will be reflected in this section.

3.3.3. Localisation – solar PV

Record demand levels for solar systems in the country were seen in 2023, where a continental record of 2 965MWp was achieved. These were largely SSEG projects, in response to enabling reforms in local electricity sector regulation (African Solar Industry Association, 2024). On the solar module supply side, Chinese-led firms, such as Jiangsu Seraphim Solar System Co. Ltd. ("Seraphim") and Talesun, have invested in two module assembly factories in South Africa. Talesun, in partnership with a domestic manufacturer, ARTSolar. They launched a 325MW per year Tier 1 manufacturing plant, aimed at meeting the project localisation requirements of the public procurement programme, known as the Risk Mitigation Independent Power Producers Programme (RMIPPP) (Talesun, 2022).

Despite these comparatively high levels of domestic demand for solar PV products in South Africa, factory utilisation levels have proved erratic and sub-optimal, because of porous local content requirements for public procurement programmes, and the lack of alignment between industrial investment incentives and trade protections (Institute for Economic Justice & COSATU, 2021).

Attempting to remedy this dynamic, in December 2023, the International Trade Administration Commission of South Africa (ITAC), responding to an application made by South Africa's two remaining solar module manufacturers, ARTSolar and Seraphim, decided to implement a 10% import tariff on PV cells, assembled modules, and panels (International Trade Administration Commission of South Africa, 2023). ITAC reported that several domestic manufacturers, including Jinko Solar, Solaire Direct, SunPower Energy Systems Southern Africa, JA Powerway, and SMA Inverters, had ceased their local manufacturing operations in favour of importing products. These manufacturers cited high production costs, and intense competition from low-cost, imported panels, as the primary reasons for this shift.

Opportunities in end-of-life management for solar PV modules are relatively in their infancy in policy development in South Africa, due to the historically recent presence of high levels of component demand. GreenCape NPC published a paper, Solar PV Modules: Shining a Light on End-of-life Management for Large-Scale Projects (GreenCape, 2024), in which it quantified the scale of PV waste since the surge in new SSEG projects over the previous three years. The central regulation supporting the nascent domestic recycling industry is the Extended Producer Responsibility (EPR), under the Waste Act, which requires producers to implement measures to keep solar PV modules out of landfills, including designing for recyclability, collection, and reuse. Opportunities were identified in refurbishing and reselling functional decommissioned modules sourced from large plants under the REI4P programme, noting that there are significant volumes of end-of-life modules expected from 2033 onwards. Residential solar and commercial and industrial applications are significantly harder to coordinate for recycling programmes. COSATU-IEJ's SAREM recommendations (Institute for Economic Justice & COSATU, 2021) include a proposal to establish municipally-owned and -operated recycling depots to manage the process.

3.3.4. Localisation - wind

In the case of wind technologies, tower and wind blade manufacturing typically account for up to 50% of the engineering, procurement and construction development costs for a utility-scale project. To date, local content requirements have had success in localising the construction of turbine towers from Rounds 1 to 4, with two facilities established at the Atlantis IDZ (Western Cape) and Coega IDZ (Eastern Cape). Wind blade production, in contrast, has failed to take root in South Africa, despite early business interest, due to the unpredictable delays between project bid rounds(Baker & Sovacool, 2017; Department of Trade Industry and Competition et al., 2023).

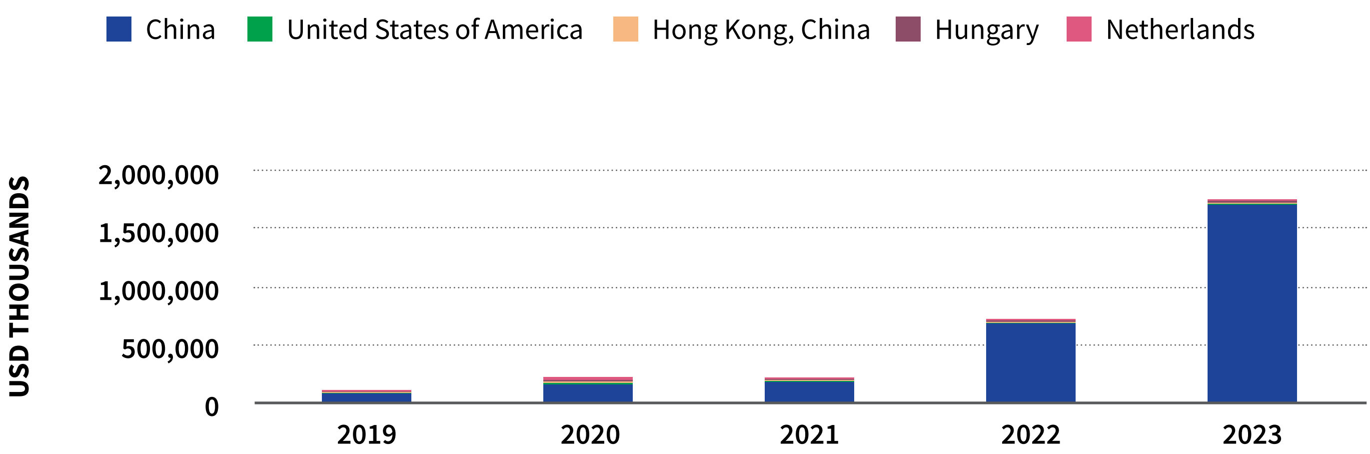
3.3.5. Localisation - storage

BESS are understood to be critical complementary technology for the expansion of wind and solar PV technologies in the national energy mix. Energy storage has emerged as a key focus in South Africa's industrial policies, as the country integrates more renewable energy into its grid. While earlier iterations of the NIPF and IPAPs paid limited attention to storage, its importance became apparent with the challenges posed by intermittent energy sources like solar and wind. By the 2018 IPAP(Department of Trade, 2018), energy storage was recognised as critical for grid stability and renewable integration.

The policies began exploring domestic opportunities for manufacturing energy storage systems, specifically listing key local mineral resources such as nickel, manganese and vanadium. Pumped hydroelectric storage also featured as a viable large-scale solution, capitalising on South Africa's geographical potential. The 2018 IPAP also indicated that, with a surging global demand for fuel cells, several projects were underway, with the support of the IDC, government and industry, to explore opportunities in the hydrogen economy, as well as within the platinum group metals market. The plans advocate for research and development in storage technologies to foster innovation and reduce dependence on imports. Programmes like the REI4P have started integrating storage solutions into project designs. However, challenges remain, including high costs, an underdeveloped local manufacturing base, and the need for more cohesive policies to support energy storage as a pillar of industrial development and renewable energy integration.

Lithium-ion-based batteries dominate the domestic BESS market, due to their declining cost and advantageous material properties, for example, deep discharge capability, comparatively high energy density, and economies of scale achieved in China (see annual imports in Figure 5).

Figure 5: Import value of lithium-ion accumulators (excl. spent[footnote 7]) to South Africa from top 5 export partners



Source: (TradeMap, 2024)

As prescribed by the Extended Producer Responsibility Regulations (Waste Act), battery pack manufacturers are responsible for end-of-life management of battery systems. Still, only the initial stages of recycling are anticipated to be developed in South Africa by 2030. The industry association, the Localisation Support Fund (LSF), published a BESS localisation study (Barnes et al., n.d.) that found that, despite mining and exporting materials to produce lithium-ion battery cells in South Africa, technology firms do not currently have advantageous intellectual property rights. Additionally, there is a high capital cost for the machinery required to beneficiate these minerals for battery-grade cell production. At the same time, both domestic and regional demand for BESS products remains relatively low.

The report suggests that short- to medium-term opportunities are primarily based on importing key components, followed by the assembly of tailored BESS products. Cell module manufacturing capabilities are sited in South Africa, representing the backbone of the short-term localisation opportunity. China currently dominates the global lithium battery value chain and accounted for over 97% of all imports for these systems in 2023 (TradeMap, 2024). These systems currently enjoy common application in residential backup systems, commercial and industrial systems typically paired with solar plants, as well as Eskom's public procurement of privately owned and operated BESS systems (more than 500MW/2000MWh (Creamer, 2023).

In response to rising demand, Balancell has inaugurated a state-of-the-art battery production facility in Ndabeni, Cape Town, with a capacity of 1 GWh per annum (Venter, 2024). Aimed at serving African and European markets, the R150 million facility focuses on producing lithium ferro-phosphate smart batteries for applications in

[5] Excluding spent means the data focuses only on new or functional lithium-ion batteries being imported into South Africa, and does not include used, depleted, or waste batteries that might be imported for recycling or disposal.

electric vehicles and renewable energy storage. The factory employs 70 full-time staff and supports an additional 1 500 indirect jobs along its value chain.

