



The role of increased renewable energy deployment in
realising the objectives of the National Development
Plan 2030.

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DECLARATION

The information used and presented in this mini dissertation is correct and up to date until 28 November 2025 when research for this mini dissertation was concluded. Any later political, social and/or legal developments have not been considered.

DEDICATION

This study is dedicated to my mom, Margeret Benjamin and my dad, Ernest Mupfekeru who believed in me and have made everything possible. And to my sekuru Bailo Benjamin (RIP) and gogo, Bernadette Benjamin who ran so I could walk. This is for you!

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ABSTRACT

South Africa faces an enduring triple challenge of poverty, inequality and unemployment, which is compounded by an energy crisis rooted in historical dependence on coal. In response, the NDP 2030 articulates an ambitious vision of an inclusive, sustainable and low-carbon economy. Central to this vision is the transformation of the energy sector through the deployment of renewable energy technologies that can stimulate economic growth, create employment and promote environmental sustainability. This dissertation investigates the pivotal role of increased renewable energy deployment in realising South Africa's NDP 2030 objectives, specifically the eradication of poverty and the reduction of inequality. Situated against South Africa's legacy of deep socioeconomic disparities and heavy reliance on coal, this study critically examines how renewable energy serves as a transformative vehicle for sustainable development and economic inclusion. Utilising a comprehensive literature review of South Africa's energy sector historical, legal and policy frameworks and the multifaceted challenges hindering the adoption of renewable energy, the research highlights the interplay between the expansion of the provision of renewable energy and socioeconomic outcomes. The findings reveal that renewable energy would contribute multidimensionality to the NDPs developmental objectives. While renewable energy policy and procurement mechanisms such as IRP and REIPPPP have catalysed progress, significant barriers impede the full realisation of these benefits. The research concludes that while renewable energy deployment is not a panacea, it constitutes a critical enabler of South Africa's transition towards an equitable, low carbon and inclusive society envisioned in the NDP 2030.

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LIST OF ABBREVIATIONS

NDP	National Development Plan
IRP	Integrated Resource Plan
REIPPP/REIPPP Procurement Programme	Renewable Energy Independent Power Producer
IPP/IPPs	Independent Power Producer(s)
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
IEP	Integrated Energy Plan
LEDs	Low Emission Development Strategy
NDC/NDCs	Nationally Determined Contribution(s)
GHG	Green House Gas
JET	Just Energy Transition
MW	Megawatt
MWh	Megawatt-hour
PV	Photovoltaic
CSP	Concentrated Solar Power
GW	Gigawatt
RDP	Reconstruction and Development Programme
GEAR	Growth, Employment and Redistribution strategy
UMIC	Upper Middle-Income Country

FLP	Food Poverty Line
LBPL	Lower Bound Poverty Line
UBPL	Upper Bound Poverty Line
BBBEE	Broad Based Black Economic Empowerment
ECD	Early Childhood Development
PPP	Public Private Partnerships
PFMA	Public Finance Management Act
MEPI	Multidimensional Energy Poverty Index

Chapter 1 INTRODUCTION AND BACKGROUND

1.1 Background

South Africa stands at a pivotal crossroads in its socioeconomic and environmental history, facing a confluence of pressing challenges: pervasive inequality and poverty, energy insecurity and mounting impacts of climate change. Today's South Africa is characterised by pervasive and enduring poverty, alongside exceptionally high levels of inequality.¹ Against this backdrop the National Development Plan was adopted as a blueprint for sustainable and inclusive development, outlining a transformative vision that seeks to eradicate poverty, reduce inequality and reduce unemployment.² South Africa's NDP provides a comprehensive framework aimed at addressing the country's persistent challenges of poverty, unemployment and inequality by the year 2030.³ Central to this plan is the transformation of the energy sector to facilitate economic development, enhance social equity and ensure environmental sustainability.⁴ The NDP sees renewable energy as driving macroeconomic growth, promoting industrialisation and facilitating social transformation, while also acknowledging its contribution to climate change mitigation.⁵

This transition is envisioned as delivering multiple, interlocking benefits, including revitalising economic growth, catalysing large-scale job creation, ensuring environmental sustainability and securing reliable access to affordable electricity.⁶ In pursuit of this objective the DMRE⁷ released the second iteration of the Integrated Resource Plan (IRP) 2019.⁸ This serves as the government's strategic blueprint for meeting national electricity demand until 2030, incorporating capacity expansion

¹ C Bundy 2020 *Oxford Research Encyclopedia of African History* 1.

² National Planning Commission National Development Plan: Vision for 2030 (2012) 1.

³ PM Molepo, K Aboalez and Mathaba TND 2025 *Energy for Sustainable Development* 2.

⁴ PM Molepo, K Aboalez and Mathaba TND 2025 *Energy for Sustainable Development* 2.

⁵ NPC: National Development Plan 150.

⁶ Department of Minerals and Energy: White Paper on the Promotion of Renewable Energy and Clean Energy Development: Part One – Promotion of Renewable Energy (August 2002) 1.

⁷ Formally known as the Department of Mineral Resources & Energy, the Ministry has since been restructured into distinct entities: the Department of Mineral and Petroleum Resources (DMPR) and the Department of Electricity and Energy.

⁸ The Minister of Mineral Resources and Energy, in terms of section 35(4) of the Electricity Regulation Act, 2006 read with item 4 of the Electricity Regulations on New Generation, 2011 published the IRP for implementation.

measures and detailing the diverse energy technologies required to achieve a balanced and sustainable energy mix.⁹ Recently the SAREM¹⁰ has been introduced to systemically advance the renewable energy agenda. These policies target ambitious capacity additions of solar, wind and other renewables. South Africa's renewable energy procurement strategy reflects its commitment to diversifying its energy mix and reducing dependence on coal as the dominant and primary source.¹¹

Globally the transition to renewable energy has become central in policies addressing climate change, fostering sustainable development and ensuring energy security. This transition holds particular importance for South Africa due to the country's heavy reliance on coal, which is the country's largest economically recoverable energy resource.¹² South Africa ranks as the 7th largest producer and exporter of coal in the world.¹³ Domestically coal remains the backbone of the energy sector, accounting for the largest share of primary energy consumption, approximately 80% of electricity generation and approximately one third of liquid fuel production.¹⁴ Consequently South Africa is a major emitter of carbon dioxide, contributing significantly to global greenhouse gas emissions and climate change.¹⁵ The adoption and deployment of renewable energy technologies present tangible opportunities for reducing the country's reliance on fossil fuels and addressing the socio-economic challenges South Africa is facing in the process.

1.2 Problem statement

South Africa's continued dependence on coal as the primary source of electricity presents a fundamental challenge to realisation of the NDP objectives of eliminating poverty, reducing inequality. Despite policy commitments to a low carbon transition, coal based energy generation remains dominant, contributing significantly to

⁹ Department of Mineral Resources and Energy: Integrated Resource Plan (IRP) 2019 (October 2019) 11.

¹⁰ Department of Mineral Resources and Energy: South African Renewable Energy Masterplan (SAREM) (2025).

¹¹ PM Molepo, K Aboalez and Mathaba TND 2025 Energy for Sustainable Development 3.

¹² NPC: National Development Plan 163.

¹³ Worldometers 2025 https://www.worldometers.info/coal/coal-consumption-by-country/#google_vignette.

¹⁴ NPC: National Development Plan 164.

¹⁵ NPC: National Development Plan 164.

greenhouse emissions and environmental degradation.¹⁶ South Africa ranks as the 7th largest producer and exporter of coal in the world.¹⁷ Domestically coal remains the backbone of the energy sector, accounting for the largest share of primary energy consumption, approximately 80% of electricity generation and approximately one third of liquid fuel production.¹⁸ Consequently South Africa is a major emitter of carbon dioxide, contributing significantly to global greenhouse gas emissions and climate change.¹⁹ This is further examined in greater depth in Chapter 2 where the drivers of renewable energy deployment are discussed.

These impacts exacerbate socio-economic vulnerability, particularly among poor and historically marginalised communities who are disproportionately affected by climate change, energy insecurity and environmental harm.²⁰ The adoption and deployment of renewable energy technologies present tangible opportunities for reducing the country's reliance on fossil fuels and addressing the socio-economic challenges South Africa is facing in the process.

Renewable energy deployment has been identified in national policy frameworks as a key mechanism for achieving climate change mitigation and sustainable development, its role in advancing NDPs developmental objectives remains inadequately integrated into energy governance and implementation strategies. The persistence of fossil fuel centric infrastructure, regulatory inertia and institutional constraints continues to limit the transformative potential of renewable energy.²¹ As a result, renewable energy deployment risks being treated as a narrow environmental or technical intervention rather than as a comprehensive socio economic tool capable of addressing structural inequality and poverty.

Over the past decade South Africa has experienced notable growth in renewable energy deployment, with solar photovoltaic (PV) and wind installations expanding

¹⁶ Bothongo and Kinyar 2025 *Sustainable Futures* 10.

¹⁷ Worldometers 2025 https://www.worldometers.info/coal/coal-consumption-by-country/#google_vignette.

¹⁸ NPC: National Development Plan 164.

¹⁹ NPC: National Development Plan 164.

²⁰ Klausbrucker et al 2016 *Environmental Science and Policy* 70.

²¹ Engineering News 2025 <https://www.engineeringnews.co.za/article/transmission-expansion-delays-strain-south-africas-power-grid-2025-04-18>.

rapidly, particularly under the Renewable Energy Independent Power Producer Procurement Programme, which has emerged as a continental benchmark for competitive energy procurement.²² This expansion has already begun to deliver measurable economic, social and environmental benefits by stimulating new industries, creating both direct and indirect employment opportunities and gradually diversifying the country's coal-dominated energy mix.²³ Nonetheless, the extent to which renewable energy can fully advance the objectives of the NDP is constrained by a range of complex challenges, including policy and regulatory uncertainty, inadequate grid infrastructure and skills gaps.²⁴

The White Paper on the Promotion of Renewable Energy and Clean Energy Development²⁵ provides a comprehensive framework for the advancement of renewable energy sources and the promotion of clean energy development within the country.²⁶ It emphasises the importance of promoting renewable energy sources such as solar, wind, hydro and biomass to diversify the energy mix and reduce reliance on fossil fuels.²⁷ Also, it aims to facilitate the development and deployment of clean energy technologies and infrastructure to achieve energy security and sustainability.²⁸ By advocating investment in renewable energy projects and industries, the White Paper seeks to stimulate economic growth, create employment opportunities and foster innovation.²⁹ One of its primary objectives is to mitigate the adverse environmental effects of conventional energy generation by transitioning to cleaner, more sustainable alternatives.³⁰ The vision of the White Paper is to ensure

²² Obisie-Orlu *Maximising the impact of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)* (Policy Briefing 2023) 5.

²³ New Development Bank *South Africa: Renewable Energy Sector Development Project Approach Paper: Methodology and Process* (April 2024) 13-24.

²⁴ Engineering News 2025 <https://www.engineeringnews.co.za/article/transmission-expansion-delays-strain-south-africas-power-grid-2025-04-18>.

²⁵ White Paper on the Promotion of Renewable Energy and Clean Energy Development complements the Energy Policy White Paper. The Energy Policy White Paper acknowledges the substantial potential of renewable energy in the medium and long term.

²⁶ Department of Mineral Resources and Energy: White Paper on the Promotion of Renewable Energy and Clean Energy Development: Part One Promotion of Renewable Energy (August 2002).

²⁷ DMRE White Paper on Promotion of Renewable Energy 4.

²⁸ Department of Mineral Resources and Energy: White Paper (Part Two – Clean Energy Development) (2003).

²⁹ DMRE: White Paper on Promotion of Renewable Energy 4.

³⁰ DMRE: White Paper on Promotion of Renewable Energy 3.

equitable access to energy resources and services for all citizens³¹ The government aims to develop a renewable energy sector that generates a supply of energy from modern sources, eventually providing a sustainable and financially viable alternative to fossil fuels.³²

South Africa's transition towards a low carbon and socially inclusive economy is fundamentally shaped by its legal and policy frameworks governing energy.³³ Although the NDP sets out a vision of eliminating poverty, reducing inequality and ensuring a just transition, the current legal and regulatory environment for renewable energy deployment remains fragmented, uncertain and at times contradictory.³⁴ This misalignment between developmental objectives and energy frameworks has contributed to delayed reforms, policy uncertainty, slow procurement processes and inconsistent implementation.³⁵ The central legal problem underpinning this study is the inadequate alignment between the NDPs developmental goals and the existing legislative and policy instruments governing renewable energy. While renewable energy is positioned by the NDP as a driver of inclusive growth and environmental sustainability, South Africa's energy framework contains several gaps and limitations that impede large scale deployment. This is further examined in greater depth in Chapter 4, where the challenges hindering renewable energy deployment are critically analysed.

This study seeks to map the critical intersection between renewable energy deployment and the NDP. It offers a comprehensive assessment of how increased deployment in renewable energy could advance the overarching goals of the NDP. It examines the multi-faceted contributions of renewables to economic growth, job creation, environmental sustainability and energy security within South Africa's unique socioeconomic context. The study therefore addresses the following question:

³¹ DMRE: White Paper on Promotion of Renewable Energy 1.

³² DMRE: White Paper on Promotion of Renewable Energy iv.

³³ Andreoni *et al.* 2022 *Oxford Review of Economic Policy* 250-55.

³⁴ Mauger and Barnard 2018 *Journal of Energy in Southern Africa* 2-4.

³⁵ Mauger and Barnard 2018 *Journal of Energy in Southern Africa* 3, 19.

To what extent can increased renewable energy deployment contribute to achieving the objectives of the NDP, particularly the elimination of poverty reduction of inequality within the context of South Africa's transition to a low carbon economy?

1.3 Research aim and objectives

Aim:

To critically examine how the increased deployment of renewable energy in South Africa is contributing to the realisation of the NDP 2030 objectives, specifically the elimination of poverty and the reduction of equality within the just energy transition. To achieve this, this study pursues the following objectives:

Objective 1: To analyse the historical development of South Africa's energy sector and assess its continuing impact on current renewable energy challenges and opportunities.

Objective 2: To analyse the legal and policy frameworks governing renewable energy deployment.

Objective 3: To identify the challenges and barriers that hinder large scale renewable energy adoption.

1.4 Research method

This study will employ a literature review as a method of research. A literature review comprises of the critical analysis of published sources on a particular topic. These sources can be divided into two main categories, namely primary and secondary sources. Examples of primary sources are legislation, policies, treaties and case law. Examples of secondary sources are books, chapters in books and journal articles.

1.5 Research framework

Chapter 1: Introduction

Chapter 2: Renewable energy deployment in South Africa.

Chapter 3: An overview of the NDP and its objectives, and the legal framework for renewable energy in South Africa

Chapter 4: Challenges and barriers to renewable energy adoption.

Chapter 5: Conclusion

1.6 Relevance to the Research Unit

The proposed study falls within the broad focus of the Faculty's Research Unit Law, Justice and Sustainability and specifically under the sub-project Environmental Change. This research is highly relevant for the Research Unit as it addresses key issues related to energy law, climate change mitigation and sustainable development. By examining the socioeconomic impacts of renewable energy deployment, the research contributes to a deeper understanding of the broader implications of attempts to bring about an energy transition in South Africa.