An emerging competitor technology, the vanadium redox flow battery[8] (VRFB), has significant local potential and a growing base of local capacity with the presence of a frontier domestic firm (Bushveld Energy); this has also been earmarked by the SAREM for long-term support. VRFBs are cited as suitable for applications for longer duration storage than lithium-ion batteries, allowing for applications for energy systems to store renewable energy (principally solar) during off peak consumption hours, to displace the use of diesel peaking plants[9]. This technology has an additional advantage in recycling, due to long-term reusability of the VRFB electrolyte.

However, the VRFB is not currently cost-competitive with lithium-ion batteries for hybrid power plants in South Africa, and its future development is likely to be tied to direct state incentives and preferential public procurement policies (Moshikaro & Pheto, 2023). Bushveld energy has benefitted from financial support from the Industrial Development Corporation (IDC) and, together with a US-based battery manufacturer, UniEnergy Technologies, participated in a pilot programme with Eskom’s Research and Innovation Centre.

South Africa’s inaugural Battery Energy Storage Independent Power Producer Procurement Programme (BESIPPPP) has reached a significant milestone with the financial close of its first two projects, Mogobe BESS and Oasis Mookodi, which will collectively deliver 180 MW/720 MWh of energy storage capacity. The Mogobe BESS project is being developed by a consortium led by Scatec, in partnership with Perpetua and a local community trust. Similarly, the Oasis Mookodi project will be constructed by a consortium led by EDF, working alongside Mulilo, Pele, Gibb Crede, and another community trust.

These projects represent a critical step in South Africa’s efforts to enhance grid stability and integrate renewable energy into its power system. The projects have committed 11-20% of their spending to local content allocations, rendering it reasonably clear that locally assembled batteries will not be used for utility scale projects (Craemer, 2024). Balancell has urged the DTIC to implement import duties on assembled batteries and introduce legislation enforcing minimum performance standards. This initiative seeks to safeguard the market from substandard, low-cost imports that undermine local manufacturers' competitiveness, a risk that very much applies to Bushveld Energy’s VRFB storage systems as well (Bulbulia, 2022).

3.3.6. Localisation - electrical equipment

Additional opportunities in the manufacturing of electrical equipment have also been identified by a recent study mapping economic trends, which found that the subsector contributes up to 4% of the domestic manufacturing workforce (TIPS & Robb, 2023). The findings illustrated that over the last decade electrical equipment’s share in the broader capital goods industry has sharply fallen, along with manufacturing investment, as a byproduct of a downturn in public spending by SOEs. The trade balance in the sector is heavily dominated by imports of electric motors, generators, transformers, and batteries. Relevant to this paper, the study also identifies sectoral local content requirements for industrial lead batteries, medium voltage switchgears, set-up boxes, cable products, solar PV systems, solar water heaters, transformers, shunt reactors and associated equipment. Increased deployment of renewable energy systems could improve the scale of employment in this subsector of the economy.

3.3.7. Localisation - transmission

In order to accommodate the anticipated expansion of utility-scale renewable energy-based systems in the national grid, significant upgrades to the domestic transmission network are currently required, specifically in high wind speed and solar irradiance resource yield areas. The Transmission Development Plan (TDP) is a key Eskom planning document that assesses the network requirements for generation integration to meet load demand on a 10-year horizon, drawing on the updated targets listed in the IRP. The IRP2023 remains in draft form, so the current TDP is related to the outcomes of the IRP2019 (Eskom, 2022).

It is important to note that since 2015, in response to the expansion of the use of IPPs, Eskom has enabled ‘self-build’ development options to private load and generator customers. Under a ‘self-build’ project, a load or generator customer undertakes to design, procure and manage the construction of transmission infrastructure,

[8] A Vanadium Redox Flow Battery stores energy in vanadium electrolyte solutions, whereas lithium-ion batteries store energy in solid electrodes.

[9] A diesel peaking plant uses diesel engines or turbines to produce electricity during peak demand periods.

which facilitates connecting the customer to the grid. The self-build transmission infrastructure is handed over to Eskom upon completion, subject to the requisite specifications and standards. Self-build options aid private developers in managing project risk, principally duration and cost, which is typically tied to incentives by IPP financiers.

Further expansion of the transmission network is constrained by two key factors: the availability of capital, and the acquisition of land servitudes along the planned path of development. Capital for transmission has become increasingly strained due to Eskom's debt crisis and low liquidity and the pursuit of private capital investment exacerbates existing concerns over the impact of the plans on the price of electricity.

The newly formed NTCSA is coordinating with Eskom broadly to execute localisation programmes tied to the transmission build-out programme, with aggressive targets for locally manufactured transformers, as part of what it describes as its largest infrastructure rollout programme, with over 170 transformers and 14 000km of new transmission lines by 2032. To support this initiative, the LSF published a study, Value Chain Mapping Local Manufacturing Capability in the Transmission & Distribution Sector (Vajeth et al., n.d.), assessing opportunities related to the TDP, as well as the anticipated distribution grid modernisation process. Reinvestment in the distribution networks is becoming increasingly necessary to reduce system losses and to accommodate the growing deployment of SSEG, BESS systems, and smart meters.

Local manufacturing capability for powerline components was found to be generally sufficient to meet current demand. However, substation equipment and smart electronic equipment will continue to be predominantly imported. Local content designations, under the DTIC, as well as the provisions in the National Industrial Participation Programme (NIPP), were also cited as key potential mechanisms to support localisation for steel, conductors, and cabling, among several other components. The investigation concludes with recommendations to enhance local manufacturing, to aim to improve procurement efficiencies, ensure secure funding is available, foster research collaborations, and support skills development. Additionally, it is essential to maintain stable demand for the subsector components; a coordinated approach could be critical in realising a consistent workflow for manufacturers.

3.3.8. Issues which undermine localisation

Between 2021 and 2024, rapid ERA reforms accelerated market liberalisation without corresponding measures to promote progressive outcomes, such as explicitly pro-poor subsidies, protection for emerging local industries, or strengthening of state institutions responsible for enforcement. This misalignment has undermined local content ambitions. The developments in the solar industry are emblematic of the tensions facing renewable energy localisation policies in South Africa. The government's crisis-framed approach under the NECOM to increasing generation identifies private investment as the primary lever for the country's security of supply. As such, the interests of private project developers significantly influence policy decisions, with the aim of incentivising more capacity. One concrete example is the prioritisation by the SAREM process of measures to encourage market certainty for renewable energy projects.

As noted above, policy uncertainty and inconsistency with the REI4P led to demand-level fluctuations, resulting in a 'boom and bust' cycle incompatible with attracting long-term manufacturing investment. For example, industrial policy measures which prescribed local content requirements left porous processes to manage exemption applications, effectively allowing REI4P solar projects to bypass local module assembly manufacturers, leading to reliance on cheaper imported panels.

From 2011 to 2021, exports for South African-assembled solar PV products fell from $500 million to $300 million (Rivett-Carnac, 2022). The renewable energy demand surge in 2022-23 led to a sharp rise in imports, particularly from Chinese original equipment manufacturers (OEMs). This included large volumes of lithium-ion batteries, solar panels, and inverter systems, directly linked to amendments in Schedule 2 of the Electricity Act, introduced during record levels of loadshedding. The rise of off-the-shelf battery solutions, treasury-backed tax incentives for solar systems, and municipal feed-in tariff policies have enabled residents and enterprises with sufficient capital to shield themselves from the national energy crisis.

This growing dependency on imported systems was entirely foreseeable. Yet state policymakers chose not to implement industrial strategies that could have leveraged the temporary crisis-driven demand surge to support and upgrade domestic manufacturing capacity.

Sector policy interventions, spearheaded by the NECOM, have focused on enabling private investment in the renewable energy sector, and have facilitated the fast-tracking of new solar, gas and battery storage projects (South African Presidency, 2024). As part of this push, Ebrahim Patel, former Minister of Trade, Industry and Competition, implemented a reduction in local content requirements in the REI4P (Omarjee, 2022), prioritising the need to bring new projects online as fast as possible. While these decentralised renewable energy projects aim to prevent the collapse of the commercial and industrial sectors during Eskom's supply crisis, they have come at the expense of a coherent and coordinated industrial strategy for the renewable energy sector.