Chapter 2 TRANSITION TO RENEWABLE ENERGY/RENEWABLE ENERGY DEPLOYMENT IN SOUTH AFRICA.

2.1 *Introduction*

The transition to renewable energy in South Africa represents a pivotal development in the country's efforts to restructure its historically carbon-intensive energy sector. This chapter provides a critical examination of the key themes underpinning this transition. Firstly, the chapter will discuss the historical overview of South Africa's energy sector, which was characterised by a longstanding reliance on coal and the dominant role of Eskom in electricity generation and distribution. This context is essential for understanding the structural and policy challenges currently shaping the shift towards a low-carbon economy. The analysis proceeds to explore some of the drivers of renewable energy deployment, including South Africa's international climate change commitments and policy, as well as socio-economic considerations. These factors illustrate the multifaceted rationale for expanding the renewable energy sector and underscore the alignment between energy transition and the broader developmental objectives of the NDP. Further, the chapter examines the role of Eskom and independent power producers in the production and acquiring of renewable energy. By analysing the above themes, the chapter lays a foundation for analysing the extent to which renewable energy deployment can aid in advancing the objectives of the NDP.

2.2 *Historical context of South Africa's energy sector*

South Africa's energy sector has undergone significant transformations over the past century, evolving from early electrification efforts to its current challenges and transitions. The journey began in the late 19th century when Kimberley became the first South African city to install a public electricity supply in 1882, using streetlights powered by a coal-fired plant.³⁶ The mineral revolution significantly contributed to the electrification of South Africa.³⁷ Although diamond mining played a role in early

³⁶ Holtzhaue *A comparative analysis of the coverage of the South African electrical energy crisis during the period 2005-2010 by Cape Town newspapers* 5.

³⁷ SA History 2024 <https://www.sahistory.org.za/article/short-history-eskom-part-1-1923-2001>.

electrification, the discovery of gold in 1882 was the primary catalyst, promoting the rapid expansion of electricity to towns along the Witwatersrand reef.³⁸ Johannesburg was electrified in 1881, and by the early 1900s most major cities in the country had access to electricity.³⁹ The increasing demand for electricity was closely tied to gold mining, which depended heavily on coal as a key energy source, forging a strong connection between gold mining and electricity generation from the late 19th century onwards.⁴⁰ Initially power grids were managed by municipalities, but over time private companies like Rand Central Electric Works Limited established and operated their own power stations.⁴¹

Coal was discovered during this period, alongside the more frequently noted discoveries of diamonds and gold.⁴² The first commercial coal mining began in Newcastle, Natal, in 1885.⁴³ In 1887 coal was also discovered in Boksburg, Transvaal, which discovery was followed by further discoveries in Brakpan and Springs two years later.⁴⁴ The first coal-fired power station was constructed by a German company and became operational in 1887; however, electricity production was interrupted during the Anglo-Boer war in 1899-1902.⁴⁵ In 1888 the Table Bay Harbour Board in Cape Town concluded that using a central station that supplies the public or other buildings by means of transformers would be more efficient than operating multiple individual lighting plants.⁴⁶ Consequently, in 1891 the Harbour Board established South Africa's first central power station and electricity distribution system.⁴⁷ Power stations were located near gold mines, which were key centres of energy consumption, resulting in a mutual dependence between energy generation

³⁸ Dubresson and Jaglin *Eskom Electricity and Technopolitics in South Africa* 15.

³⁹ Gentle "Escom to Eskom: From racial Keynesian capitalism to neo-liberalism (1910–1994)" 55.

⁴⁰ Worthington "Cheap at half the cost: Coal and electricity in South Africa" 127.

⁴¹ Worthington "Cheap at half the cost" 127.

⁴² Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 44.

⁴³ Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 44.

⁴⁴ Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 44.

⁴⁵ Holtzhausen *A comparative analysis of the coverage of the South African electrical energy crisis during the period 2005-2010 by Cape Town newspapers* 5.

⁴⁶ Eskom 2020 <https://www.eskom.co.za/heritage/the-early-years/#:~:text=Between%201884%20and%201890%20the,and%20Port%20Elizabeth%20in%201906.>

⁴⁷ Eskom 2020 <https://www.eskom.co.za/heritage/the-early-years/#:~:text=Between%201884%20and%201890%20the,and%20Port%20Elizabeth%20in%201906.>

and mineral discoveries.⁴⁸ The growing demand for power stations led to an interesting competition between advocates of coal-fired power in Vereeniging and supporters of a hydroelectric scheme at Victoria Falls.⁴⁹

The Victoria Falls and Transvaal Power Company (VFTPC) was the leading electricity generator in the early 1900s.⁵⁰ Although initially intended to harness hydroelectric power from Victoria Falls, the company shifted its focus to the abundant coal resources in the Transvaal, where operations were simpler and more profitable.⁵¹ Recognising the growing demand for electricity, the South African government enacted the Electricity Act,⁵² leading to the formation of the Electricity Supply Commission (ESCOM) in 1923. ESCOM, later known as Eskom, was established as a state-owned entity to oversee electricity generation and distribution across the country.⁵³ The Electricity Act replaced the Transvaal Power Act of 1910⁵⁴ and was designed to extend its scope beyond the Transvaal to cover the entire Union of South Africa.⁵⁵ The first section of the Act focussed on establishing the Electricity Supply Commission, which was tasked with developing, maintaining and managing electricity supply operations across South Africa, as well as with coordinating the existing electricity supply entities.⁵⁶ The second section introduced the Electricity Control Board, which was to be responsible for overseeing and regulating the Commission's electricity supply activities.⁵⁷

In 1925 ESCOM built the Malieveldspruit hydro station as a temporary measure until the Sabie River Gorge plant became operational in 1927.⁵⁸ The company further expanded by acquiring the Victoria Falls Power Company (VFP) in 1948 and

⁴⁸ Gentle "Escom to Eskom" 53.

⁴⁹ Holtzhause *A comparative analysis of the coverage of the South African electrical energy crisis during the period 2005-2010 by Cape Town newspapers* 5.

⁵⁰ SA History 2024 <https://www.sahistory.org.za/article/short-history-eskom-part-1-1923-2001>.

⁵¹ Dubresson and Jaglin *Eskom Electricity and Technopolitics in South Africa* 15.

⁵² Electricity Act 42 of 1922.

⁵³ SA History 2024 <https://www.sahistory.org.za/article/short-history-eskom-part-1-1923-2001>.

⁵⁴ The Act was significant for establishing two fundamental principles, i.e. it recognised the provision of electricity as a public service and that the electricity supply should fall under state authority, ensuring that it would be regulated and managed as a public good.

⁵⁵ Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 45.

⁵⁶ Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 45.

⁵⁷ Veck *Eskom And The Electrification Of South Africa 1980 – 1995* 45.

⁵⁸ Moore 2019 <https://ruleoflaw.org.za/2019/06/13/review-of-laws-governing-electricity-provision/>.

Kimberley's central power station in 1950.⁵⁹ This acquisition marked a pivotal shift towards a vertically integrated state utility responsible for generation, transmission and distribution.⁶⁰ The subsequent decades saw a substantial increase in coal-fired power generation to meet the demands of industrialisation and urbanisation. Between 1952 and 1959 eight power stations were commissioned, including Hex River, Vierfontein, Umgeni, Wilge, Salt River 2, West Bank 2, Taaibos and Highveld.⁶¹ This growth was fuelled by the nation's vast coal reserves, which offered an affordable and dependable energy source.⁶²

South Africa ventured into nuclear power to diversify its energy mix. The origins of South Africa's nuclear industry can be traced back to the mid-1940s, when the organisation that would later become the Atomic Energy Corporation (AEC) was established.⁶³ In 1959 the government approved the development of a domestic nuclear industry, and planning commenced in the following year to construct a research reactor in collaboration with the US Atoms for Peace Program.⁶⁴ By the mid-1950s the government had recognised that, alongside utilising South Africa's vast coal reserves, the country's uranium deposits could be used for power generation.⁶⁵ The government established a commission in 1956 to assess the viability of introducing nuclear power, but the commission was unable to provide definitive evidence supporting the feasibility of the programme.⁶⁶ Koeberg's construction began in 1976, with its two reactors connecting to the grid in 1984 and 1985 respectively.⁶⁷ Situated near Cape Town, Koeberg was developed as the primary power source for the Western Cape, after fossil fuel power stations were considered to be too small and costly.⁶⁸ It supplies electricity to the national grid, enabling

⁵⁹ Boers 1985 *Civil Engineering= Siviele Ingenieurswese* 519.

⁶⁰ Van Niekerk 2021 <https://aidc.org.za/a-brief-history-of-eskom-1923-2015/>.

⁶¹ Eskom 2021 <https://www.eskom.co.za/heritage/history-in-decades/escom-1953-1962/>.

⁶² Between 1945 and 1955, ESCOM more than doubled the capacity of its power stations and projected that it would need to double capacity again over the next decade.

⁶³ World Nuclear Association 2025 <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-africa#Notes>.

⁶⁴ World Nuclear Association 2025 <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-africa#Notes>.

⁶⁵ Van Wyk 2015 *Historia* 54.

⁶⁶ Van Wyk 2015 *Historia* 54.

⁶⁷ PMG 2024 <https://static.pmg.org.za/241031pcenergyreport2.pdf>.

⁶⁸ PMG 2024 <https://static.pmg.org.za/241031pcenergyreport2.pdf>.

surplus power to be distributed across the country when needed.⁶⁹ Koeberg is the only commercial nuclear power plant in Africa and currently the station contributes approximately 6% of South Africa's electricity supply.⁷⁰

For the past decades, South Africa has explored ways to enhance its nuclear energy capabilities.⁷¹ It has been developing new nuclear technologies since 2000, including the Pebble Bed Modular Reactor (PBMR), which is designed to improve the energy supply and efficiency.⁷² The aim of this innovation will be to support the electricity sector, which is under pressure with rising demand.⁷³ In 2006 the South African government announced that it was considering the construction of an additional conventional nuclear power plant, potentially at Koeberg, to enhance the electricity supply in the Cape Province.⁷⁴ By early 2007 Eskom's board had approved a plan to expand the country's power generation capacity to 80GWe by 2025.⁷⁵ This included adding 20Gwe of new nuclear capacity, increasing nuclear energy's share of the supply from 5% to over 25%, and reducing the contribution of coal from 87% to below 70%.⁷⁶ The IRP 2019 emphasised the importance of maintaining nuclear power in South Africa's energy mix and acknowledged the contribution of Koeberg in this effort.⁷⁷

The evolution of South Africa's energy policies and initiatives, much like other facets of the country's society, has been significantly influenced by the legacy of racial segregation under apartheid,⁷⁸ when the energy policy was largely characterised by centralisation, secrecy and the prioritisation of white minority development.⁷⁹ Eskom played a central role in the agenda, benefitting from systems like the Minerals-

⁶⁹ PMG 2024 <https://static.pmg.org.za/241031pcenergyreport2.pdf>.

⁷⁰ Williams 2015 *Eras* 81.

⁷¹ Williams 2015 *Eras* 82.

⁷² Smith and Bredell 2010 *Nuclear engineering and design* 2415.

⁷³ Smith and Bredell 2010 *Nuclear engineering and design* 2415.

⁷⁴ World Nuclear Association 2025 <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-africa#Notes>.

⁷⁵ World Nuclear Association 2025 <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-africa#Notes>.

⁷⁶ World Nuclear Association 2025 <https://world-nuclear.org/information-library/country-profiles/countries-o-s/south-africa#Notes>.

⁷⁷ Department of Mineral Resources and Energy: Integrated Resource Plan (2023).

⁷⁸ Chitonge *The Political Economy of Energy Policy in South Africa: From a Gender Agenda to a Class Project* 2.

⁷⁹ Baker *The Political Economy of Clean Energy Transitions* 10.

Energy Complex (MEC).⁸⁰ The MEC represents a system of production and consumption that originated from South Africa's historical reliance on cheap coal and racially segregated labour to produce inexpensive electricity for an export-oriented economy.⁸¹ The country's strong reliance on coal is driven not only by its vast reserves but also by the historical political and economic context of its energy sector.⁸² The prevalence of coal can largely be traced back to the apartheid-era energy policies, particularly those shaped by international sanctions from the 1960s.⁸³ These sanctions motivated the government to prioritise energy security, emphasising self-sufficiency and independence.⁸⁴ Due to its political isolation the apartheid government established an energy system centred on locally available resources, mainly coal, to mitigate the risks associated with dependence on imported energy sources.⁸⁵

South Africa's energy sector continues to be influenced by the country's apartheid legacy, as well as by the political, social and economic dynamics of the post-apartheid era.⁸⁶ Prior to the end of apartheid in 1993, only 36% of the population had access to electricity, with racial inequality playing a significant role in the distribution.⁸⁷ Between 1994 and 2000 Eskom launched an extensive expansion programme connecting 2.4 million households to the grid; however a considerable share of the population, particularly in rural regions, remains without electricity access.⁸⁸ In post-apartheid South Africa the government has implemented a pro poor approach to energy access and affordability, resulting in numerous benefits for the

⁸⁰ Baker *The Political Economy of Clean Energy Transitions* 10.

⁸¹ Baker *The Political Economy of Clean Energy Transitions* 4.

⁸² Chitonge *The Political Economy of Energy Policy in South Africa: From a Gender Agenda to a Class Project* 10.

⁸³ Chitonge *The Political Economy of Energy Policy in South Africa: From a Gender Agenda to a Class Project* 10.

⁸⁴ Chitonge *The Political Economy of Energy Policy in South Africa: From a Gender Agenda to a Class Project* 10.

⁸⁵ Ogunlade *et al.* 2006 *Energy Research Centre* 5.

⁸⁶ Baker, Newell and Phillips 2014 *The Political Economy of Energy Transitions New Political Economy* 792.

⁸⁷ Baker 2014 *The Political Economy of Energy Transitions New Political Economy* 792.

⁸⁸ Baker 2014 *The Political Economy of Energy Transitions New Political Economy* 792.

population, although a significant portion of this energy capacity still relies on environmentally harmful fossil fuels.⁸⁹

Evidently, South Africa's energy sector has evolved through significant coal power expansion, attempts at hydro power production and ventures into nuclear energy, with on-going efforts to diversify the energy mix and enhance sustainability. At present Eskom has a diversified energy generation portfolio with which to meet the nation's electricity demands. The South African energy sector is currently undergoing significant transformation, driven by the need to address both historical challenges and future opportunities.⁹⁰ The sector is experiencing a major shift due to several factors, including the need to diversify the energy mix, improve energy security and reduce environmental impacts.⁹¹ Historically, the country has depended heavily on coal⁹² for its energy requirements, a legacy of its abundant coal reserves.⁹³ The exploitation of coal resources dates back to the early 20th century as noted above, with the mineral being critical to the country's industrialisation. However, the country has implemented policies aimed at integrating renewable energy sources like wind, solar and hydroelectric power into its energy mix.⁹⁴ The quantity of coal in the energy mix is projected to decline from two-thirds to just one third by 2030, while renewable energy's capacity is set to increase.⁹⁵ The Integrated Energy Plan envisions providing affordable energy for everyone while reducing the harmful impacts of energy consumption on human health and the environment.⁹⁶

The energy sector has faced challenges recently, with Eskom being in severe financial and operational difficulties.⁹⁷ With coal becoming increasingly unprofitable, major international mining companies have either exited from or restructured their coal operations, transferring their assets to local stakeholders, while other large

⁸⁹ Essex and de Groot 2019 *Energy Policy* 7.