Labour negotiators involved in the SAREM development process emphasised the critical need to align supply- and demand-side incentives to support the sustainability of local manufacturing. Policy recommendations made by COSATU-IEJ as early as 2021 included calls for several measures (Institute for Economic Justice & COSATU, 2021) to increase local content requirements for public procurement of renewable energy systems, to implement import tariffs on strategically selected components, and to ensure public finance options are used to provide grants and preferential loan agreements. These proposals formed part of a strategy to shape the sector's industrial policy to enable domestic manufacturing firms to expand their scale and capacity to meet the anticipated demand surge. For this to transpire, bold decisions would need to be made within the DTIC, aligned with the National Treasury.

3.4. DECENT WORK

In 2011, the South African government made a commitment to "the attainment of decent work and sustainable livelihoods for all workers and has undertaken to mainstream decent work imperatives into national development strategies"(Cohen & Moodley, 2012). No separate formal definition for decent work has been developed, however. As a member of the International Labour Organisation (ILO), South Africa has accepted the four pillars of its decent work agenda, including (a) employment creation (b) social protection (c) rights at work (d) social dialogue. The South African Decent Work Country Programme (DWCP) was launched in 2010 and developed through a consultative process at the National Economic Development and Labour Council (NEDLAC). It has identified key priority focus areas for state policy, in alignment with the decent work agenda.

The initial key priority areas (NEDLAC & Decent Work Country Programme, 2010) include strengthening fundamental principles and rights at work by enhancing enforcement mechanisms and ensuring compliance with labour standards. The programme also focused on promoting employment creation through support for labour-absorbing sectors, small enterprises, and skills development, while addressing challenges associated with non-standard work arrangements. Another key priority was broadening social protection coverage to include vulnerable workers in the informal economy, alongside improving occupational safety and health measures. Lastly, the DWCP aimed to enhance tripartite engagement (government, industry and labour negotiations) and social dialogue, by strengthening institutions such as NEDLAC and collective bargaining frameworks.

These efforts were designed to mitigate the impacts of the global economic crisis and foster sustainable, equitable growth in South Africa. The founding report also called for the creation of "green jobs", and the development of a "coherent policy framework developed for the adoption of employment intensive investments in green production in both the formal and informal economies" (NEDLAC & Decent Work Country Programme, 2010).

Drawing from a second consultative process (NEDLAC & Decent Work Country Programme, 2018), initiated in 2016, the second phase of the DWCP for 2018-2023 sought to limit its intervention scope by strategically focusing on areas of the economy with high potential impact. The priority focus areas included fostering inclusive labour market policies, particularly for youth, women, and persons with disabilities, while promoting a just transition to a green economy. It aims to expand social protection systems to cover informal and vulnerable workers, addressing gaps in access to pensions, health, and unemployment benefits. Additionally, the programme emphasises strengthening the capacity and representation of employers' and workers' organisations to advocate for improved labour relations and sustainable job creation. The green economy features as a high priority area, with suggested policy indicators for monitoring progress that include the following:

Outcome indicator 1

Existence of a coherent national employment policy environment that is gender responsive and in line with international labour standards and integrates provisions for a just transition to a low carbon economy.

Outcome indicator 1

Number of enterprises (including green and social economy enterprises) targeting women, youth and persons with disabilities, that are established and access innovative business development services in rural, urban and township economies

The process to develop the SAREM, which has to date been consultative and inclusive of government, industry and labour, has significant potential to align with the focus of South Africa's Decent Work Programme. But the current state of South Africa's policy promoting renewable energy (including SAREM inputs) fails to adequately interrogate the prospects for decent work and the subsequent implications for policy alignment or supplementation. The same is true for the broader policy discourse and current reporting on jobs, and much of the existing research estimating the growth of green jobs with the increase in the renewable energy market size. The Congress of South African Trade Unions (COSATU), the largest federation of trade unions in South Africa, represents the primary energy transition stakeholder that has historically championed and introduced the Decent Work Agenda (DWA) into local public policy debates. The federation's gender policy provides a useful basis for understanding the breadth of this concept in the South African context (International Labor Organization, 2024b). This approach is derived from the international labour movement, promoted under the DWA by the ILO (International Labor Organization, 2024c)[10].

COSATU is currently developing comprehensive recommendations for the government's masterplan development process, ensuring alignment with the demands for decent work. In the SAREM negotiating process, COSATU has provided specific recommendations focused on decent work principles. The labour movement has criticised the renewable energy sector, particularly wind and solar systems, for relying heavily on temporary employment during the construction phase of projects. This issue has been cited as a problem internationally, with renewable energy construction jobs for large-scale utility plants typically occurring in remote areas with low levels of collective bargaining for workers (International Labor Organization, 2024a). One of the few critical investigations into the complex dynamics around employment, Community Acceptance Challenges of Renewable Energy Transition: A Tale of Two Solar Parks in Limpopo, South Africa" (Nkoana, 2018) highlights some of these critical issues[11].

Several publications estimate renewable energy employment potential by organisations, including the DMRE (2019), the IPP Office (quarterly), Eskom, the International Renewable Energy Agency (IRENA), and the ILO (annually), Statistics South Africa (quarterly) and SAPVIA (2021) (Hermanus, 2022). These tend to be model-based studies, providing estimates and projections of employment under various transition scenarios. Robust and credible employment figures provide essential insights into the current state of employment, enabling policymakers to address projected job losses in the coal sector and identify potential job creation opportunities in renewable energy. However, variations in the metrics, methodologies, assumptions, and data sources used in different studies lead to a lack of consistency and clarity, undermining coherent policy action (Hermanus, 2022). Key metrics such as headcount/jobs, job-years, and full-time equivalents (FTEs) each have their advantages and limitations. Headcount measures the number of people employed but does not reflect the quality or duration of employment. Job-year metrics provide a cumulative measure of employment time but fail to indicate the number of individuals employed or the quality of work. Similarly, FTEs offer a standardised measure of employment time but lack information on the number of employees or the qualitative aspects of employment.

The trend of domestic research interest in renewable energy employment studies aligns with international patterns, as exemplified by the widely cited article, Employment Factors for Wind and Solar Energy Technologies: A Literature Review, which analysed 70 global studies (Cameron & Van Der Zwaan, 2015). Significant uncertainty persists due to diverse methodologies and the limited availability of reliable data within the sector. Job creation potential is also influenced by the operational context, local industrial policy, and labour productivity, yet few studies comprehensively consider these factors. Another study published in 2022 (Malope, 2022) conducted an explicit inquiry into the state of employment opportunities in the

[10] The concept of decent work has been in use in ILO reports and declarations as early as 1999 (International Labor Organization, 2024c) but only becomes formally incorporated into the 2030 sustainable development goals in 2015. The DWA is founded on four key objectives: employment, social protection, social dialogue, and rights at work. The DWA has since expanded to incorporate the notion of a just transition, ensuring that the move towards sustainable practices does not leave workers behind, and that new green jobs are decent jobs.

[11] Drawing from a set of stakeholder interviews from private company representatives, traditional leaders, and local government authorities among others, the study identified several key challenges. These included fragmented governance systems for IPP projects, a lack of monitoring and accountability of commitments to local communities, and complaints around the quality of employment in employment opportunities.

wind energy sector by surveying dynamics surrounding the development of two wind plants. The study found that jobs created during construction partially met the criteria of decent work, with better wages and conditions than local employers. These opportunities, however, proved to be largely temporary and offered limited absorption into long-term employment opportunities. Mandated community development initiatives, a requirement of the REI4P process, were also found to be top-down and largely fragmented.

The SAREM policy document (Department of Trade Industry and Competition et al., 2023) includes job projections by headcount but lacks an evidence-based analysis of the qualitative aspects of employment within the sector, particularly concerning the REI4P. Consequently, the document fails to provide recommendations addressing concerns about the qualitative aspects of employment. Furthermore, there is no definition of a decent job, despite the document's emphasis on "sustaining decent jobs" as one of its objectives. To ensure consistency and reliability in employment data, it is imperative to address methodological concerns, such as defining the boundaries of what is counted and standardising data sources.

- Direct, indirect, and induced employment must be clearly delineated, to avoid misleading comparisons.
- Detailed assessments of the coal sector exist, but there are gaps in understanding the nature and quality of employment. In contrast, renewable energy studies are growing but suffer from inconsistencies in metrics and methodologies.
- Future projections must distinguish between gross and net employment to avoid overstating job creation. Policymakers should standardise the use of FTEs and headcounts in future studies, and collect qualitative data on job quality and worker experiences.
- Clear guidelines for reporting employment data and supplementing company data with comprehensive surveys will enhance the accuracy and utility of employment assessments, supporting informed decision-making and a just transition to a low-carbon economy.
- Public policymaking can be substantially enhanced through coordinated efforts by national government agencies to produce reliable employment statistics, ensuring that public procurement projects set the gold standard for employment conditions reporting. This requires standardised methodologies and consistent definitions across state departments, such as DTIC, DMRE, Department of Forestry, Fisheries and the Environment, and the Department of Labour.
- The COSATU-IEJ recommendations on the SAREM draft include a proposal to establish a framework for monitoring and evaluating employment opportunities in line with decent work criteria[12] (Institute for Economic Justice & Brian Kamanzi, 2022). State capacity to monitor, evaluate, and enforce the framework must be adequately resourced to ensure compliance.

Concerns have been raised by civil society regarding the insufficient resources allocated to skills development (COSATU, 2023). Eskom accounts for an overwhelming portion of the budget for the Energy and Water Sector Education and Training Authority[13] (EWSETA) to support upskilling workers in the electricity sector. The EWSETA has already taken the initiative to develop programming to support workers in the green economy, and has pioneered initiatives aimed at supporting women's participation in the workforce, discussed further in Section 3.5 below. Despite this, the potential role in developing a skilled workforce for wind and solar value chains has not been well explored in recent policy debates. The JET IP[14] recommends that the government collaborate with universities and other educational institutions to develop new courses and programmes to equip workers with the skills necessary for the transition. However, there has yet to be a corresponding coordinating initiative established under aligned national programmes, including the National System of Innovation and the Department of Higher Education and Training strategies.

[12] This report goes on to recommend that incentives offered to renewable energy projects and local manufacturers should be tied to compliance targets within this decent work framework. It proposes that, to ensure adherence to these targets, penalties for non-compliance should be implemented. This approach will help guarantee that the employment opportunities created are both substantial and meet quality standards, contributing to sustainable and fair job creation in the renewable energy sector.

[13] 23 SETA initiatives were established under the National Skills Development Strategy to transform education and training in South Africa and to improve industry competitiveness.

[14] The landmark Just Energy Transition Partnership (JETP) agreement has earmarked a mere 0.15 % of its $8.5 billion package for this purpose. Similarly, the broader Just Energy Transition Investment Plan (JET IP) allocates only 0.2% of its total investment target to skills development.

3.5. SUSTAINABLE LIVELIHOODS AND GENDER EQUITY

The pursuit of gender equity, and the realisation of ensuring sustainable livelihoods for South Africa's most vulnerable communities, are urgent and pressing socio-economic challenges. The country, which is among the most industrialised on the continent and boasts the largest renewable energy industry by a significant margin, is also characterised by profound economic disparities, including persistent gender-based inequalities. The integration of gender considerations into policies and programmes related to sustainable livelihoods, particularly in the renewable energy sector, is necessary to improve the distribution of benefits from forthcoming sectoral investments.

3.5.1. Sustainable livelihoods

Given issues of precarity in employment in renewable energy value chains, it is necessary to consider whether and how public and private sector efforts could support sustainable livelihoods more broadly, to support workers and the communities in which they live. Public sector efforts aligned to this goal include social security measures such as unemployment or basic income grants, together with basic service delivery policies, such as effectively administered free basic electricity (FBE). The JETP acknowledges the need to improve the delivery of these services in the context of the transition, especially for vulnerable workers and communities impacted by coal power station decommissioning and mine closure (The Presidency, 2022). It does not necessarily extend this rationale to communities whose vulnerability arises in the context of renewable energy developments. Without a robust understanding of the needs of people employed in various parts of renewable energy value chains, it is impossible to assess what kinds of additional complementary strategies might be required from the government at local and national levels to facilitate sustainable livelihoods for workers and local communities.

Sustainable livelihoods have generally been considered under a corporate social responsibility approach in the REI4P. Qualifying bidders must meet local employment quotas, and socio-economic development (SED) and enterprise development (ED) spending obligations, and facilitate community ownership in projects. SED spending includes IPP investments of a portion of their revenue into local development projects, which can include infrastructure improvements, educational programmes, and health services. This investment aims to uplift communities surrounding renewable energy sites. A 2022 study, Scaling the Just Transition for Community Based and Community Placed Projects"(Mthembi, 2021), reflected that these obligations have essentially forced IPPs,, in the predominantly rural districts in which projects are based to supplement local development, creating employment additional to direct employment in the project itself, in addition to infrastructure, education and health services. These non-core 'benefits' have been met with mixed assessments and significant criticism. Additionally, the study further highlighted issues with established community trusts, which are supposed to manage the socioeconomic benefits of IPP projects, but which were found to be poorly managed in some instances.

Technologies such as solar, wind, and biomass have an identified potential to improve agricultural productivity and access to water for residents and commercial applications, and support the growth of small-scale enterprises in rural areas (Nhamo et al., 2020). Access to energy can also contribute to improved health and education outcomes. Together with increased economic opportunity, these constitute key components of sustainable livelihoods (Mukisa et al., 2020). In many of these rural areas, however, poor infrastructure limits the efficient deployment of renewable energy. High upfront costs also create financial barriers for small farmers and businesses with limited access to capital. These issues, combined with unequal resource distribution and historical land and energy access inequalities, make it harder to ensure renewable energy benefits historically marginalised groups.

3.5.2. Gender equity

There is no specific government policy that targets gender equity related to energy access. As noted in the discussion of energy poverty, there is a gendered dynamic to this challenge. Rural communities are significantly impacted by energy poverty, which disproportionately impacts women. Women, particularly in rural areas, are forced to spend considerable time and effort on energy-related tasks, which often include collecting firewood and managing household energy needs (Longe, 2021). Due to low family income levels, women in rural areas often also do not have access to timesaving consumer electronics, which can reduce the time and effort spent on household tasks. This limits their opportunities for education, economic participation, and overall well-being (Longe, 2021). Distributed renewable energy systems could play an important role in improving these conditions, but they are not clearly defined in policy. Gender-sensitive approaches could also be integrated into electrification programmes and electricity subsidy programmes; however, this is not currently being considered. Serious challenges exist with the administration of subsidised services in general (Ledger, 2021).

The Women Empowerment and Gender Equality Bill(2013) provides a robust legislative framework for advancing gender equity in South Africa, mandating systemic measures to ensure equal representation and participation for women in all spheres of society. Rooted in the Constitution's principles of equality, the Bill calls for at least 50% female representation in decision-making roles, and prioritises women's economic empowerment through targeted policies and programmes. In the context of South Africa's renewable energy sector, these legislative ambitions intersect with the opportunities and challenges of fostering gender equity. The sector presents a unique opportunity to operationalise the Bill's goals, by addressing persistent disparities and unlocking women's potential through strategic initiatives, as detailed below.

The recently developed Strategy for Economic Empowerment of Women, Youth, and Persons with Disabilities (Department of Women, 2024) emphasises the urgency of addressing systemic inequities that limit participation in South Africa's economy. Recognising that economic empowerment is not only a matter of justice but also critical for sustainable development, the strategy outlines measures to dismantle barriers in employment, entrepreneurship, and access to resources. Specifically, it highlights the intersectional challenges women face in traditionally male-dominated sectors, such as energy, due to gender stereotypes, inadequate support systems, and limited representation in decision-making. This framework aligns with ongoing discussions about promoting gender equity in the renewable energy sector by creating inclusive opportunities and addressing structural inequities, as explored in the subsequent policy recommendations.

A report, Policy Assessment for the Economic Empowerment of Women in Green Industry in South Africa, was commissioned in 2021 by DTIC, the Department of Women, Youth, and Persons with Disabilities and the United Nations Development Organisation to assess the need for gender-responsive policy actions (UNIDO et al., 2023). It describes South Africa as having a robust policy framework for gender equality, yet integrating these principles into green industry policies remains inconsistent. Relevant to the energy sector, the report highlighted the development of the DMRE Women Empowerment Policy, the National Development Plan (NDP) 2030 and the IRP 2019, the latter failing to include a structural consideration for gender equity. Identified barriers to women's participation in green industries include limited access to technical skills, financial resources, and supportive networks, as well as discriminatory social norms and institutionalised sexism. These challenges are compounded by difficulties in balancing caregiving responsibilities and accessing markets.