⁹⁰ Department of Mineral Resources and Energy: The South African Energy Sector Report (2023) 5.

⁹¹ DMRE: Energy Sector Report 5.

⁹² South Africa is home to some of the largest coal fired power plants globally. In 2022, fossil fuels contributed 84.44% of the total electricity generation.

⁹³ DMRE: Energy Sector Report 5.

⁹⁴ DMRE: Energy Sector Report 5.

⁹⁵ Department of Mineral Resources and Energy: Integrated Energy Plan (IEP) 2010–2030.

⁹⁶ DMRE: Integrated Energy Plan.

⁹⁷ Hanto *et al.* 2022 *Energy for Sustainable Development* 166.

mining corporations have declared limitations on future investments.⁹⁸ South Africa has entered the coal transition phase influenced by internal developments in the coal mining industry, external global changes in energy markets, and evolving dynamics in the electricity sector.⁹⁹ The government has introduced the Renewable Energy Independent Power Production Programme (REIPPPP) as an initiative to reduce the nation's reliance on fossil fuels and increase the contribution of renewable energy to the national energy mix.¹⁰⁰ The programme forms a crucial part of South Africa's energy policy, as outlined in the NDP and the IRP 2010.

The evolution of South Africa's energy sector underscores a complex interplay between resource availability, political dynamics, socio-economic development and environmental stewardship. As the nation navigates its energy transition, balancing these factors remains crucial to achieving a sustainable and equitable energy landscape.

2.3 *Drivers of renewable energy deployment in South Africa*

The shift towards renewable energy in South Africa has been influenced by a complex interplay of factors. There is no universally accepted definition of renewable energy deployment, but insights are provided by scholars and authoritative organisations into its scope and significance. Renewable energy can be defined as energy sourced from natural elements that are replenished as quickly as they are consumed.¹⁰¹ Deployment, according to the Oxford Dictionary, refers to "the action of bringing resources into effective action."¹⁰² Therefore renewable energy deployment can be understood as the process of integrating, mobilising, implementing and utilising renewable energy sources and technologies into the energy mix. Renewable energy deployment is a critical component of the country's energy transition strategy, particularly considering its commitment to reducing greenhouse gas emissions and achieving a low-carbon economy by 2030, as outlined in the National Development Plan.

⁹⁸ Burton *et al.* *Coal transition in South Africa* 14.

⁹⁹ Burton *et al.* *Coal transition in South Africa* 14.

¹⁰⁰ Department of Mineral Resources and Energy: Energy Sector Report 5.25.

¹⁰¹ United Nations <https://www.un.org/en/climatechange/what-is-renewable-energy>.

¹⁰² Oxford Dictionary.

Several studies have shown that renewable energy contributes to lowering GHG emissions.¹⁰³ A significant decline in emissions could be achieved by extensively integrating renewable energy into the overall energy system.¹⁰⁴ Additional research has examined the factors that propel renewable energy deployment, identifying a country's economic, political and social attributes as potential drivers.¹⁰⁵ The viability of South Africa's just energy transition, measured by the rate at which coal is phased out and renewable energy is expanded, will be influenced by a range of techno-economic, socio-political and socio-technic factors.¹⁰⁶ Renewable energy deployment is driven by interlinked economic, environmental and policy factors. However, these drivers can only translate into developmental gains if supported by an effective legal and regulatory framework.

2.3.1 Environmental and climatic commitments

South Africa is the top contributor of CO₂ emissions in Africa, accounting for about 40% of the continent's total emissions, and it is also the largest greenhouse gas emitter in the region.¹⁰⁷ Globally it ranks as the fifteenth highest CO₂ emitter and is considered one of the most carbon intensive economies.¹⁰⁸ South Africa's leading source of carbon dioxide emissions comes from coal combustion, which emits the primary greenhouse gas associated with climate change.¹⁰⁹ The coal industry significantly influences South Africa's socio-economic landscape,¹¹⁰ with the energy industry contributing 80% of the country's greenhouse gas emissions.¹¹¹ South Africa has long relied on coal for electricity generation, but in recent years there has been an increasing focus on energy diversification and the adoption of renewable resources.¹¹² In response to the environmental harm caused by conventional electricity generation, the country has initiated efforts to diversify its energy mix.¹¹³

¹⁰³ Chiu and Chang 2019 *Renewable and Sustainable Energy Reviews* 1670.

¹⁰⁴ Chiu and Chang 2019 *Renewable and Sustainable Energy Reviews* 1670.

¹⁰⁵ Hao and Shao 2021 *Energy Research & Social Science* 1.

¹⁰⁶ Mirzania *et al.* 2023 *Energy Research & Social Science* 1.

¹⁰⁷ Salahuddin *et al.* 2019 *Heliyon* 2.

¹⁰⁸ Salahuddin *et al.* 2019 *Heliyon* 2.

¹⁰⁹ DMRE: White Paper on Promotion of Renewable Energy 2.

¹¹⁰ Hanto *et al.* 2022 *Energy for Sustainable Development* 164.

¹¹¹ National Planning Commission: Economy Series: Energy (2019).

¹¹² DMRE: Energy Sector Report 29.

¹¹³ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5080.

From an environmental perspective, the most urgent priority for South Africa is transitioning away from coal to fulfil its Nationally Determined Contributions (NDCs) under the Paris Agreement.¹¹⁴

As a signatory to the Paris Agreement¹¹⁵ South Africa is facing global pressure to reduce its greenhouse gas emissions.¹¹⁶ These international commitments have indirectly made switching to renewable energy a central approach for achieving climate goals,¹¹⁷ particularly because electricity production remains the primary source of South Africa's GHG emissions. The IEA highlights that global GHG emissions must begin to decline immediately in order to achieve net zero emissions by 2050.¹¹⁸ There is a shared understanding of the urgent need for a shift towards a low-carbon economy, which involves reducing dependence on fossil fuels and coal mining to address the environmental, socio-economic and health-related challenges linked to climate change.¹¹⁹ South Africa's NDC is aligned with the long-term emissions pathway set out in the National Climate Change Response strategy White Paper.¹²⁰ It outlines a commitment to reduce greenhouse gas emissions to between 398 MtCO₂e and 614 MtCO₂e during the 2025-2030 period.¹²¹ In 2021 the country updated its NDCs, lowering and narrowing its 2030 emissions target range and reaffirming the 2025 peak.¹²² The NDC is based on a peak, plateau and decline emissions pathway in which emissions are expected to peak between 2020 and 2025,

¹¹⁴ South Africa's NDCs under Paris Agreement outlines the country's commitments to reduce GHG emissions. The Updated NDC commits to 31% reduction and a fixed target for GHG emissions levels 398-510 MtCO₂e by 2025, and 350-420 MtCO₂e by 2030.

¹¹⁵ While the Paris Agreement is the most recent of the international instruments binding South Africa on issues of reducing emissions the country is signatory to several international instruments that require it to reduce GHG emissions. These include the UNFCCC and the Kyoto Protocol.

¹¹⁶ Salahuddin et al. 2019 *Heliyon* 2.

¹¹⁷ Most of the international agreements that South Africa is signatory to do not expressly mention renewable energy usage but it can be implied from their requirement to reduce GHG emissions which can be done through the implementation of renewable energies.

¹¹⁸ IEA 2021 <https://www.iea.org/reports/world-energy-outlook-2021/executive-summary>.

¹¹⁹ Hanto *et al.* 2022 *Energy for Sustainable Development* 170.

¹²⁰ Coal transitions in South Africa Understanding the implications of a 2oC-compatible coal phase-out plan for South Africa 2018 Jesse Burton, Tara Caetano, Bryce McCall 2.

¹²¹ Hanto *et al.* 2021 *Environmental Science & Policy* 74.

¹²² Hanto *et al.* 2022 *Energy for Sustainable Development* 170; The updated new targets set GHG emissions at a defined range of 318-510 MtCO₂e by 2025 and 350-420 MtCO₂e by 2030. This is a more ambitious commitment than the initial NDC.

level off for a decade and then begin to decline thereafter.¹²³ The country also included the ambition to achieve net-zero emissions by 2025 in its Low Emission Development Strategy (LEDS).¹²⁴

The dominance of coal in the energy mix has provided South Africa with a degree of energy security but has also laid the foundation for its significant GHG emissions. South Africa is both a contributor to GHG emissions and highly vulnerable to the effects of climate change, which threaten health, livelihoods, water and food security.¹²⁵ They are intensifying, and unless significant efforts are made to reduce GHG emissions, temperatures in the western, central and northern regions of South Africa could increase by over 6°C.¹²⁶ The effects of climate change are directly impacting on millions of people by undermining their food and water security, elevating their living costs, harming their health and diminishing their income.¹²⁷ Food security is already unstable due to the prevalence of poverty and the unequal ownership of arable land rooted in the country's historical background.¹²⁸ Climate change is increasingly placing pressure on the provision of basic services and infrastructure.¹²⁹ A significant part of the country's economic future relies on how quickly it can adopt renewable energy to replace coal and deliver reliable, affordable electricity.¹³⁰

In the same vein, the NDP provides the foundational vision for sustainable development pathway and explicitly identifies the transition to a low carbon economy as integral to achieving the country's overarching goals.¹³¹ It envisions that "by 2030 South Africa's transition to an environmentally sustainable, climate change resilient, low carbon economy and just society will be well under way."¹³² This vision reflects recognition that environmental sustainability and economic development are mutually

¹²³ Burton *et al.* *Coal transition in South Africa* 21.

¹²⁴ Department of Forestry, Fisheries and the Environment: South Africa's Intended Nationally Determined Contribution (INDC) (2021).

¹²⁵ NPC: National Development Plan 33.

¹²⁶ Chersich and Wright 2019 *Globalization and Health* 2.

¹²⁷ Johnston *et al.* *Climate Change Impacts in South Africa* 11.

¹²⁸ Masipa 2017 *Jàmbá: Journal of Disaster Risk Studies* 4.

¹²⁹ Johnston *et al.* *Climate Change Impacts in South Africa* 16.

¹³⁰ Johnston *et al.* *Climate Change Impacts in South Africa* 5.

¹³¹ DFFE *The Just Transition to a Decarbonised Economy for South Africa (JUST SA)* 1.

¹³² NPC: National Development Plan 199.

reinforcing, not contradictory, imperatives for South Africa. The NDP establishes specific climate related targets that operationalise this vision, including the achievement of GHG emissions peak, plateau and decline trajectory with the peak anticipated around 2025.¹³³ Critically, the NDP identifies renewable energy expansion as essential to this transition, to supplement South Africa's aging coal dependent electricity system.

The Climate Change Act¹³⁴ provides the comprehensive legal framework through which South Africa operationalises its Paris Agreement commitments and NDP objectives. The Act represents the culmination of over a decade of legislative development and establishes legally binding obligations to implement climate action aligned with emissions reduction targets. The Act operationalises emissions reductions through multiple mechanisms like national greenhouse gas emission reduction trajectory,¹³⁵ sectoral emissions targets,¹³⁶ as well as carbon budgets.¹³⁷

2.3.2 Policy drivers

The country has developed several policy documents and frameworks that support the deployment of renewable energy. The significance of policy and governance in enabling the transition to renewable energy is paramount.¹³⁸ Strong policy frameworks and a favourable regulatory environment are vital for drawing investments and fostering the adoption of renewable technologies.¹³⁹ The NDP, the Draft Integrated Energy Plan (IEP) and the Renewable Energy White Paper provide the overall framework for building a more equitable and low-carbon society by promoting sustainable economic development.¹⁴⁰ NDP 2030 envisions that by 2030 the country will be well on its way to becoming an environmentally sustainable, climate-resilient, low-carbon and a more just society.¹⁴¹ It states that a low-carbon

¹³³ NPC: National Development Plan 205.

¹³⁴ Climate Change Act 22 of 2024.

¹³⁵ Section 24 of the Climate Change Act.

¹³⁶ Section 25 of the Climate Change Act.

¹³⁷ Section 27 of the Climate Change Act.

¹³⁸ Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1504.

¹³⁹ Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1504.

¹⁴⁰ Hanto *et al.* 2022 *Energy for Sustainable Development* 166.

¹⁴¹ NPC: National Development Plan 199.

future is the only feasible solution, as the world must reduce emissions per unit of output by roughly eight times within the next 40 years.¹⁴²

The government's commitment to lowering emissions through the greater adoption of renewable energy technologies is also highlighted.¹⁴³ A target has been set to generate 20 000 MWh of renewable energy by 2030, but progress has been slow, with renewables contributing only 1% of the electricity supply.¹⁴⁴ It is also clear on the objectives of the energy sector, which include promoting environmental sustainability by working to reduce pollution and addressing climate change through the introduction of cleaner energy solutions.¹⁴⁵ The NDP promotes the diversification of the energy mix and the development of clean energy infrastructure to ensure long-term sustainability and economic growth. It states that developing infrastructure for liquefied natural gas and expanding efforts to discover local gas resources, including shale gas and coal bed methane, are among the strategies to diversify South Africa's energy mix and lower its carbon emissions.¹⁴⁶

South Africa also intends to diversify its energy sources beyond fossil fuels by partnering with neighbouring nations to harness hydropower.¹⁴⁷ Simultaneously, the country will explore natural gas as a lower carbon transitional energy source.¹⁴⁸ South Africa has substantial renewable energy potential, particularly from solar and wind, beyond coal and natural gas.¹⁴⁹ The effective utilisation of the natural resources is crucial for moving away from coal-fired power and advancing the decarbonisation of the economy.¹⁵⁰ To adhere to the peak, plateau and decline emissions pathway, future energy capacity will need to be sourced from alternatives like gas, wind, solar, imported hydropower and possibly a nuclear programme.¹⁵¹

¹⁴² NPC: National Development Plan 91.

¹⁴³ Salahuddin et al. 2019 *Heliyon* 2.

¹⁴⁴ NPC: National Development Plan 150.

¹⁴⁵ NPC: National Development Plan 163.

¹⁴⁶ NPC: National Development Plan 46.

¹⁴⁷ NPC: National Development Plan 169.

¹⁴⁸ NPC: National Development Plan 169.

¹⁴⁹ NPC: National Development Plan 198.

¹⁵⁰ NPC: National Development Plan 202.

¹⁵¹ NPC: National Development Plan 168.

The IRP is a living plan that outlines a strategy for electricity infrastructure development that focuses on achieving the lowest cost balance between supply and demand while also considering energy security and reducing the environmental impacts including emissions and water use.¹⁵² It outlines the planned decommissioning of coal fired plants and the scaling up of renewable energy sources such as solar PV, wind and hydropower. Approximately 24 100 MW of coal-fired power plants are expected to be decommissioned between 2030 and 2050. As such, it is crucial to focus on the strategy for transitioning to a new energy mix and to undertake the required groundwork for the retirement and replacement of these facilities.¹⁵³ The IRP supports the expanded adoption of renewable energy sources in order to achieve the objectives set out in the NDCs.¹⁵⁴ Although the IRP outlines the strategy for meeting electricity demand, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) is instrumental in securing renewable energy through its competitive bidding system, which has already resulted in the procurement of over 6GW cross-four bidding windows.¹⁵⁵ This means that the programme has successfully attracted investment to deliver large scale renewable energy projects, significantly expanding South Africa's generation capacity and diversifying the energy mix.

The REIPPPP aims to advance the development of renewable energy initiatives and reduce the reliance on fossil fuels while also increasing the contribution of renewables to the country's portfolio.¹⁵⁶ If it does so, South Africa will decrease its greenhouse gas emissions.¹⁵⁷ The programme was initiated to promote private sector participation in the development of grid connected renewable energy in the country.¹⁵⁸ Independent power producers (IPPs) were encouraged to submit bids for projects using technologies such as onshore wind, solar PV, concentrated solar power, small hydro, biomass, biogas, and landfill gas.¹⁵⁹ In 2021, the majority of

¹⁵² DMRE: Integrated Resource Plan 2019 8.

¹⁵³ DMRE: Integrated Resource Plan 2019 44.

¹⁵⁴ Hanto *et al.* 2021 *Environmental Science & Policy* 81.

¹⁵⁵ Hanto *et al.* 2022 *Energy for Sustainable Development* 166.

¹⁵⁶ DMRE: Energy Sector Report 25.

¹⁵⁷ DMRE: Energy Sector Report 25.

¹⁵⁸ Eberhard and Naude 2016 *Journal of Energy in Southern Africa* 2.

¹⁵⁹ Eberhard and Naude 2016 *Journal of Energy in Southern Africa* 2.

electricity generated through the REIPPPP came from onshore wind, which contributed 55%, followed by solar PV at 33%.¹⁶⁰ Concentrated solar power accounted for 11% while small scale hydropower made up 1%.¹⁶¹

2.3.3 Socio-economic factors

South Africa's socio-economic conditions are significantly influencing the development of its energy policies and the transition toward renewable energy sources. South Africa views the deployment of renewable energy increasingly as a lever not only for environmental sustainability but also for promoting poverty alleviation, supporting gender and social inclusion and fostering job creation.¹⁶² South Africa continues to grapple with the lasting impacts of apartheid and unequal socio-economic transformation.¹⁶³ Energy poverty is a significant issue, particularly among residents of informal settlements, where challenges related to affordability and limited access to the grid infrastructure persist.¹⁶⁴ As SEA notes, resolving energy poverty is a complex challenge that involves more than just extending energy services to low income households.¹⁶⁵ It involves comprehending the critical infrastructure requirements¹⁶⁶ in this case the deployment of renewable energy technologies. Renewable energy offers decentralised and scalable solutions¹⁶⁷ to the need to expand energy access in areas where grid extension would be economically unfeasible.¹⁶⁸

The need to address chronic electricity shortages and frequent load shedding is another one of the primary socio-economic drivers of renewable energy. Eskom has experienced an escalating operational crisis over the years, largely resulting from its heavy dependence on an outdated coal-fired power infrastructure, the consistent

¹⁶⁰ DMRE: Energy Sector Report 27.

¹⁶¹ DMRE: Energy Sector Report 27.

¹⁶² Marema and Tlokolo *Socio-economic benefits of renewable and storage technologies in South Africa* 1.

¹⁶³ IRENA *Socio-economic footprint of the energy transition: South Africa* 2023 15.

¹⁶⁴ Masuku 2024 *Development Southern Africa* 472.

¹⁶⁵ SEA *Tackling urban energy poverty in South Africa* 8.

¹⁶⁶ Masuku 2024 *Development Southern Africa* 473.

¹⁶⁷ Ukoba *et al.* 2024 *Heliyon* 3.

¹⁶⁸ Decentralised Renewable Energy systems have proven to be the most effective and cost-efficient means of delivering electricity to underserved regions, particularly in rural and remote areas.

neglect of maintenance and extensive issues related to poor governance.¹⁶⁹ This has caused significant disruption¹⁷⁰ in national economic activity and placed a disproportionate burden on low income households¹⁷¹ since the country's economy is energy-sensitive.¹⁷² Energy insecurity has an impact on service delivery, undermines economic development and diminishes the quality of life for citizens. Energy security is essential for economic stability as it guarantees the consistent and sustainable energy supply needed to drive economic growth and development.¹⁷³ In this context the adoption of renewable energy presents a practical approach to diversifying the energy mix and delivering a more dependable, decentralised and secure energy supply.

One of the most frequently referenced socio-economic justifications for renewable energy deployment is the potential to stimulate employment creation. Employment has been a central theme in South Africa's energy transition discussions, initially with the focus being concerns about potential job losses in the coal industry. More recently attention had been directed on the opportunities for job creation associated with the expansion of the provision of renewable energy.¹⁷⁴ Expanding the renewable energy sector in South Africa holds out the potential to generate increased employment opportunities, thereby contributing to the improvement of the national economy.¹⁷⁵ For instance, developing and maintaining renewable energy facilities demands a trained workforce, leading to employment across multiple industries.¹⁷⁶ Programmes such as the REIPPPP have already clearly demonstrated that embracing renewable energy technologies could be a powerful driver of job creation.¹⁷⁷ Regarding a job creation target, projections based on bid data across bid windows estimate that approximately 109,444 jobs will be created for local citizens.¹⁷⁸ Of these a significant 84,564 jobs are expected to benefit black citizens, while 57,690 jobs will

¹⁶⁹ Hanto *et al.* 2022 *Energy for Sustainable Development* 166.

¹⁷⁰ IRENA *Socio-economic footprint of the energy transition: South Africa* 23.

¹⁷¹ Inglesi-Lotz 2023 *South African Journal of Science* 9.

¹⁷² IRENA *Socio-economic footprint of the energy transition: South Africa* 23.

¹⁷³ Banna *et al.* 2023 *Energy Economics* 2.

¹⁷⁴ Mohlakoana *et al.* 2024 *Development Southern Africa* 650.

¹⁷⁵ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5080.

¹⁷⁶ Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1506.

¹⁷⁷ Since its inception in 2011 it has generated a total of 55,217 jobs that are measured in terms of full-time equivalent jobs.

¹⁷⁸ Eberhard and Naude 2016 *Journal of Energy in Southern Africa* 13.

be allocated to members of the local communities near the project sites.¹⁷⁹ Most of the employment opportunities will stem from onshore wind and solar PV projects, as these account for 79 out of the 92 large-scale renewable energy projects approved so far.¹⁸⁰

Economic growth is playing a significant role in promoting the adoption of renewable energy.¹⁸¹ As South Africa pursues sustainable development and seeks to diversify its energy portfolio; renewable energy is becoming increasingly central to long-term economic planning. Research indicates that the use of renewable energy contributes positively to economic development, especially in nations rich in renewable resources.¹⁸² South Africa's geographic conditions and population distribution make it well suited for the exploitation of various forms of renewable energy.¹⁸³ The sector continues to attract major financial investments, which are essential for developing renewable energy technologies and scaling up projects.¹⁸⁴

Renewable energy can be framed as a key instrument for a socially just transition in Mpumalanga by showing how it can substitute coal-related livelihoods with new forms of employment, skills and local value creation, in a way that advances the NDP's commitments to inclusion, social cohesion and spatial justice.¹⁸⁵ Mpumalanga is the critical province for illustrating these dynamics. It currently hosts most of South Africa's coal power stations and a very high share of coal mining employment, meaning that plant decommissioning and mine closure will have disproportionate local impacts.¹⁸⁶ Research indicates that tens of thousands of jobs in mining, power generation and related services could be lost as coal declines, affecting workers, dependants and coal town economies¹⁸⁷. Mpumalanga's economy is heavily

¹⁷⁹ Eberhard and Naude 2016 *Journal of Energy in Southern Africa* 13.

¹⁸⁰ Eberhard and Naude *The South African renewable energy IPP procurement programme* 39.

¹⁸¹ Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1506.

¹⁸² Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1506.

¹⁸³ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5080.

¹⁸⁴ Uzundu and Lele 2024 *Int. J. Appl. Res. Soc. Sci* 1506.

¹⁸⁵ Marais and Mqotyana 2023 *Frontiers in Sustainable Cities* 6.

¹⁸⁶ Marais and Mqotyana 2023 *Frontiers in Sustainable Cities* 6.

¹⁸⁷ Marais and Mqotyana 2023 *Frontiers in Sustainable Cities* 6.

dependent on coal, with limited diversification, making it particularly vulnerable to job losses and revenue declines as plants and mines close.¹⁸⁸

It is also increasingly targeted for renewable energy projects (solar, wind, repurposing of coal plant sites), partly because it already has grid infrastructure and a skilled industrial workforce.¹⁸⁹ Siting renewables and related manufacturing in Mpumalanga can directly substitute some coal related jobs and help anchor new local value chains, consistent with NDP commitments to reduce regional disparities and promote inclusive growth.¹⁹⁰ Many coal sector skills are partially transferable to renewables, but require targeted reskilling and certification programmes, often in partnership with TVET colleges, SETAs and industry.¹⁹¹ A just transition in Mpumalanga is not automatic: renewable deployment becomes a justice enhancing strategy only if it is accompanied by deliberate policies for reskilling, job placement, local procurement and community ownership. The NDP aims to eradicate poverty and reduce inequality by 2030, with a strong focus on employment, spatial justice and expanded access to basic services, including energy. A just transition centred on renewable energy in Mpumalanga advances these aims if it prioritises decent work for displaced workers, expands access to affordable, reliable electricity for poor households, and ensures that benefits accrue to historically disadvantaged groups.

2.4 *The role of Eskom and independent power producers (IPPs)*

The transition to renewable energy cannot be fully understood without examining the roles played by Eskom as the only power utility and independent power producers (IPPs). Eskom has long held a monopoly over electricity generation, transmission and distribution. Presently, Eskom is the country's primary electricity provider, producing the largest percentage of the country's total power supply, with the remaining portion being generated by municipalities and independent power producers.¹⁹² Eskom owns and manages a range of power generation facilities, including coal

¹⁸⁸ African Climate Foundation 2023 <https://africanclimatefoundation.org/blog/powertracker-tracking-renewable-power-in-mpumalanga/>.

¹⁸⁹ Cole *et al* 2025 *Energy Research and Social Science* 4.

¹⁹⁰ NPC: National Development Plan 169.

¹⁹¹ Cole *et al* 2025 *Energy Research and Social Science* 7.

¹⁹² Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5080.

fired,¹⁹³ gas-fired,¹⁹⁴ hydroelectric and pumped storage stations,¹⁹⁵ along with a single nuclear power plant.¹⁹⁶ As already mentioned, Eskom has faced significant challenges including aging infrastructure, poor maintenance financial mismanagement, as a result of which it has had to resort to rolling blackouts. Although Eskom remains primarily a coal power producer, it has begun advocating the faster adoption of renewable energy sources to improve supply stability.¹⁹⁷ As Eskom's strength and expertise lie mainly in fossil fuel technologies, the government view IPPs as being better positioned to expand the country's renewable energy capacity.¹⁹⁸

Eskom was slow to embrace renewable energy and was argued to be resisting the growth of renewable energy in order to retain its monopoly.¹⁹⁹ Between 1998 and 2018 Eskom attempted to hinder the expansion of renewable energy in the country's electricity supply mix.²⁰⁰ A critical turning point occurred in 1998 with the proposal to introduce private sector participation, which posed a direct threat to Eskom's monopoly.²⁰¹ The 1998 White Paper advocated unbundling, which would allow private sector entities to take on new electricity generation, challenging Eskom's monopoly.²⁰² Eskom's apprehension was also evident when the utility refused to sign any further Power Purchase Agreements beyond the preferred projects selected in bid window 4.5 of the REIPPPP.²⁰³ However, it has shifted from resisting reforms to endorsing certain aspects of them.²⁰⁴

¹⁹³ Eskom operates a total of fifteen coal-fired power stations with a combined installed capacity of approximately 45,397 MW.

¹⁹⁴ Eskom operates five gas-fired power stations with a combined installed capacity of approximately 2,761 MW.

¹⁹⁵ Eskom has a total of five hydroelectric and pumped storage facilities comprising two traditional hydroelectric power stations and three pumped storage schemes.

¹⁹⁶ Eskom operates the Koeberg Nuclear Power Station, which consists of two reactors with a total generation capacity of 1,860 MW.

¹⁹⁷ Hanto *et al.* 2022 *Energy for Sustainable Development* 168.

¹⁹⁸ Nel 2017 *Administratio Publica* 34.

¹⁹⁹ Eskom gradually absorbed smaller municipal and private electricity companies, eventually becoming a monopoly in both electricity generation and distribution.

²⁰⁰ Ting and Byrne 2020 *Energy Research & Social Science* 2.

²⁰¹ Ting and Byrne 2020 *Energy Research & Social Science* 18.

²⁰² Ting and Byrne 2020 *Energy Research & Social Science* 18.

²⁰³ Engineering News 2016 <https://www.engineeringnews.co.za/article/eskoms-ipp-stance-seen-undermining-investment-and-green-industrialisation-2016-07-22>.

²⁰⁴ McCulloch *South Africa's power sector reform* 3.

In support of promoting renewable energy, Eskom established the nation's first wind farm, Klipheuwel along the west coast.²⁰⁵ Klipheuwel has served as a demonstration project aimed at assessing the potential of wind energy for electricity generation.²⁰⁶ The demonstration facility has been highly successful, offering Eskom important technical and strategic insights into the use of wind as an energy source.²⁰⁷ It has also provided direction for the development of a large-scale commercial wind power facility.²⁰⁸ The experience and knowledge acquired from the Klipheuwel Wind Farm has helped shape Eskom's later renewable energy efforts, particularly leading to the development of the 100 MW Sere Wind Farm, which began operation in 2015.²⁰⁹ Sere is Eskom's first major renewable energy project, showcasing the utility's dedication to lowering its carbon emissions and promoting a sustainable energy future.²¹⁰ In 2020 Eskom unveiled its Just Energy Transition (JET) strategy, which focusses on shifting towards a low-carbon, greener future while creating new employment opportunities for those affected by the move away from coal-based technologies.²¹¹

In recent years IPPs have emerged as critical players in the renewable energy space. An independent power producer is any entity that is not majority owned or controlled either directly or indirectly by the government or any state body and that is involved in or plans to be involved in the development of new electricity generation capacity as authorised from the Minister under section 34(1) of the Electricity Regulation Act.²¹² IPPs represent a competitive government procurement model through outsourcing, with the idea that they will attract private investment, thus alleviating the cost of transition.²¹³ Eskom's financial constraints limit its ability to invest in expanding renewable energy sources, making IPPs and the REIPPPP essential for bridging the current energy shortfall and cutting greenhouse gas emissions.²¹⁴ IPPs function as hybrid public-private partnerships, where government outsources energy

²⁰⁵ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5084.

²⁰⁶ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5084.

²⁰⁷ CSIR *Draft Scoping Report: Wind Energy as a power generation option* 24.

²⁰⁸ CSIR *Draft Scoping Report: Wind Energy as a power generation option* 24.

²⁰⁹ Moyo 2016 <https://www.itweb.co.za/article/eskom-decommissions-klipheuwel-wind-farm/5rW1xLv5Pk9qRk6m>.

²¹⁰ Eskom *Fact Sheet: Sere Wind Farm* 1.