Despite these barriers, the report highlights opportunities for women in South Africa's green industry. There is growing participation of women entrepreneurs in sectors like renewable energy and waste management. Initiatives such as Southern African Females in Energy Efficiency (SAFEE), the South African Wind Energy Association (SAWEA), the South African National Energy Development Institute (SANEDI), and the National Green Fund have provided platforms for mentorship, skills development, and financial support. Additionally, positive trends such as equal pay practices, family support for women entrepreneurs, and perceptions of increasing opportunities, reflect progress. The report provided recommendations for the private sector to adopt gender-responsive practices, including equal pay, workplace safety, and leadership opportunities for women. Recommendations directed at the government included enhancing transparency and accountability in implementing gender-mainstreamed policies.

Employment in the renewable energy sector presents an opportunity for advancing gender equity in South Africa. However, as highlighted in the study, Renewable Inequity? Women's Employment in Clean Energy in Industrialized, Emerging, and Developing Economies (Baruah, 2017), women remain underrepresented in the sector across many developing economies, particularly in technical and leadership roles. This underrepresentation is a result of several factors, including gender stereotypes, lack of access to education and training in Science, Technology, Engineering, and Mathematics (STEM) fields, and workplace cultures that are not conducive to women's advancement. Women are often relegated to lower-paying, administrative roles, rather than being involved in technical or decision-making positions. The report calls for comprehensive policies that address these disparities by promoting gender-sensitive recruitment practices, providing mentorship and leadership training for women, and creating a more inclusive workplace culture in the renewable energy sector. Box 1 summarises different approaches to gender equity applied by both the public and private sectors.

Different approaches to addressing gender equity

The public and private industry policy initiatives aimed at addressing gender equity in renewable energy can be grouped into the following six categories:

- Gender mainstreaming in existing energy policies: Making efforts to ensure energy policy explicitly addresses gender disparities and includes measures to promote women's participation in the renewable energy sector. This includes setting gender targets, in line with Broad-Based Black Economic Empowerment (BBBEE), providing financial incentives for companies that hire and promote women, and ensuring that women's needs are considered in energy planning and decision-making processes.

- Promoting education and training in Science, Technology, Engineering, and Mathematics (STEM) for Women: Increasing women's participation in the renewable energy sector, to promote education and training in STEM fields from a young age. This includes providing scholarships and mentorship programmes for women, and creating awareness campaigns that challenge gender stereotypes in these fields.

- Supporting women's entrepreneurship in renewable energy: Supporting women entrepreneurs through targeted initiatives to address access to finance, specialised training, and industry networks. There is a growing demand for an expanded pool through targeted funding programmes, business development services, and the creation of women's networks in the renewable energy sector.

- Ensuring the implementation of gender-sensitive employment practices: Encouraging companies in the renewable energy sector to adopt gender-sensitive employment practices, such as unbiased recruitment and promotion processes and flexible work arrangements that support work-life balance.

- Strengthening legal frameworks for gender equality: Strengthening South Africa's legal frameworks ened to address gender inequalities in the renewable energy sector. This includes enforcing laws against gender-based discrimination and harassment in the workplace and ensuring that women have equal access to employment opportunities in the sector.

- Monitoring and evaluating gender equity initiatives: Monitoring and evaluating the impact of gender equity initiatives in the renewable energy sector, which is crucial. This is a significant policy gap which surfaces the critical importance of collecting, and making publicly available, sex-disaggregated data, conducting regular gender audits, and reporting on progress towards gender equity targets.

Box 1: Different approaches to gender equity

The report Renewable Energy Consumption and Gender Development in Southern Africa, 2002-2020 (Mhariwa, 2002) provides an analysis of how renewable energy consumption has influenced gender development in Southern Africa, with a specific focus on South Africa. The report reveals that while renewable energy adoption has increased, gender disparities persist in access to these technologies and in the benefits derived from them. Women are shown to be often excluded from decision-making processes related to energy projects, leading to a lack of consideration for their specific needs and challenges. The report also reflects that women have less access to financial resources and training opportunities, which are crucial for participating in the renewable energy sector.

To address these issues, the report recommends targeted interventions that promote women's involvement in the renewable energy sector, including capacity-building programmes, access to credit, and the inclusion of women in energy governance structures. There may be a particular opportunity to create employment for women in rural areas where formal employment opportunities are scarce, as argued by a report, Powering Jobs: The Employment Footprint of Decentralized Renewable Energy Technologies in Sub-Saharan Africa" (Shirley et al., 2020). The recommendations support the scaling up of decentralised renewable energy technologies, with a focus on training and employing women in these new jobs. It also emphasises the need for gender-sensitive approaches in the deployment of these technologies, to ensure that women benefit equally from the opportunities created. Given that Eskom and municipalities have been promoting distributed renewables, these options could be viably explored.

Supplementing the government's policy framework, industry has played a proactive role in operationalising gender equity. Several initiatives have emerged in South Africa to support women's participation, with a focus on the professional white-collar (administrative, executive, and highly skilled engineering) layers of the labour market:

- Public sector:

  o In 2023, the Department of Higher Education and Training (DHET) and the EWSETA, supported by the United States Agency for International Development (USAID), launched a six-month skills development programme for women artisans, aiming to work in the renewable energy sector (Arnoldi, 2023). In 2024, the US-based North Carolina Clean Energy Technology Center (NCCETC) hosted 35 energy professionals from Eskom and local SMMEs in a hybrid immersion programme to learn best practices in renewable energy expansion initiatives (NCCETC, 2019).

- Industry initiatives:

  o A key example includes the Management Development Programme for Women in Renewable Energy led by SAWEA through the collaborative Gender Diversity Working Group (GDWG), with SAPVIA, EWSETA and the University of Witwatersrand Business School (WITS business School, 2023). The programme received a partial subsidy from the government via the EWSETA but still required participants to pay, which may impact the profile of the professionals participating.

  o Individual utility plants, under the REI4P public procurement programme, are also required to allocate specific financial contributions towards economic development spending. There is currently no comprehensive database for coordinating these projects, or their objectives. Several of the initiatives IPPs opt to invest in target women-owned SMMEs. For example, Matla A Bokone Solar's enterprise development accelerator programme funded an initiative to provide resources and materials for 12 local SMMEs, with target support for women entrepreneurs, as they navigated adapting to the pressures of the loadshedding crisis (SAPVIA, 2023).

Given that electricity regulation changes have weakened the government's mechanisms to drive gender equity through public procurement, incentivising more extensive initiatives in the industry could be an important way to drive these concerns.

3.6. SMME CAPABILITY DEVELOPMENT.

The 2020–2025 strategic plan of South Africa's Department of Small Business Development (DSBD) outlines an ambitious framework to promote entrepreneurship, SMMEs, and co-operatives as key drivers of economic transformation and job creation[15]. The plan identifies the green economy, particularly renewable energy, as a critical area for economic transformation. Recognising the global shift towards sustainability, it highlights opportunities for SMMEs in renewable energy technologies, such as solar PV, wind, and battery storage. The plan also emphasises that efforts are being made to promote SMME participation in component manufacturing, project development, and operations and maintenance. Key challenges, such as inconsistencies in demand and limited access to high-value contracts for emerging Black entrepreneurs, are acknowledged. Strategies to mitigate these include enforcing local content regulations, facilitating access to affordable financing, and scaling up training programmes, like the PV GreenCard initiative, to build the skills pipeline.

To address systemic barriers, the DSBD has committed to promoting innovation and technology transfer by establishing a coherent strategy for knowledge

[15] This strategic plan is aligned with national priorities under the Medium-Term Strategic Framework for 2019–2024 and the National Development Plan (NDP) Vision 2030, with a particular focus on overcoming the country's triple challenges of poverty, unemployment, and inequality.

diffusion and skills development, enabling SMMEs to adopt and develop renewable energy technologies. Additionally, it seeks to enhance financial access by streamlining funding mechanisms tailored to the needs of emerging enterprises, particularly those from marginalised communities, to encourage participation in the green economy. Furthermore, the DSBD aims to facilitate market integration by strengthening value chain linkages to boost the competitiveness of locally manufactured products, while ensuring compliance with BBBEE laws. Through the DSBD, the South African cabinet has released an SMME-focused localisation policy framework in alignment with the post-Covid 19 2020 Economic Recovery Plan (Department of Small Business Development, 2019). Green technologies are listed as a key focus area, explicitly mentioning “makers of solar PV panels” and electrical machinery manufacturing (including transformers, generators, motors, and power electronics, among others). The DSBD seeks to reduce dependency on imported green technology by prioritising local production, offering financial support for machinery and equipment, and revitalising industrial production to supply renewable energy infrastructure. Technical and financial support play a pivotal role in this strategy. The report outlines training programmes to enhance SMME skills in renewable energy systems, energy-efficient product standards, and certification processes. Financial support includes blended financing, combining grants and loans, to encourage green technology development, with up to R15 million per project, and up to 50% of project costs for qualifying initiatives, with funding provided as grants and “soft loans”, offered at prime lending rate.