²¹¹ Eskom *Fact Sheet: Just Energy Transition (JET) Fact sheet #001* 1.

²¹² Section 34(1) of the Electricity Regulation Act; see also Nel 2017 *Administratio Publica* 30.

²¹³ Nel 2017 *Administratio Publica* 31.

²¹⁴ Hanto *et al.* 2022 *Energy for Sustainable Development* 170.

generation while involving Eskom in purchasing energy from the IPPs.²¹⁵ Private sector participation in energy provision is expected to ease the financial pressure on the government, lower Eskom's borrowing needs and introduce generation technologies that may not fall within Eskom's primary focus.²¹⁶

Owing to the significant renewable energy potential and evolving policy environment, there has been a consistent rise in the number of IPPs, particularly within the renewable energy sector.²¹⁷ As energy demand is projected to grow while existing power capacity remains insufficient, enhancing and broadening the energy mix is essential for achieving the country's developmental objectives and strengthening the critical security of energy supply.²¹⁸ The IRP highlights that involving IPPs offers several advantages, including quicker project completion times, reduced finance pressure on Eskom, the development of new energy infrastructure and the enhancement of South Africa's renewable energy portfolio.²¹⁹ The White Paper²²⁰ remains the primary guiding policy for IPP procurement models.²²¹ It aims to enhance energy governance by promoting greater stakeholder participation, strengthening institutional governance, supporting the introduction of IPPs to expand distribution and aid in transitioning from a supply-focussed to a demand-driven approach in energy planning.²²² Under the REIPPPP framework the Department of Energy (DoE) is assigned the role of procurer while Eskom acts solely as the buyer.²²³

Procurement processes in South Africa are primarily governed by the Constitution,²²⁴ the Public Finance Management Act²²⁵ and Treasury regulations and guidelines.²²⁶

²¹⁵ Nel 2017 *Administratio Publica* 30.

²¹⁶ Nel 2017 *Administratio Publica* 31.

²¹⁷ Hanto *et al.* 2022 *Energy for Sustainable* 164.

²¹⁸ Ndlovu and Inglesi-Lotz 2019 *Journal of Energy in Southern Africa* 14.

²¹⁹ DMRE: Integrated Resource Plan 2010- 2030; See also Ndlovu and Inglesi-Lotz 2019 *Journal of Energy in Southern Africa* 16.

²²⁰ Department of Minerals and Energy: White Paper on Energy Policy (1998) 55.

²²¹ Martin and Winkler *Procurement models applied to independent power producer programmes in South Africa* 2.

²²² Martin and Winkler *Procurement models applied to independent power producer programmes in South Africa* 2.

²²³ Nel 2015 *African Journal of Public Affairs* 56.

²²⁴ Section 217 of the Constitution.

²²⁵ Public Finance Management Act 1 of 1999.

²²⁶ Martin and Winkler *Procurement models applied to independent power producer programmes in South Africa* 3.

Energy procurement operates within this broader framework, but it is subject to specific rules. The DoE has issued regulations²²⁷ specifically for the procurement of new electricity generation capacity under the Electricity Regulation Act²²⁸ as amended. These regulations cover procurement not only from Eskom and other government entities but also from IPPs²²⁹ and govern the power purchase agreements between Eskom (the buyer) and the IPP procurement programme.²³⁰ The DoE officially launched the REIPPPP in 2011 with the initial plan outlining the procurement of 3,725 MW across five bidding rounds, depending on the availability of capacity.²³¹ The IPP office²³² assists the Department of Mineral Resources and Energy (DMRE) in procuring electricity capacity from IPPs and contributes to fulfilling the objectives outlined in both the NDP and the IRP.²³³

IPPs have pledged to help meet the renewable energy target and are intended to enhance competition within the energy market.²³⁴ The REIPPPP has been the cornerstone of renewable energy deployment by IPPs. IPPs have significantly expanded the country's renewable energy capacity through the REIPPPP. Eskom has asserted that IPPs play a crucial role in maintaining energy security, particularly during times when electricity demand matches or exceeds generation capacity, by creating opportunities for maintenance and helping to reduce the risk of load shedding.²³⁵ The DoE has described the REIPPPP as the country's most comprehensive initiative for transitioning towards a greener economy.²³⁶ IPPs have successfully delivered projects across various technologies such as solar PV, wind, biomass, small hydro and concentrated solar power (CSP) all of which are clean

²²⁷ Electricity Regulation Act: Electricity Regulations on New Generation Capacity 2011.

²²⁸ Electricity Regulation Act.

²²⁹ Martin and Winkler *Procurement models applied to independent power producer programmes in South Africa* 3.

²³⁰ Nel 2015 *African Journal of Public Affairs* 50.

²³¹ Martin and Winkler *Procurement models applied to independent power producer programmes in South Africa* 4. Since its inception the REIPPPP has procured approximately 7,706 MW across six bidding windows.

²³² The IPP office was created in 2010 following an agreement between the DMRE and the National Treasury with the Development Bank of Southern Africa to assist in implementing South Africa's IPP Programmes. It serves as a vital institution in fostering an environment that promotes private sector participation in the country's power provision.

²³³ McCulloch *South Africa's power sector reform* 87.

²³⁴ Nel 2017 *Administratio Publica* 34.

²³⁵ McCulloch *South Africa's power sector reform* 94.

²³⁶ McCulloch *South Africa's power sector reform* 94.

energy technology. By early 2024 they had contributed more than 6,180 of renewable energy to the national grid,²³⁷ highlighting their critical role in addressing South Africa's energy demands and supporting the country's climate obligations under international agreements like the Paris Agreement. IPPs have undoubtedly developed as agents of change within the nation's evolving energy landscape, thus playing a central role in efforts to transition to a more inclusive energy future.

2.5 *Legal and policy framework for renewable energy*

2.5.1 White Papers

South Africa's energy policy and regulatory trajectory are anchored in the 1998 White Paper on Energy Policy, which sought to restructure the energy system to meet the needs of a post-apartheid society.²³⁸ Unlike earlier approaches that were primarily concerned with energy security, the 1998 framework emphasised balancing energy demand with supply while advancing broader developmental objectives.²³⁹ Key proposals included the adoption of integrated energy and resource planning as a tool for guiding the sector's growth, the deregulation of the electricity supply industry and the unbundling of Eskom.²⁴⁰ Importantly, the 1998 White Paper recognised that reliable and affordable energy access was integral to South Africa's economic development.²⁴¹ Building on this foundation, the 2003 White Paper on Renewable Energy marked a pivotal policy shift by establishing renewable energy targets and fostering conditions conducive to investment in renewable energy generation.²⁴² It emphasised the creating of an enabling regulatory and institutional environment to mobilise both public and private sector resources in support of renewable deployment.²⁴³

²³⁷ Department of Mineral Resources and Energy: *Independent Power Producers Procurement Programme (IPPPP) An overview* 15.

²³⁸ Obisie-Orlu *Maximising the impact of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)* Policy Briefing 3.

²³⁹ Obisie-Orlu *Maximising the impact of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)* Policy Briefing 3.

²⁴⁰ DMRE: White Paper on the Energy Policy 1998 53.

²⁴¹ DMRE: White Paper on the Energy Policy 1998 3,8,23.

²⁴² DMRE: White Paper on Renewable Energy 2003 ii.

²⁴³ DMRE: White Paper on Renewable Energy ii,14.

2.5.2 Integrated Resource Plan 2019

The Integrated Resource Plan serves as South Africa's principal policy document guiding electricity generation and procurement through to 2030.²⁴⁴ It was first released in 2010, then revised in 2019 and again in 2023/2024. The IRP 2019 envisages the progressive decommissioning of aging coal plants²⁴⁵ and sets out aggressive procurement schedules for renewables, targeting at least 18,000 MW of new solar PV and wind capacity by 2030.²⁴⁶ It acknowledges the low-carbon transition imperative in the NDP and the National Climate Change Response White Paper.²⁴⁷ The plan supports extending the REIPPP as a core mechanism to achieve its renewable energy targets.²⁴⁸ IRP 2019 sets the foundation for South Africa's energy transition aspirations by balancing energy security, economic considerations and climate goals. The latest update to the IRP, the IRP 2023, builds upon previous IRPs and introduces a structure with two key horizons: horizon 1 (2023-2030), which is focussed on immediate capacity needs and horizon 2 (2030-2050), which looks at longer term energy system transformation.²⁴⁹

2.5.3 South African Renewable Energy Masterplan 2025

The South African Renewable Energy Masterplan approved by Cabinet in 2025, marks a major step in aligning the country's energy transition with industrial growth, skills development and socio-economic inclusion.²⁵⁰ Its core vision is to industrialise the renewable energy and battery storage technologies so that South Africa can meet rising demand for clean power while creating jobs, building domestic manufacturing capacity and broadening participation in the energy sector.²⁵¹ Among its targets are adding around 3-5 GW OF renewable energy annually through to

²⁴⁴ DMRE: Integrated Resource Plan (IRP2019) 11.

²⁴⁵ DMRE: Integrated Resource Plan (IRP2019) 11,33.

²⁴⁶ DMRE: Integrated Resource Plan (IRP2019) 9,31.

²⁴⁷ Department of Forestry, Fisheries and the Environment: National Climate Change Response White Paper 2011.

²⁴⁸ DMRE: Integrated Resource Plan (IRP2019) 9.

²⁴⁹ DMRE: Integrated Resource Plan (IRP2030).

²⁵⁰ Energize 2025 <https://www.energize.co.za/article/cabinet-approves-renewable-energy-masterplan-to-drive-local-manufacturing>.

²⁵¹ South African Government 2025 <https://www.gov.za/news/media-statements/deputy-minister-samantha-graham-mar%C3%A9-sa-renewable-energy-masterplan-26-jun>.

2030,²⁵² realising local content in manufacturing inputs, establishing skills pathways to fill critical gaps and integrating emerging technologies such as green hydrogen to meet obligations like a 5% blended fuel usage in the aviation and maritime sectors by 2030.²⁵³ The Masterplan is designed as a living document so that it can evolve with changing technology, policy, market conditions and demand.

2.5.4 National Energy Act

The National Energy Act²⁵⁴ promotes the availability of diverse energy sources, including renewables to support energy security, and sustainable development.²⁵⁵ It obliges the government to compile and disseminate energy data, develop integrated plans and create the regulatory conditions for least cost and low-carbon development.²⁵⁶

2.6 Conclusion

This chapter has provided an in-depth examination of South Africa's transition to renewable energy, starting with a description of the historical development of the energy sector. The analysis was guided by the central research question: To what extent can the increased deployment of renewable energy contribute to the realisation of some of the objectives of the NDP? The historical overview revealed that South Africa's energy sector has been profoundly shaped by its legacy of coal dependence and Eskom's centralised control of electricity generation and distribution. This historical trajectory has entrenched structural inefficiencies, constrained diversification and perpetuated unequal access to energy. The exploration of the drivers of renewable energy deployment identified three interrelated and mutually reinforcing factors. First, South Africa's commitment to global environmental and climate change frameworks, including the Paris Agreement, has necessitated a gradual decarbonisation of its energy sector. Second, the policy framework with instruments like the IRP and the White Paper has provided a normative and strategic

²⁵² DMRE: SAREM 16

²⁵³ Enerdata 2025 <https://www.enerdata.net/publications/daily-energy-news/south-africa-approves-south-african-renewable-energy-masterplan.html> accessed 02-10-2025.

²⁵⁴ National Energy Act 34 of 2008.

²⁵⁵ Long title of the National Energy Act.

²⁵⁶ Section 3 of the National Energy Act.

framework for the expansion of renewable energy. Third, socio-economic pressures have positioned renewable energy as a viable instrument for realising socio-economic transformation. These findings reinforce the notion that renewable energy is not only a response to environmental concerns but also a critical vehicle for achieving the NDP's objectives.

The chapter further analysed the institutional dynamics surrounding the transition, focussing on the respective roles of Eskom and IPPs. While Eskom remains central to the energy sector, its operational and financial constraints continue to hamper the effective implementation of energy reforms. In contrast, the increasing role of IPPs, particularly through the REIPPPP, has introduced and accelerated the deployment of renewable technologies. This shift signals a move towards a more decentralised and pluralistic energy system. Collectively, the chapter suggests that renewable energy deployment in South Africa holds substantial potential to contribute meaningfully to the realisation of the NDPs objectives. However, the extent of this contribution remains contingent upon the resolution of persistent challenges, including institutional constraints.

Building upon the foundations laid in this chapter, the next chapter will undertake a focussed examination of the core objectives of the NDP. The objectives to be discussed are the elimination of poverty, the reduction of inequality and the creation of employment. The chapter will further explore the impact renewable energy will have on these specific objectives.

Chapter 3 AN OVERVIEW OF THE NDP, ITS OBJECTIVES AND THE LEGAL FRAMEWORK FOR RENEWABLE ENERGY IN SOUTH AFRICA

3.1 *Introduction*

This chapter explores the historical development of the NDP, its core objectives and how it envisions the use of strategic sectors like the energy sector as levers to achieve its goals. Central to the NDP are two overarching and interrelated objectives: the elimination of poverty and the reduction of inequality by 2030, which will be the main points of discussion in this research report. The chapter traces the evolution of national development policy from the RDP and GEAR, culminating in the formulation of the NDP. It then unpacks the structural causes and contemporary manifestations of inequality and poverty in South Africa, drawing attention to the enduring legacy of apartheid. In addition, the chapter discusses the interconnectedness of inequality and poverty. As such, reducing inequality is not only a developmental goal in its own right but also a strategic enabler of poverty eradication. In addition, the chapter critically examines the role of energy and specifically renewable energy as a key mechanism through which the NDP aims to address inequality and poverty. Finally, the chapter discusses the NDPs broader implementation framework, which includes building capabilities, enhancing the capacity of the state and promoting inclusive leadership and partnerships.

3.2 *Background*

In 2012 the African National Congress and the South African government implemented the National Development Plan (hereinafter NDP) as the foundation and framework for the country's future economic and socio-economic development strategy.²⁵⁷ The NDP is a plan for South Africa that aims to eradicate poverty and reduce inequality by 2030 through uniting South Africans, harnessing citizen potential, fostering an inclusive economy, building skills, and strengthening state

²⁵⁷ Zarenda *South Africa's National Development Plan and its implications for regional development* 1.

capacity with collaborative leadership to address complex challenges.²⁵⁸ Eradicating poverty²⁵⁹ and reducing inequality require the economy to grow at a faster pace and in a way that benefit all South Africans.²⁶⁰ The plan is intended to be a roadmap for ensuring a secure and prosperous future for South Africans, as outlined in the Constitution.²⁶¹ It envisions a South Africa where individuals feel free yet connected to one another, where all can reach their full potential, and opportunities are shaped by ability, education and effort rather than birth.²⁶² Achieving this vision will require economic transformation and targeted efforts to strengthen the country's capacities.²⁶³

The NDP is serving as a general blueprint addressing diverse aspects of the country's socio-economic challenges in the context of its historical legacies, such as apartheid²⁶⁴ and an absence of socio-political transformation, while responding to contemporary global challenges such as climate change and technological disruptions. Climate change has emerged as a pressing concern in South Africa. The effects of climate change are already evident in South Africa and will intensify with increasing global temperatures albeit the severity of these effects will depend on future emission levels.²⁶⁵ Rising temperatures have an impact on occupational settings, particularly in the mining, agricultural and outdoor service sectors.²⁶⁶ The consequences, including observable mortality rates, are exacerbated for individuals residing in informal settlement²⁶⁷ where homes are frequently built from sheets of

²⁵⁸ NPC: National Development Plan 1.