Within the industry itself, stakeholders see the growth of the renewable energy sector as presenting a variety of opportunities for SMMEs (Department of Trade Industry and Competition et al., 2023). The wind energy sector currently has activity from SMMEs participating in the manufacturing of components, such as wind towers and steel components, as well as a variety of services in project development, construction, and plant maintenance. The solar PV value chain allows SMMEs to participate in the assembly of mounting structures, inverters and trackers, as well as the production of modules and related components. Battery storage systems, particularly the lithium-ion battery value chain, present opportunities in mineral beneficiation, casing, and assembly, and the manufacturing of electrical systems (for example, cabling and transformers) and battery management systems (Department of Trade Industry and Competition et al., 2023).

The procurement of renewable energy through the REI4P, and its predecessor, REFIT, which began in 2011, attracted investment from both local and foreign investors. However, SMME participation in the core value chain of renewable energy has always been relatively marginal. Private sector livelihood interventions to date have been shaped by REI4P procurement conditions (Mthembi et al., 2019). A large proportion of the SMMEs provide auxiliary services, such as cleaning, catering, and security (Gaylor Montmasson-Clair, 2024), along with small, specialised firms offering high-level design, project management, and system integration. Inconsistencies in market demand, related to the historical track record of the public procurement schemes, have been widely cited as having hampered the ability of SMMEs to sustain operations and investments, affecting the stability of local manufacturing capabilities. Complaints have also emerged that IPPs meet local content requirements by sourcing materials from within South Africa, but fail to source goods and services from emerging Black entrepreneurs, which is out of line with the country’s BBBEE law. These accounts resonate with findings made by the report, Whose Power Is It Anyway? Emthanjeni Local Municipality and Renewable Energy, by the Public Affairs Research Institute (PARI), in its investigation based in the Northern Cape (Nzo, 2021).

Three sector developments present potential improvements in opportunities for SMMEs:

- The rapid increase of SSEG projects, kickstarted by the amendment of the ERA schedule 2 and the harsh conditions of loadshedding from 2018-2023, created significant opportunities for well-placed SMMEs, particularly in installing and maintaining solar PV systems. The cost reduction of solar PV components over the past two decades, and the increasing demand for decentralised power solutions internationally, has resulted in many off-the-shelf small-scale energy solutions that make this sector attractive for a range of different SMMEs in sales, import and distribution, as well as in maintenance and innovative small scale solar financing design. In the SSEG segment of the market, new industrial accreditation has emerged for a range of activities, ranging from solar installer workshops to specialised training courses related to wind turbine maintenance, illustrating an emerging demand for skills training facilities, as well as local installation and maintenance companies. Initiatives like the PV GreenCard programme, which promotes high-quality and safe installations, have been designed to boost customer confidence and encourage SMME participation in the solar PV industry (Mkhwebane & Ntuli, 2019).

- Emerging opportunities for commercial firms using wheeling agreements have also created a new avenue for project development. The demand for embedded generation projects will require a significant upscaling in investments in grid infrastructure.

- Municipalities' involvement in facilitating utility-scale projects could also support the growth of SMMEs in this sector. Municipalities could play a critical role in creating an environment where high levels of renewable energy deployment can be achieved. However, this role is highly constrained and embedded in complex institutional dynamics, which, by September 2024, prevented any projects from being implemented (Hermanus & Foster, 2023). There are, however, municipal-owned, smaller-scale embedded generation projects.

Despite these changes, SMMEs face significant barriers to entry into the renewable energy sector. Key challenges include a lack of experience and track record, insufficient financial resources, which are particularly challenging while achieving regulatory compliance, and a lack of access to technology:

- Manufacturing equipment typically has high capital investment requirements (Montmasson-Clair, 2024), and local content regulations for the public procurement of utility-scale plants are often not enforced, increasing the risk barrier for smaller firms. For key equipment, even at the home solar system level, consumers may be concerned as to whether new entrant SMMEs will have the capacity to survive to honour service agreements across the full product lifespan, which may extend up to two decades. SMMEs also struggle with stringent industry requirements, and competition from established firms that can deliver globally well-known products at low prices (Baker & Sovacool, 2017).

- Technology transfer is also crucial for enabling SMMEs to acquire the necessary skills and knowledge to participate effectively in the renewable energy sector (Institute for Economic Justice & COSATU, 2021). In response to early recommendations offered by COSATU-IEJ, the 2022 draft of the SAREM acknowledged the importance of establishing a coherent technology transfer strategy to ensure that potential learning from increased technology diffusion is captured and institutionalised. It does not, however, articulate how this process will be integrated into the broader localisation strategy, or how it will be financed and prioritised. At an international level, despite the recognition of technology transfer in the 1992 UNFCCC, negotiations have stalled, especially concerning intellectual property rights (Cheng, 2022). This poses a significant challenge more generally for economies across the Global South in the energy transition, which may also disproportionately experience the negative impacts of monopolistic behaviour in price-setting from patent-holding clean technology firms located in the Global North.

SECTION FOUR: **CONCLUSIONS AND RECOMMENDATIONS**

SECTION FOUR: CONCLUSIONS AND RECOMMENDATIONS

South Africa's energy transition is not just about shifting from fossil fuels to renewable energy; it is also about using the opportunities emerging in this broad technological and economic change to transform the broader socio-economic landscape.

This requires a holistic approach that integrates energy policy with goals and strategies spanning industrial development, social equity, and environmental sustainability. A significant amount of research is required to map the progress and the trajectory of the transition, in the wake of the rapid shifts in the sector's regulatory environment.

The socio-economic impacts of failures in electricity governance have negatively impacted electricity prices and left many residents reeling from the broader economic implications of loadshedding. South Africa's existing economic challenges, including poverty, inequality and unemployment, have implications that are racial (affecting Black South Africans more than other groups), gendered (impacting women more than men), and spatial (impacting rural households and communities more than urban). Intersecting climate change and transition risks (for example, job losses and the decline of certain economic activities) pose significant threats to already vulnerable social groups, and will create new vulnerable populations.

This analysis does not engage with general responses to these intractable challenges. Instead, it focuses on the current use and expansion of renewable energy projects, identifying options for pursuing gender equity and SMME participation in the sector. The document also underscores the importance of addressing energy poverty, which remains a pervasive issue despite South Africa's relatively high electrification rates. The main findings regarding electricity, industrial and decent work policy are summarised below (Table 3, collating all relevant policy and reflecting the integration of gender, youth and decent work, can be found in Appendix B).

4.1. ELECTRICITY POLICY

Electricity policy changes, together with Eskom's performance and market shifts, have led to a growing demand for renewable energy at different levels in South Africa. Gaps within a conducive electricity policy framework do not appear to be a barrier to renewable energy uptake (especially through business-to-business arrangements) in the short term. However, long-term sustainability of demand is less certain, and new system governance and administration will also be tested in time.

The South African electricity sector is undergoing widespread change, shaped by a range of potentially transformative opportunities related to the integration of renewable energy technologies at different levels, by households, communities, businesses, IPPs, and Eskom. In 2024, South Africa had a comprehensive suite of energy laws, regulations and policies to enable renewable energy, largely through different modes of private investment. There are residual areas of uncertainty, and several policies, although existing in draft, have not been finalised. Moreover, there are still competing visions for the future structure of the sector overall, including what role the state should play. However, stakeholders are still advancing on individual and collective strategies to invest in renewable energy generation.

01 This policy scan identifies the need for a coherent and coordinated approach to energy policy that integrates national objectives with local realities. The energy planning processes have often sidelined municipalities. Yet, these entities are set to play a crucial role in the distribution of electricity and the facilitation of renewable energy projects at the local level.

02 Empowering municipalities through capacity building, appropriate national and local regulations (inclusive of pricing that supports progressive socio-economic outcomes) and facilitating appropriate funding are essential to ensure that they can effectively contribute to the country's energy transition.

03 Careful consideration will need to be given to resolving enduring challenges with the municipal funding model, and electricity pricing tariff reform will need to be managed to ensure fairness.

04 Renewable energy projects, particularly decentralised systems, offer a viable solution to improve energy access in rural and underserved areas. However, these initiatives must be carefully designed and incentivised to ensure that they genuinely benefit the rural communities with employment opportunities, and that universal electricity access is realised.