²⁵⁹ In the same vein the Reconstruction and Development Programme, 1994 stated that "No political democracy can survive and flourish if the mass of our people remains in poverty, without land, without tangible prospects for a better life. Attacking poverty and deprivation must therefore be the first priority of a democratic government."

²⁶⁰ NPC: National Development Plan 1.

²⁶¹ The Constitution requires that "we must build a united and democratic South Africa, able to take its rightful place as a sovereign state in the family of nations."

²⁶² NPC: National Development Plan 24.

²⁶³ NPC: National Development Plan 1.

²⁶⁴ The NDP acknowledges that historical legacies left by apartheid are still affecting the nation despite the progress and success of the transition.

²⁶⁵ Johnston et al. *Climate Change Impacts in South Africa* 3.

²⁶⁶ Chersich and Wright 2019 *Globalization and Health* 2.

²⁶⁷ Informal settlements are a visible manifestation of economic inequality and poverty because they are primarily inhabited by people who cannot afford adequate housing often due to low income, unstable employment

corrugated iron.²⁶⁸ The effects of climate change are potentially leading to substantial impacts that are disproportionately affecting the poor.²⁶⁹ There is a potential that food production will decrease and access to clean water will be limited,²⁷⁰ threatening food security.

The NDP emphasises the need for South Africa to transition to a low-carbon economy, ensuring that the country meets its international climate commitments²⁷¹ while promoting inclusive economic growth. This shift requires a focus on sustainable resource management, green technologies²⁷² and renewable energy deployment to reduce the nation's reliance on fossil fuels. It acknowledges that addressing climate change is not merely an environmental concern but a developmental imperative. Against this backdrop the NDP states that in the short term, policy must swiftly and effectively address environmental protection and reduce the impacts of climate change.²⁷³ In the long term, with ambitious strategies and strong international partnerships, South Africa can navigate the shift to a low-carbon economy in line with government commitments, while safeguarding jobs and maintaining competitiveness.²⁷⁴

3.3 *The historical development of the NDP*

The NDP is the most recent in a series of strategies that began with the Reconstruction and Development Programme (RDP) in 1994.²⁷⁵ After the end of apartheid in 1994 South Africa implemented the RDP as its initial policy framework. It

²⁶⁸ Naicker *et al.* Indoor 2017 *Int J Environ Res Public Health* 2.

²⁶⁹ The existing inequalities in South Africa will probably be exacerbated by climate change, which might lead to food insecurity and water scarcity; NDP Page 33.

²⁷⁰ NPC: National Development Plan.

²⁷¹ South Africa is bound by several international commitments to reduce greenhouse gas (GHG) emissions, many of which stem from global climate agreements and frameworks. One of these international agreements is the Paris Agreement, adopted under the United Nations Framework Convention on Climate Change (UNFCCC), which is the most significant international climate accord. South Africa is a signatory and has committed to: Limiting global warming to well below 2°C, with efforts to cap the increase at 1.5°C above pre-industrial levels, and submitting a Nationally Determined Contribution (NDC), which outlines the country's specific targets for reducing GHG emissions. South Africa's NDC includes a commitment to peak emissions between 2020 and 2025, plateau them for a decade, and then begin to decline by 2035.

²⁷² Green technologies broadly refer to environmentally friendly or clean technologies that include various innovations designed to reduce the ecological footprint of human activities.

²⁷³ NPC: National Development Plan 48.

²⁷⁴ NPC: National Development Plan 48.

²⁷⁵ Naidoo and Maré 2015 *Politikon* 407.

was aimed at addressing inequalities and promoting economic growth.²⁷⁶ The RDP was a comprehensive socio-economic policy framework aimed at uniting the nation's people and resources to eliminate the effects of apartheid and build a democratic, non-racial and non-sexist society.²⁷⁷ The RDP White Paper outlined various transformation priorities for South Africa's first democratically elected government, ranging from improving service delivery to reforming the public service.²⁷⁸ Central to the RDP's policy approach was the focus on meeting basic needs and addressing social and economic challenges like access to water, housing, electricity, healthcare and education.²⁷⁹ While it touched on economic policy, it did not position itself as a macroeconomic framework, instead suggesting that a separate White Paper on macroeconomic policy should follow.²⁸⁰

In the early 2000s the RDP was replaced by the Growth, Employment, and Redistribution (GEAR) strategy. GEAR, introduced two years after the RDP, is often seen as a pivotal shift in South Africa's economic policy, marking a move from ambitious redistribution goals to a more neoliberal approach.²⁸¹ However, the government maintained that the two policies were meant to complement each other, asserting that the success of the RDP relied on the effective implementation of GEAR.²⁸² Officially GEAR was framed as a more targeted and enabling macroeconomic strategy designed to support the RDP's social and economic transformation goals.²⁸³ It was intended to attract investment by showcasing a "credible" and "orthodox" policy framework.²⁸⁴ Consequently GEAR was not seen as replacing the RDP but rather as a tool to help it to achieve its objectives.²⁸⁵

²⁷⁶ Moyo and Mamobolo 2014 *Journal of Public Administration* 948.

²⁷⁷ African National Congress The Reconstruction and Development Programme (RDP) 1994.

²⁷⁸ Naidoo and Maré 2015 *Politikon* 409.

²⁷⁹ South Africa's history was marked by racism, apartheid and segregation across areas such as health, welfare, transport and employment. In response to this legacy, the RDP policy was designed to address and rectify the injustices of the past.

²⁸⁰ Naidoo and Maré 2015 *Politikon* 409.

²⁸¹ Marais *South Africa Limits to Change: The Political Economy of Transitions* 170.

²⁸² Manuel *Budget Speech* 1.

²⁸³ Naidoo and Maré 2015 *Politikon* 411.

²⁸⁴ Gelb "Macroeconomic Policy in South Africa: From RDP Through GEAR to AsgiSA" 17–28.

²⁸⁵ Department of Finance: Growth, Employment and Redistribution: A Macroeconomic Strategy (1996).

The Accelerated and Shared Growth Initiative for South Africa (ASGISA), introduced around 2005, aimed to raise the growth rate to about 6% and “halve poverty and unemployment” by 2014, primarily through infrastructure investment, industrial support and targeted interventions for the second economy.²⁸⁶ ASGISA identified binding constraints such as inadequate infrastructure, skills shortages and regulatory bottlenecks, and placed strong emphasis on large-scale public investment in transport, logistics, and network industries as a stimulus for growth and employment.²⁸⁷

However, academic evaluations highlight that ASGISA largely continued a growth-first, macro-stability-oriented paradigm inherited from GEAR, with relatively weak structural transformation, limited progress in reducing inequality and persistent energy-sector vulnerabilities.²⁸⁸ Infrastructure spending under ASGISA did not fundamentally alter the carbon-intensive structure of the economy; Eskom’s capacity expansion centred on new coal-fired megaprojects such as Medupi and Kusile, deepening dependence on coal and entrenching future emissions.²⁸⁹ Weak implementation, fragmented coordination and institutional instability meant that ASGISA’s ambitions on inclusive growth and job creation were only partially realised, and the initiative faded without achieving its headline targets.²⁹⁰

The New Growth Path (NGP), launched in 2010/2011, explicitly framed employment creation as the central objective and proposed to generate about five million jobs by 2020, with a strong emphasis on job-rich sectors including infrastructure, manufacturing, agriculture, and the green economy.²⁹¹ Unlike GEAR, the NGP

²⁸⁶ AsgiSA 2008 Agsi
https://www.gov.za/sites/default/files/gcis_document/201409/asgisa2008.pdf#:~:text=2008%201,unemployment%20between%202004%20and%202014.

²⁸⁷ ²⁸⁷ AsgiSA 2008 Agsi
https://www.gov.za/sites/default/files/gcis_document/201409/asgisa2008.pdf#:~:text=2008%201,unemployment%20between%202004%20and%202014.

²⁸⁸ McGrath and Akoojee 2007 International Journal of Educational Development 8.

²⁸⁹ Nhleko et al 2023 Management and Economics Research Journal 5.

²⁹⁰ Nhleko et al 2023 Management and Economics Research Journal 5.

²⁹¹ New Growth Plan
https://www.gov.za/sites/default/files/NGP%20Framework%20for%20public%20release%20FINAL_1.pdf#:~:text=The%20strategy%20sets%20out%20critical,and%20collective%20efforts%20of%20all.

foregrounded industrial policy, state coordination and social dialogue, and it recognised opportunities in renewable energy, energy efficiency and related value chains as potential drivers of green industrialisation and employment.²⁹² The NGP thus begins to mainstream the idea that energy and infrastructure policy must not only secure supply and support growth but also catalyse structural transformation and green jobs, opening normative and policy space for renewable energy programmes such as REIPPPP.

At the same time, academic critics argue that the NGP was conceptually inconsistent and institutionally weak. It retained many assumptions from previous macro-economic frameworks, while layering ambitious job-creation and green-economy targets onto an economy still dominated by minerals-energy interests; it was also criticised for vagueness, over-optimistic employment numbers and insufficient clarity about the division of responsibilities across departments and state-owned entities.²⁹³ In practice the NGP had a very short policy “shelf life” , being rapidly overshadowed by the NDP, and many of its proposals did not translate into coherent, cross-government implementation.

The NDP does not arise in a vacuum; it explicitly builds on earlier strategies while seeking to correct their limitations. Conceptually, it retains the concern with growth, employment and macro-stability found in GEAR and ASGISA, and the focus on infrastructure, industrial policy and green-economy opportunities seen in the NGP. Chapter 3 of the NDP acknowledges the need to address structural constraints identified in ASGISA—such as infrastructure backlogs, skills and institutional weaknesses—while also taking forward NGP themes of job-rich and green growth, including investment in a diversified, low-carbon energy mix.

The NDP emerged in response to the limitations of previous policies, aiming for a more comprehensive and inclusive development path. In 2009 the Minister in the

²⁹² https://www.gov.za/sites/default/files/NGP%20Framework%20for%20public%20release%20FINAL_1.pdf#:~:text=The%20strategy%20sets%20out%20critical,and%20collective%20efforts%20of%20all

²⁹³ Meyer 2013 African Journal of Public Affairs 7.

Presidency at the time released the Green Paper, National Strategic Planning, in which he argued that the nation's progress depended not only on short-term programmes implemented since 1994 but also on the development of a long-term strategy.²⁹⁴ The Green Paper suggested establishing the National Planning Commission (hereinafter NPC) to develop a long-term plan spanning roughly 15 years.²⁹⁵ The Commission was to be composed of independent leaders and experts who could critically evaluate South Africa's democratic progress and propose evidence-based policies aimed at long-term development.²⁹⁶ To inform its work the NPC initiated a study to explore the factors behind South Africa's achievements and failures since 1994.²⁹⁷ The findings were compiled into a Diagnostic Overview²⁹⁸ which highlighted nine key challenges the country needed to address to solidify the achievements of democracy.²⁹⁹ Consequent to an extensive process of investigation the plan emerged with 13 key topics and 15 chapters. Each of the 13 key topics has its objectives supported by 119 specific actions, and beyond that two overarching objectives of reducing inequality and eliminating poverty were established.³⁰⁰

The NDP emphasised three priority areas to accomplish these objectives: fostering employment through accelerated economic growth, enhancing education and skills development, and strengthening the state's capacity to address developmental challenges.³⁰¹ The NDP builds on the lessons from the failure to meet key development goals³⁰² and integrates them into a broader framework that touches upon institutional reforms, human development, and sustainable growth.

South Africa has achieved significant progress in its transition from apartheid to democracy, which has been a peaceful shift despite the nation's history of violence and dispossession.³⁰³ The country transitioned to democracy after the end of

²⁹⁴ Schaling, Horne and Hobbs J *National development plan: The outlook in 2016*.

²⁹⁵ Schaling, Horne and Hobbs J *National development plan: The outlook in 2016*.

²⁹⁶ The Presidency: Green Paper: National Strategic Planning (September 2009).

²⁹⁷ Schaling, Horne and Hobbs J *National development plan: The outlook in 2016*.

²⁹⁸ The diagnostic document sought to highlight the key challenges facing the country and analyze their root causes. It is not a plan in itself but serves as a foundation for developing one.

²⁹⁹ National Planning Commission *Diagnostic Overview*.

³⁰⁰ This required ensuring that individuals earned at least R419 per month (in 2009 prices) by the 2030 deadline — at the time of the plan's publication, approximately 39% of the population lived below this threshold.

³⁰¹ Schaling, Horne and Hobbs J *National development plan: The outlook in 2016*.

³⁰² National Planning Commission *Diagnostic Overview*.

³⁰³ NPC: National Development Plan 24.

apartheid in 1994, but significant inequalities among racial groups linger, leaving the country as one of the most unequal in the world.³⁰⁴ The NDP was shaped by this historical context and the recognition that deeper structural reforms were necessary. Consequently, reducing poverty and addressing inequality has become central to the nation's democratic ethos.³⁰⁵

From a critical perspective, scholars note that the NDP still reflects tensions between an extractivist, export-oriented growth model and the imperative of deep structural transformation, including a rapid energy transition. While it recognises renewables and a just transition, implementation has often lagged, and coal-centric decisions (such as slow reforms at Eskom, delayed procurement, and initial reluctance to fully restructure the utility) have undermined the NDP's own low-carbon and inequality-reduction aspirations. In this sense, ASGISA and the NGP can be read as part of a pattern: successive strategies articulate developmental ambitions and, increasingly, green-economy rhetoric, but struggle to shift the underlying political-economy of the minerals-energy complex and associated institutional arrangements.

3.4 *The objectives of the NDP*

The main objectives of the NDP are to eliminate poverty and reduce inequality by uniting South Africans of all races and classes around a common goal.³⁰⁶ Although the NDP encompasses a broad set of objectives, particular emphasis will be placed on eliminating poverty and reducing inequality by 2030. This research focuses exclusively on these two objectives, given the urgent need to address the socio-economic marginalisation affecting the population of South Africa particularly in the context of climate change and the deployment of renewable energy in the transition to a more sustainable economy. Poverty and inequality are closely interrelated, often reinforcing one another, yet they are conceptually distinct phenomena.³⁰⁷

³⁰⁴ Mtapuri and Tinarwo 2021 *Southern African Journal of Demography* 106.

³⁰⁵ Hundenborn, Leibbrandt and Woolard *Drivers of Inequality in South Africa* 8.

³⁰⁶ NPC: National Development Plan 24.

³⁰⁷ Bundy 2020 *Oxford research encyclopedia of African history* 2.

3.4.1 Inequality in South Africa

Inequality refers to the uneven distribution of income, resources and opportunities within a population.³⁰⁸ South Africa's inequality has its roots in its colonial and apartheid past.³⁰⁹ The apartheid regime institutionalised racial segregation and discrimination, resulting in a deeply divided society in which black South Africans were systematically marginalised from access to economic resources, quality education and land ownership.³¹⁰ The advent of democratic governance in 1994 marked a pivotal moment in South Africa's history, accompanied by a commitment to promoting equal opportunities and improving the socio-economic conditions of the majority of the population.³¹¹ Formal democracy initially inspired optimism regarding the reduction of inequality; however evidence indicates that although certain dimensions of inequality have gradually shifted overall inequality has in fact deepened in the post-apartheid era.³¹² Although numerous policy measures have been implemented since 1994, including the provision of social grants, structural barriers still persist and continue to hinder meaningful progress in reducing inequality.³¹³

The fight against apartheid was fundamentally aimed at building a non-racial, non-sexist democratic society where all individuals have equal rights.³¹⁴ At present the aspirational ideals of the Constitution stand in contrast to the persistent reality of racialised poverty, as well as profound social and economic inequalities.³¹⁵ In many ways South Africa has made significant progress in overcoming its history, but the country remains the same as it was in 1994.³¹⁶ Three decades on, South Africa is a deeply divided society³¹⁷ with racial disparities still prominently shaping its social and economic landscape. South Africa stands as the epitome of paradox, being one of the most unequal countries in the world while being home to one of the most

³⁰⁸ Bundy 2020 *Oxford research encyclopedia of African history* 2.

³⁰⁹ Kakwata "Perspective Chapter" 1.

³¹⁰ Kakwata "Perspective Chapter" 1.

³¹¹ Hundenborn, Leibbrandt and Woolard *Drivers of Inequality in South Africa* 1.

³¹² McKeever 2024 *Sociology Compass* 2.

³¹³ Díaz Pabon *et al.* 2021 *The British Journal of Sociology* 118.

³¹⁴ NPC: National Development Plan 35.

³¹⁵ Albertyn 2019 *Development Southern Africa* 754.

³¹⁶ Schaling, Horne and Hobbs J *National development plan: The outlook in 2016*

³¹⁷ NPC: National Development Plan 35.

progressive Constitutions in the world.³¹⁸ During apartheid inequality in South Africa was not only political but also economic, manifesting in inequalities in income and wealth.³¹⁹

The South African Constitution envisions a unified, thriving, inclusive society that is free from racial and gender discrimination, where all citizens share equal ownership and embrace diversity.³²⁰ It necessitates the pursuit of equality by safeguarding it as an enforceable constitutional right³²¹ and a fundamental principle that supports the nation's constitutional democracy.³²² The Constitution places the right to equality at its core as a fundamental right.³²³ Its significance is evident in the first section of the Constitution, which states that achieving equality is one of the founding values of the Republic.³²⁴ The constitutional devotion to equality stems from the country's history of inequality and injustice.³²⁵ Under the former apartheid government, segregation and apartheid policies systematically excluded black people from the social, political, and economic spheres.³²⁶ Consequently, the attainment of equality became an integral part of building a new democratic South Africa going forward.

South Africa is characterised by extreme income and wealth inequality. One of the most significant consequences of apartheid was its contribution to the severe economic inequality among racial groups in South Africa.³²⁷ Income inequality stems from the socio-economic imbalances imposed by apartheid, which hindered education and skills development, limiting labour market participation and trapping most of the population in poverty.³²⁸ South Africa has one of the highest Gini coefficients recorded globally, reflecting profound income disparities.³²⁹ The

³¹⁸ Francis and Webster 2019 *Development Southern Africa* 788.

³¹⁹ Mtapuri and Tinarwo 2021 *Southern African Journal of Demography* 107.

³²⁰ Preamble of the Constitution.

³²¹ Section 9 of the Constitution.

³²² Maseko *Chapter 8: Equality* 310.

³²³ Deane and Brijmohanlall 2003 *Codicillus* 93.

³²⁴ The Republic of South Africa is a unified, sovereign, and democratic state built upon the following core values:

(a) Respect for human dignity, the pursuit of equality, and the promotion of human rights and freedoms.

³²⁵ Deane and Brijmohanlall 2003 *Codicillus* 93.

³²⁶ Deane and Brijmohanlall 2003 *Codicillus* 93.

³²⁷ Keswell "Education and racial inequality in post-apartheid South Africa" 83.

³²⁸ NPC: National Development Plan 354.

³²⁹ Díaz Pabon *et al.* 2021 *The British Journal of Sociology* 108.

distribution of wealth is similarly unequal, with the wealthiest 10% controlling nearly 85% of the nation's wealth, whereas the poorest 20% possess less than 3%.³³⁰ The current distribution of wealth and income is deeply rooted in historical factors that date back centuries.³³¹ The gap between the rich and the poor has widened, with a small percentage of the population holding most of the wealth while a significant portion struggles to meet basic needs. Inequalities in wealth and income, both domestically and globally, pose a threat to social cohesion, economic growth and political stability.³³² Income inequality represents only a partial view of the overall inequality in South Africa while wealth inequality offers a more accurate depiction of societal inequality.³³³ Income inequality is linked to various challenges that are faced daily in society such as health and social issues, life expectancy and educational outcomes, among others.³³⁴

Inequality still manifests in multiple dimensions nearly 31 years after democracy. as the country faces declining economic growth, escalating unemployment and persistently high levels of both income and wealth inequality.³³⁵ Elevated unemployment levels, especially among black South Africans, are a key driver of economic inequality. The informal economy continues to provide substantial employment opportunities; however, it is characterised by low pay and minimal access to social protection.³³⁶ Social inequality in South Africa is largely driven by limited access to quality education, essential services and sustainable employment opportunities.³³⁷ Apartheid Bantu education policies divided the privileged white minority and the marginalised black community,³³⁸ a legacy that endures in historically disadvantaged communities where inadequate infrastructure and limited resources remain prevalent. Spatial planning enforced residential segregation,

³³⁰ Van der Merwe *et al.* "A Fair Share: Reflecting Essays on Economic Inequality in South Africa" 5.

³³¹ Dollery *A history of inequality in South Africa, 1652-2002* 14.

³³² NPC: National Development Plan 78.

³³³ Valodia 2023 <https://www.wits.ac.za/news/latest-news/opinion/2023/2023-09/south-africa-cant-crack-the-inequality-curse-why-and-what-can-be-done.html>.

³³⁴ Wilkinson and Pickett *The Spirit Level: Why Equality is Better for Everyone* 29.

³³⁵ Van der Merwe *et al.* "A Fair Share: Reflecting Essays on Economic Inequality in South Africa" 42.

³³⁶ Olawuyi, Mushunje and Eyinade 2024 *Journal of Infrastructure, Policy and Development* 6.

³³⁷ Kakwata "Perspective Chapter" 1.

³³⁸ Kakwata "Perspective Chapter" 4.

relegating many black South Africans to underdeveloped townships and remote rural areas with limited access to essential services.³³⁹

The RDP was fundamentally intended to transform South African society from one characterised by apartheid-era discrimination and inequality into one founded on the principles of freedom, equality and shared economic prosperity.³⁴⁰ In contrast, the GEAR strategy viewed slow economic growth as the primary concern and prioritised macroeconomic stability over broader social and developmental objectives.³⁴¹ The NDP represents a shift in South Africa's development approach³⁴² emphasising inclusive growth and the eradication of poverty and inequality by 2030. It seeks to reduce inequality through a comprehensive strategy that addresses the socio-economic imbalances inherited from the apartheid era. A specific target is set for the Gini coefficient, a commonly used measure of income inequality, which is that it should decrease from its current level of 0.69 to 0.6.³⁴³ Emphasis is placed on the importance of establishing a robust and adaptable network of economic infrastructure capable of supporting the country's medium and long-term development goals.³⁴⁴

3.4.2 Poverty in South Africa

Poverty is generally understood as the inability to satisfy basic needs such as shelter and subsistence.³⁴⁵ Poverty in South Africa has deep historical roots, with its prevalence being particularly pronounced during the apartheid era, when the black majority was systematically excluded from meaningful participation in the country's economic activities.³⁴⁶ Present-day factors, particularly the perpetual periods of low economic growth, have also played a significant role, as the economy has failed to produce the level of resources required to effectively address and reduce poverty.³⁴⁷

³³⁹ Shahaboonin, David, and Van Wyk 2023 *International Journal of Economics and Financial Issues* 102.

³⁴⁰ Moyo and Mamobolo 2014 *Journal of Public Administration* 953.

³⁴¹ Moyo and Mamobolo 2014 *Journal of Public Administration* 953.

³⁴² Moyo and Mamobolo 2014 *Journal of Public Administration* 946.

³⁴³ NPC: National Development Plan 34.

³⁴⁴ NPC: National Development Plan 160.

³⁴⁵ Sen "*Development as Freedom*" 20.

³⁴⁶ Matyana and Thusi 2023 *International Journal of Development and Sustainability* 217.

³⁴⁷ Arvanitakis and Hornsby *South Africa's Cycle of Poverty* 1.

Poverty can be understood as a lack of socio-economic capabilities, encompassing various dimensions such as insufficient income, limited access to basic services, and the inadequate ownership of assets, among other things.³⁴⁸ Myrdal conceptualises poverty as the result of cumulative and reinforcing factors³⁴⁹ with inequality playing a significant role in contributing to unemployment and intensifying the visibility and persistence of poverty.³⁵⁰

Despite being classified as an upper middle income country (UMIC)³⁵¹ and possessing substantial natural and economic resources, South Africa continues to grapple with high levels of poverty.³⁵² The country's classification as an UMIC fails to account for two crucial dimensions of poverty; high levels of income equality and persistently elevated unemployment rates.³⁵³ The challenges associated with poverty in South Africa are inherently dynamic, with some individuals moving in and out of poverty while others remain entrenched in chronic deprivation.³⁵⁴ Addressing this complexity continues to be a significant challenge for the government, particularly in terms of allocating adequate resources.³⁵⁵ South Africa has made extensive use of social grants as a key mechanism for poverty alleviation,³⁵⁶ establishing one of the most expansive and comprehensive social assistance systems in the developing world.³⁵⁷ Amid persistently high levels of poverty, social grants have played a critical role in sustaining the lives of the most vulnerable parts of the population.³⁵⁸

Despite the limited progress that has been made towards eliminating poverty, it remains persistent. In 2024 roughly 13,2 million people in South Africa were still living in extreme poverty and the projections indicate that this figure will continue to

³⁴⁸ Mokgala *An institutional framework for sustainable rural development aimed at addressing poverty in South Africa: selected cases* 8.

³⁴⁹ Myrdal *Asian Drama: An Enquiry into the Poverty of Nations* 38.

³⁵⁰ Motloutung and Mears 2002 *Development Southern Africa* 532.

³⁵¹ South Africa is formally classified as an upper middle-income country (UMIC) based on the United Nations criteria which rely solely on a nation's average gross national income per capita.

³⁵² ACFS <https://www.acfs.org.za/impact-of-poverty-in-south-africa/>.

³⁵³ National treasury <http://idc.treasury.gov.za/Newsletters/News%20Issue%205.pdf>.

³⁵⁴ Kruger *Investigating transitory and chronic poverty in South Africa, 2008-2015* 19.

³⁵⁵ Kruger *Investigating transitory and chronic poverty in South Africa, 2008-2015* 19.

³⁵⁶ Miyajima 2024 *International Review of Applied Economics* 706.

³⁵⁷ Goldblatt 2005 *Politikon* 239.

³⁵⁸ Miyajima 2024 *International Review of Applied Economics* 706.

rise by 2030.³⁵⁹ The concentration of poverty in South Africa is particularly in rural areas,³⁶⁰ among black South Africans, the less educated, the unemployed, female-headed households, large families and children.³⁶¹ It is heavily concentrated in historically disadvantaged areas, particularly in the former homelands-areas designated along ethnic lines for black South Africans under apartheid.³⁶² The poverty in the country remains closely tied to both historical and ongoing racial disparities.³⁶³ Significant differences in poverty rates persist across racial groups with a smaller percentage of white South Africans classified as less poor in contrast to a higher percentage of black South Africans.³⁶⁴

Addressing poverty has been a central focus of government policy since the country's first democratic elections.³⁶⁵ This commitment is evident in the policies implemented in South Africa, starting with the adoption of the RDP and later the NDP.³⁶⁶ The NDP plans to eliminate income poverty by reducing the proportion of households with a monthly income below R419 per person (in 2009 prices) from 39% to zero.³⁶⁷ Income poverty in South Africa is measured using three national poverty lines that are updated annually to reflect inflation and the cost of living.³⁶⁸ These include the Food Poverty Line (FLP), which as of 2025 is R796³⁶⁹ per person per month, representing the minimum amount needed for basic nutrition. The Lower Bound Poverty Line (LBPL) is at R1,109 per person per month, representing food plus essential non-food items.³⁷⁰ Lastly, the Upper Bound Poverty Line (UBPL) stands at R1,634 per person per month, covering food plus average non-food items for households at the food

³⁵⁹ Statista 2025 <https://www.statista.com/statistics/1263290/number-of-people-living-in-extreme-poverty-in-south-africa/>.

³⁶⁰ Aliber 2003 *World development* 480.

³⁶¹ Sulla and Zikhali *Overcoming Poverty and Inequality in South Africa* 1.

³⁶² Sulla and Zikhali *Overcoming Poverty and Inequality in South Africa* 1.

³⁶³ Chauke and David 2025 *African Journal of Science, Technology, Innovation and Development* 318.

³⁶⁴ Chauke and David 2025 *African Journal of Science, Technology, Innovation and Development* 318.

³⁶⁵ Mokgala *An institutional framework for sustainable rural development aimed at addressing poverty in South Africa: selected cases* 12.

³⁶⁶ Mokgala *An institutional framework for sustainable rural development aimed at addressing poverty in South Africa: selected cases* 12.

³⁶⁷ NPC: National Development Plan 34.

³⁶⁸ Business Tech 2024 <https://businesstech.co.za/news/lifestyle/788856/the-r30-a-day-line-in-south-africa-that-millions-cannot-cross/>.

³⁶⁹ PMBEJD *Household Affordability Index for April 2025* 2.

³⁷⁰ Stats SA *National Poverty Lines* 11.

poverty line level.³⁷¹ A significant measurement of poverty in South Africa is closely linked to the country's high levels of income inequality³⁷²

As of 2025 approximately 63,5% of South Africa's population is living in poverty, based on the upper middle income poverty line.³⁷³ This highlights the gravity of the situation, particularly in the light of the country's comparatively developed infrastructure and economic potential. Progress in poverty reduction has largely stagnated since 2011, a trend attributed to subdued economic growth, persistently high unemployment and structural inequalities.³⁷⁴ South Africa continues to grapple with stagnant economic growth, declining levels of investment and persistently high unemployment.³⁷⁵ Unemployment remains a critical socio-economic challenge for the government and is one of the primary drivers of poverty in the country.³⁷⁶

While these policies reflect the state's evolving strategic approach to poverty alleviation, they are underpinned by a deeper constitutional imperative. In its capacity as a transformative document, the South African Constitution explicitly recognises the need to address poverty as fundamental to building a just society. It enshrines specific provisions that ensure the social protection of its citizens.³⁷⁷ Section 27(1) of the Constitution, which is situated within the Bill of Rights, emphasises the right to access healthcare, food, water and social security.³⁷⁸ The Constitution commits the state to the progressive realisation of rights aimed at uplifting the most vulnerable and marginalised populations.