4.2. INDUSTRIAL POLICY

As the document illustrates, however, the inconsistent application of local content requirements and the lack of a robust and resourced industrial policy framework have hindered the full realisation of these benefits. From 2011 onward, the government's legal and policy enablement of renewable energy (most significantly through the REI4P) was accompanied by a simultaneous attempt to apply mechanisms to drive localisation. The competing dynamics shaping electricity reform are currently likely to lead to socially regressive outcomes, such as unaffordable electricity prices, an overreliance on imported technologies, vulnerability to global supply chain risks, and weak protections and regulations to ensure equitable worker and community benefit-sharing from new infrastructure investments. South Africa's obscene inequality limits the extent to which policymakers can assume that the existence of economic opportunities arising from the transition will be accessible to the majority of the population. Without targeted and coherent interventions, these issues would become defining features of a renewable-based power system and broader economy, supplanting one extractive configuration for another, and transitioning from carbon-intensive poverty to low-carbon poverty.

The SAREM, which responds to a drastically accelerated pace of change in the sector, picks up on the localisation drive that was only partially realised and faced several setbacks in more than a decade of implementation of REI4P. It attempts to review this effort, reassessing the opportunities for localisation between 2021 and 2024. These opportunities are constrained and undermined by a range of comingled challenges, including the ongoing energy crisis (exacerbated by Eskom's ongoing governance challenges and unstable operational performance), legacy issues of corruption, the sovereign debt burden, and chronic public infrastructure underinvestment. There are also constraints that arise from the configuration of relevant global supply chains, trade, and tax.

By pursuing the SAREM, the DTIC, DMER, and Department of Science and Innovation (DSI) have taken important steps to coordinate sector industrial policy towards a set of shared sectoral goals. The existing measures include technical support, incubation, targeted financial assistance, and a growing list of certification programmes with some early involvement from universities and Technical and Vocational Education and Training (TVET) institutions.

01 It is imperative that, as the adopted final SAREM is implemented, it and all future policies prioritise clear and enforceable localisation targets, and offer the necessary financial and technical support to local manufacturers.

02 It is also necessary that the government achieves coherence between different departments regarding the hierarchy of renewable energy goals and trade-offs.

03 It is critically important that incentives to encourage investment in renewable systems are tied more closely, to ensure that the robust government support demanded by private industry is carefully monitored, steered, and leveraged to ensure broad-based local benefit. With the right interventions, SMMEs could play a vital role in broadening the distribution of benefits in the energy transition for South Africa.

4.3. DECENT WORK

The final aspect considered is decent work (which also addresses issues related to gender equity). South Africa has historically had a robust labour movement that has advanced the decent work agenda in the context of the energy sector and beyond. However, the influence of this movement on energy policy has lessened over time, as reflected in the shift in energy market structure. There are references to decent work across important policies informing the sector. While renewable energy projects have the potential to create significant employment opportunities, there is significant work to do to operationalise the principles of decent work. The emphasis on short-term, low-quality jobs, particularly during the construction phases of projects, does little to address the broader issues of unemployment, inequality, and multidimensional poverty and vulnerability in the country. Without understanding current renewable energy employment in more detail and assessing the quality of this employment, it is not possible to understand the relationship between renewable energy employment and sustainable livelihoods. It needs to be understood how, and to what extent, jobs created in the renewable energy sector can be sustainable, well-paid, and accessible to more people, including women and marginalised communities. The lack of operationalisation of gender sensitivity and gender inclusivity mirrors and intersects with decent work dynamics The benefit of addressing these gaps is the contribution to bolstering the social compacting process in the context of the transition.

01 Improving sectoral policy coherence is vital for advancing the renewable energy sector in South Africa, aligning with the principles outlined by the DWCP through NEDLAC. Integrating policy frameworks allows the renewable energy sector to better address decent work deficits, particularly by creating sustainable employment opportunities and supporting vulnerable workers.

02 Developing appropriate indicators to evaluate job creation potential, inclusivity, and social protections within the sector is crucial for monitoring progress and ensuring alignment with objectives outlined in national policy related to decent work. These measures not only enhance labour market governance, but also contribute to equitable, sustainable growth in the transition to clean energy.

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APPENDIX A: Institutional arrangements for renewable energy

Figure 6: The institutional arrangements for renewable energy

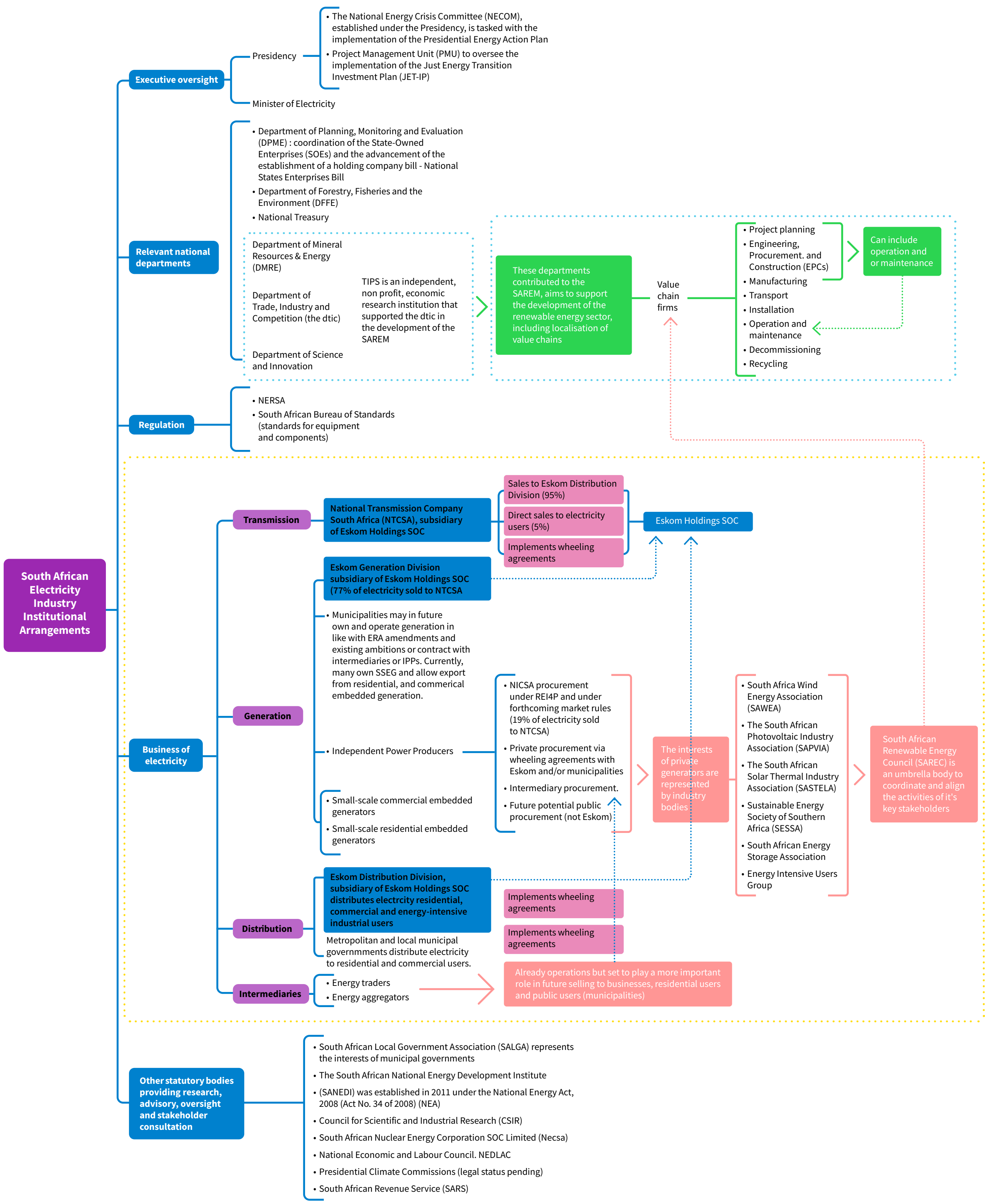

Table 3: Renewable energy-relevant policies developed by the authors.

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
Just Transition Policy	Just Energy Transition Partnership (JETP) Investment Plan and Implementation Plan	The JETP is a multilateral finance package to facilitate South Africa's just transition, involving donor countries from the IPG, including the US, UK, Germany, France, and the EU for $8.5 billion. It aims to cover a much broader set of actions and investments, however, maintaining a focus on the power system, with a lesser focus on new energy vehicles and green hydrogen.	yes	yes	yes	The plan has been critiqued for its power system focus and limited mobilisation of grant funding and funding for social security.
	Framework for a Just Transition	Primarily articulated through the Just Transition Framework established by the PCC. Aims to coordinate and guide the country's transition to a low-carbon economy while ensuring that the process is equitable and inclusive.	yes	yes	yes	
Energy policy	Integrated Resource Plan	A strategic framework developed by the South African government to guide the country's electricity supply and demand management. It considers the implications of different technologies on the overall energy mix, emphasising the need for a least-cost, diversified approach to ensure energy security and sustainability. It does consider economic impacts of different energy mixes, including employment impacts.	n/a	n/a	n/a	Not ratified at 01/09/2024

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
	Integrated Energy Plan Implementation Plan	Provides a holistic view of the energy landscape, addressing not just electricity generation but also the overall energy supply and demand. It provides a holistic view of the energy landscape, addressing not just electricity generation but also overall energy supply and demand.	n/a	n/a	n/a	
Electricity legislation	National Energy Act 34 of 2008 (NEA)	Refers to the need for a diversity of energy and its sources, which should be available, sustainable, and affordable. It promotes energy efficiency, which is described as "economical and efficient production and utilisation of an energy carrier or resource".	n/a	n/a	n/a	
	Electricity Regulation Act 4 of 2006 (ERA)	Amendments (2021, 2022, 2023) to the ERA have enabled holistic changes to the structure of the power system, including liberalisation of the generation industry, transitioning the country to a competitive market with an independent transmission system operator.	n/a	n/a	n/a	
	National Energy Regulator Act 40 of 2004 (NERA)	Gives NERSA its powers.	n/a	n/a	n/a	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
Electricity regulations	Electricity Pricing Policy (GG31741 19 December 2008) (EPP)	Prescribes the pricing regulations for the access and use of electrical networks. Currently a municipality may only lawfully charge an approved tariff or an approved surcharge.	n/a	n/a	n/a	
	Grid code for Renewable Power Plants (RPPs) connected to the transmission or distribution network in South Africa	Prescribes the acceptable Quality of Supply (QoS) for distinct categories of generators connected to the grid network.	n/a	n/a	n/a	
	Regulatory Rules on Network Charges for Third Party Transportation of Electricity ("Rules")	Allows load customers to enter bilateral arrangements with third-party generators. Municipalities may need to acquire ministerial approval to sign third-party Power Purchase Agreement (PPAs).	n/a	n/a	n/a	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
	South African National Standard (SANS) 474	The Code of practice for electricity metering.	n/a	n/a	n/a	
	SANS 10142	The "specific requirements for embedded generation installations connected to the low-voltage distribution network in South Africa".	n/a	n/a	n/a	
	NRS 097 Series and NRS 057	The NRS 097 series focuses on the interface between the small-scale embedded generator and the utility. NRS 057 prescribes the appropriate guidelines for deployed electrical meters.	n/a	n/a	n/a	
	Wheeling Framework(s)	Eskom draft and local policies	n/a	n/a	n/a	There is no national wheeling framework.
	Cost of Supply Framework for Licensed Electricity distributors in SA	Used to design electricity rates to be implemented to provide the service required by customers and recover the cost incurred by the licensees. Provides a guideline for how these studies should be conducted.	n/a	n/a	n/a	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
Institutional/ finance	Public Finance Management Act 1 of 1999 (PFMA)	Governs the financial management and fiscal responsibilities of national and provincial government departments, public entities, and other institutions in South Africa. Creates a framework that allows government entities to incorporate BBBEE criteria into their procurement processes.	yes	yes	no	
	Municipal Finance Management Act 56 of 2003 (MFMA)	Establishes the financial and procurement process obligations to which municipalities must adhere. Creates a framework that allows government entities to incorporate BBBEE criteria into their procurement processes.	yes	yes	no	Does not allow municipalities to transact in line with ERA amendments.
	Municipal Fiscal Powers and Functions Act (2007) (MFPFA)	Govern various other aspects related to the financial powers and functions of municipalities. Provide a legal framework for the functioning and governance of municipalities, including governance and decision-making processes, planning and development, service delivery, performance management, and public participation.	n/a	n/a	n/a	
	Municipal Systems Act (2000) (Systems Act)		n/a	n/a	n/a	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
	By-laws for municipal functions such as electricity supply (vary per authority)	Cover land use and zoning, building codes, water use, and electricity reticulation.	yes	yes	no	
	The Broad-based Black Economic Empowerment (BBBEE) Act 53 of 2003	Defines BBBEE as the viable economic empowerment of all Black people, specifically mentioning women, workers, youth, people with disabilities, and those living in rural areas. Enables the use of preferential procurement and employment to achieve these aims and applies to public and private entities.	yes	yes	no	
Spatial development	Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA)	Provides a framework for spatial planning and land use management, and for municipal development planning.				

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
Climate change	Climate Change Act 22 of 2024	Addresses various aspects of climate change mitigation, adaptation, and resilience. Aims to enhance institutional capacity and accountability for climate change, and enable cross-sector collaboration. Still in draft; however, implementation of some aspects has begun.	yes	yes	yes	
	South Africa Updated Nationally Determined Contribution (2021)	South Africa published its latest updated NDC in September 2021. Enhanced the country's commitment to reducing greenhouse gas emissions and outlined specific targets for the years 2025 and 2030. Includes a commitment to a fixed target for greenhouse gas emissions levels of 398-510 $MtCO_2e$ by 2025 and 350-420 $MtCO_2e$ by 2030.	yes	partial	no	
	Low Emission Development Strategy 2050 (LEDS)	Outlines a sequenced path to realising a low-carbon economy in South Africa, inclusive of structural changes that need to be implemented across economic sectors. Does consider employment impacts of decarbonisation (including job creation) within a just transition approach, broadly articulated.	no	no	no	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
	National Climate Change Adaptation Strategy (2019)	Outlines a framework for addressing the impacts of climate change through adaptation measures.	no	no	no	
Environmental management	National Environmental Management Act 107 of 1998 (NEMA)	Serves as the legal framework for cooperative environmental governance. Covers cooperative governance, sustainable development, public participation, integrated management, and regulatory enforcement. Aims to protect the environment while promoting social equity and economic development.	yes	yes	yes	
	Environmental Impact Assessment (EIA) Regulations and Listed Activities Notices	EIAs are a critical tool for assessing the potential environmental impacts of proposed projects. However, EIAs under NEMA do not explicitly address gender, youth, and decent work in a comprehensive manner. EIAs require public consultation with parties affected by planned activities. Must also include climate change impact assessments.	no	no	no	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
Industrial Policy	South African Renewable Energy Masterplan (SAREM) (2024)	A strategic framework to guide the development of the renewable energy sector. Explicitly addresses localisation by setting targets for local content, aligning industrial policies, supporting emerging suppliers, and promoting skills development. Includes commitments to decent work principles that encompass working conditions, union access, and gender considerations. Acknowledges the need for gender-responsive and youth-targeted approaches in developing the renewable energy sector.	yes	yes	yes	Several critiques have been made, notably by labour.
	SMME Support Plan	A strategic initiative aimed at enhancing the growth and sustainability of SMMEs and cooperatives in South Africa. Explicitly considers gender, youth, and decent work as part of its objectives and interventions.	yes	yes	yes	

Issue	Applicable national legislation, regulations, and policy	Additional notes	Explicit reference to gender and women	Explicit reference to youth	Explicit reference to decent work	Notable policy gaps
End of Life Management	Norms and standards for the "Management of Waste Electrical and Electronic Equipment for South Africa" [draft, 2024]	Aimed at promoting a waste electrical and electronic equipment management chain tot reduce waste through reuse by restoring functionality and ensuring safe and accessible Electrical and Electronic Equipment (EEE).	no	no	no	
	Extended Producer Responsibility (2021)	Prescribes requirements for a defined group of producers/manufacturers to manage the end-of-life of specific types of component, in alignment with environmental regulations. Producer responsibility organisations are required to collect fees from registered producers to invest in, amongst others, collection, aggregation and end-of-life management solutions.	yes	yes	yes	
	E-Waste landfill ban (2021)	Prohibits the disposal of all electrical and electronic waste (e-waste) in landfills, requiring producers and consumers to find alternative means of managing this type of waste.	n/a	n/a	n/a	

Source: (Hermanus et al., 2023; Kamanzi & Hermanus, 2022)