3.5 Constitutional and Environmental Legal Framework

3.5.1 Constitution

South Africa's Constitution and environmental laws create a strong legal basis for renewable energy as part of a sustainable, just development trajectory. Section 24

³⁷¹ Stats SA *National Poverty Lines* 11.

³⁷² Statista 2024 <https://www.statista.com/statistics/1127838/national-poverty-line-in-south-africa/>.

³⁷³ World Bank *South Africa* 1.

³⁷⁴ World Bank Group *South Africa Poverty and Equity Brief* 2.

³⁷⁵ Pasara and Garidzirai 2020 *Economies* 1.

³⁷⁶ Nkhumeleni, Stiegler and Ogujiuba 2022 *International Journal of Economics and Financial Issues* 95.

³⁷⁷ Mtapuri and Tinarwo 2021 *Southern African Journal of Demography* 114.

³⁷⁸ Section 27(1) of the Constitution.

guarantees “everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected” for current and future generations.³⁷⁹ This includes a duty to prevent pollution, conserve natural resources, and secure ecologically sustainable development while promoting “justifiable economic and social development.”³⁸⁰ In the energy context, this right has been read as imposing a duty on the state to avoid locking the country into a high-carbon, pollution-intensive electricity system and to consider climate impacts when authorising new coal-based capacity.³⁸¹ Importantly, the Section 24(a) right to a safe and healthy environment extends beyond control of immediate environmental harm and includes a duty to prevent actions or inactions that materially contribute to dangerous climate change.³⁸²

Youth-led climate litigation such as the African Climate Alliance (“Cancel Coal”) case³⁸³ illustrates how section 24 can be used to challenge further coal procurement on the basis that additional coal-fired power is incompatible with a safe climate and the environmental right. The case challenges the government's decision to procure 1500 MW of new coal-fired power, arguing that additional coal-fired power is incompatible with a safe climate and violates the section 24 environmental rights.³⁸⁴ The applicants in the case relied directly on Section 24(a) and related rights, including the rights to life, dignity, equality, and the best interests of the child, to argue that new coal-fired power plants would contribute to dangerous climate change and harm vulnerable groups, including children and future generations.³⁸⁵ In the recent Richards Bay gas power plant litigation brought by groundWork³⁸⁶ and others, the Supreme Court of Appeal set aside the environmental authorisation for a 3 000 MW gas-to-power project at Richards Bay. The court held that decision-makers had unlawfully failed to consider feasible renewable-energy alternatives and to

³⁷⁹ Section 24 of the Constitution.

³⁸⁰ Section 24 of the Constitution.

³⁸¹ Mcconnachie 2024 *Constitutional Court Review* 316

³⁸² Section 24(a) of the Constitution.

³⁸³ African Climate Alliance & Others v Minister of Mineral Resources and Energy & Others Case No: 56907/2021 (‘African Climate Alliance’).

³⁸⁴ African Climate Alliance para 2.

³⁸⁵ African Climate Alliance para 23.

³⁸⁶ Minister of Environmental Affairs v Trustees for the time being of Groundwork Trust and Others [2025] ZASCA 43; 2025 (4) SA 98 (SCA) (11 April 2025).

compare the social, environmental, technical and economic impacts of these options, with sustainable development as the overarching goal. It also criticised the inadequate assessment of cumulative upstream impacts (such as gas extraction and transport) and deficiencies in public participation. The court explicitly states that the “preferred alternative must be the final choice after comparing the social, environmental, technical, and economic impacts of all the considered options”, and that this comparison must be guided by sustainable development.

Section 152 sets out the objectives of local government, including providing democratic and accountable government, ensuring the provision of services in a sustainable manner, promoting social and economic development, and creating a safe and healthy environment.³⁸⁷ Section 153 requires municipalities to structure their budgets and administration to give priority to basic needs and to promote social and economic development.³⁸⁸ These provisions support a reading that municipalities must actively pursue cleaner, reliable and affordable electricity supply whether through their own procurement or through influencing national policy as part of their obligations to advance development and create a safe and healthy local environment. That logic dovetails with the NDP’s emphasis on inclusive, spatially just development and expansion of modern energy services to poor and marginalised communities.

3.5.1 National Environmental Management Act (NEMA)

The National Environmental Management Act (NEMA)³⁸⁹ codifies the sustainability imperative. It entrenches sustainable development as a guiding principle, requiring that development meet present needs without compromising ecological integrity or the ability of future generations to meet their needs.³⁹⁰ This principle directly supports shifting away from coal which imposes high cumulative climate, health and ecological costs towards renewables that have significantly lower lifecycle emissions and pollution profiles. South African courts treat sustainable development, climate change and consideration of cleaner alternatives as legally required components of lawful, developmentally sound decision-making in the energy space. This is

³⁸⁷ Section 152 of the Constitution.

³⁸⁸ Section 153 of the Constitution.

³⁸⁹ National Environmental Management Act 107 of 1998.

³⁹⁰ Section 2 of NEMA.

evidenced in the Fuel Retailers case. In *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Mpumalanga*,³⁹¹ the Constitutional Court held that environmental authorities must consider whether a proposed development is socially, economically and environmentally sustainable when granting authorisation, and that this obligation flows from section 24 of the Constitution and NEMA's section 2 principles.³⁹² The Court rejected the idea that "need and desirability" and socio-economic implications could be left entirely to town-planning processes, stressing that environmental decision-makers must integrate socio-economic and environmental factors under the banner of sustainable development.³⁹³

Its preamble links environmental harm to poverty and inequality, recognising that "inequality in the distribution of wealth and resources... are among the important causes as well as the results of environmentally harmful practices".³⁹⁴ NEMA requires that adverse environmental impacts must not be distributed in a manner that unfairly discriminates against vulnerable or disadvantaged persons and that these groups must not bear a disproportionate share of negative environmental consequences.³⁹⁵ Coal combustion has long generated severe local air-quality and health burdens in communities around power stations and coal mines, which are typically poor and historically marginalised.³⁹⁶ Prioritising renewable energy, including community- and municipal-scale projects, can reduce this inequitable burden and address what scholars describe as "energy and environmental injustice" in South Africa's coal belt.³⁹⁷

3.6 The interplay between renewable energy, inequality and poverty

South Africa faces a profound paradox: despite high electrification rates exceeding 90%, approximately 40% of the population remains trapped in energy poverty, and

³⁹¹ *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province and Others* (CCT67/06) [2007] ZACC 13; 2007 (10) BCLR 1059 (CC); 2007 (6) SA 4 (CC) (7 June 2007).

³⁹² *Fuel Retailers* para 62.

³⁹³ *Fuel Retailers* para 86.

³⁹⁴ Preamble of NEMA.

³⁹⁵ Section 2(4)(c) of NEMA.

³⁹⁶ Cole *et al* 2022 *Journal of the Southern African Institute of Mining and Metallurgy* 637.

³⁹⁷ Cole *et al* 2022 *Journal of the Southern African Institute of Mining and Metallurgy* 637.

this energy deprivation intersects fundamentally with multidimensional poverty and pervasive inequality.³⁹⁸ Similarly, multidimensional poverty encompasses deprivations in education, health, employment, housing, water, sanitation and nutrition, each of which is fundamentally linked to energy availability and affordability. Energy poverty extends far beyond the absence of grid connection; it encompasses the inability to afford sufficient energy for basic needs, reliance on inefficient and polluting energy sources, lack of access to modern energy services and an inadequate quality of energy provision.³⁹⁹ The country grapples with an official unemployment rate exceeding 34%, extreme income inequality measured by a Gini coefficient of 0.63, and poverty rates affecting nearly 40% of the population. These levels have not been witnessed for over a decade.⁴⁰⁰ Research demonstrates compelling interlinkages: approximately 96% of those without electricity also lack access to clean cooking fuel, nearly half of the energy-poor experience malnourishment in their households, and close to half have experienced child mortality, indicating energy poverty to be both a symptom of and a driver of deep deprivation.⁴⁰¹ The renewable energy transition, far from being merely an environmental imperative, represents a critical pathway through which South Africa can simultaneously address energy insecurity, economic stagnation and the interconnected challenges of poverty and inequality.

Research utilising the multidimensional energy poverty index reveals that South African low-income households, particularly those in rural areas, face severe deprivation across multiple dimensions.⁴⁰² The poorest income quintile dedicates approximately 27% of household expenditure to energy, compared to 14% on average across all households, creating a severe burden that constrains resources available for food, healthcare and other essentials.⁴⁰³ Furthermore, energy poverty manifests differently across geographies: rural households spend significantly more on energy relative to income, while poor urban households in informal settlements

³⁹⁸ Ye and Koch 2023 *Energy Research & Social Science* 1.

³⁹⁹ Tshabalala, Davies and Mohlakoana 2025 *Environmental Research: Energy* 11.

⁴⁰⁰ IRENA *Socio-economic footprint of the energy transition: South Africa* 23.

⁴⁰¹ Alkire, Kanagaratnam and Vollmer *Interlinkages between multidimensional poverty and electricity* 6.

⁴⁰² Olawumi Israel-Akinbo, Snowball and Fraser 2018 *South African journal of economics* 469.

⁴⁰³ South *Poverty and Gender in Urban South Africa Sustainable Energy Africa* 11.

lack reliable access despite the existence of physical grid connections.⁴⁰⁴ Renewable energy, particularly decentralised energy like solar home systems and microgrids, is presented as a way to extend energy access to areas where grid expansion is difficult or costly.⁴⁰⁵

Reducing inequality has been found to exert a stronger pronounced influence on poverty reduction than economic growth.⁴⁰⁶ This is due to the fact that when inequality is high, the benefits of growth tend to be concentrated among the wealthier parts of society, thereby diminishing its overall effectiveness in alleviating poverty. Although economic growth remains a vital component of development, its benefits are frequently distributed unequally, which can intensify existing inequalities.⁴⁰⁷ Such uneven distribution constrains the capacity of growth to serve as an effective tool for poverty reduction.⁴⁰⁸ In an UMIC like South Africa, economic growth may exacerbate inequality, suggesting that income level influences the nature of the growth inequality dynamic.⁴⁰⁹ Inequality not only weakens the poverty-reducing effects of growth but also adversely affects the overall rate and sustainability of economic expansion.⁴¹⁰ The importance of reducing inequality is paramount in understanding and addressing poverty⁴¹¹ because poverty does not exist in isolation. It is often a result of unequal access to resources, opportunities and services.

Consistently with this, the NDP identifies the dual imperatives of reducing inequality and eliminating poverty as central to South Africa's long-term developmental vision. These objectives are not pursued in isolation; rather the NDP recognises their interconnectedness and the necessity of addressing both simultaneously to achieve inclusive and sustainable growth. By addressing both inequality and poverty concurrently the NDP aims to break the cycle of exclusion and deprivation that has

⁴⁰⁴ South *Poverty and Gender in Urban South Africa Sustainable Energy Africa* 11.

⁴⁰⁵ Tshabalala, Davies and Mohlakoana 2025 *Environmental Research: Energy* 11.

⁴⁰⁶ Bergstrom *The role of inequality for poverty reduction* 1.

⁴⁰⁷ Oktay and Algan 2022 *Journal of the Human and Social Science Researches* 695.

⁴⁰⁸ Oktay and Algan 2022 *Journal of the Human and Social Science Researches* 695.

⁴⁰⁹ Oktay and Algan 2022 *Journal of the Human and Social Science Researches* 695.

⁴¹⁰ Espoir and Ngepah 2021 *GeoJournal* 2608.

⁴¹¹ Ivins *Inequality matters: BRICS inequalities fact sheet*. BRICS Policy Center, Oxfam International. Available online: <https://policy-practice.oxfam.org/resources/inequality-matters-brics-inequalities-fact-sheet-276312/>.

long characterised South Africa's socio-economic landscape. It envisions a society where all citizens regardless of their background can contribute to and share in the country's development outcomes. If this is so, the reduction of inequality would serve as a precondition for an outcome of poverty eradication. As a result of the NDPs emphasis on addressing poverty and inequality, this research turns its focus to the role of energy, particularly renewable energy, in achieving these objectives.

Reducing inequality and eliminating poverty are not just moral or political goals but also strategic enablers of socio-economic development. Within this framework, energy infrastructure is identified as a foundation enabling socio-economic advancement.⁴¹² By framing energy as fundamental, the NDP acknowledge that a reliable, sustainable and affordable energy supply is crucial for driving economic growth, creating jobs, and reducing inequality and poverty. Energy provision is fundamental to the broader development agenda.⁴¹³ The NDP recognises that energy access is crucial for economic development and social equity, and it promotes policies that facilitate the provision of modern energy services to marginalised communities. It supports initiatives like Free Basic Electricity (FBE), which provides 50kWh/month to low-income households.⁴¹⁴ It states that although many low-income households currently benefit from FBE and cross-subsidised tariffs, the measures require more consistent and comprehensive implementation to effectively protect vulnerable consumers from price increases.⁴¹⁵

The South African economy is highly energy-intensive. It is among the most energy-intensive nations globally.⁴¹⁶ As energy demand continues to rise, the energy sector is projected to be a key driver of the country's economic growth and development.⁴¹⁷ The provision of energy is essential in the overarching initiative aimed at mitigating inequality⁴¹⁸ as it has a direct influence on economic development, accessibility to fundamental services and the generation of opportunities. Reducing energy

⁴¹² Nel 2017 *Administratio Publica* 28.

⁴¹³ Nkomo 2005 *Journal of Energy in Southern Africa* 10.

⁴¹⁴ Monyei, Adewumi and Jenkins 2018 *Energy research & social science* 152.

⁴¹⁵ NPC: National Development Plan 171.

⁴¹⁶ Mohamed *The energy-intensive sector: considering South Africa's comparative advantage in cheap energy* 1.

⁴¹⁷ Nkomo 2005 *Journal of Energy in Southern Africa* 10.

⁴¹⁸ Acheampong, Dzator and Shahbaz 2021 *Energy Economics* 3.

inequalities is crucial for addressing income inequalities, gender inequalities and other forms of inequality⁴¹⁹ The NDPs goal of reducing inequality, particularly through addressing the Gini coefficient, relies on ensuring equitable access to resources, including energy. Although access to energy⁴²⁰ is a broad and multifaceted concept, prioritising electricity access is essential for initiating meaningful progress towards reducing inequality. Electricity access is intricately linked to various dimensions of socio-economic development through complex causal pathways.⁴²¹ Incorporating electricity access would serve as a critical enabler of economic growth, poverty reduction, and the mitigation of socio-economic disparities.⁴²² Electrification contributes to enhanced access to productive opportunities by lowering transaction costs, thereby facilitating industrial development, which consequently supports the accumulation of assets among low income populations, thereby contributing to the reduction of inequality.⁴²³

The NDP advocates a transition from a coal-dependent energy system to a more diversified energy portfolio that incorporates renewable sources.⁴²⁴ A diversified energy market is anticipated to stimulate investment, drive innovation and generate employment opportunities, especially in emerging sectors like renewable energy, thereby offering potential socioeconomic benefits for historically marginalised communities.⁴²⁵ It aims to ensure that over 90% of the population has access to electricity,⁴²⁶ recognising this as a critical step toward reducing inequality. Enhancing access to reliable and affordable electricity could significantly improve educational outcomes, healthcare services and economic prospects⁴²⁷ particularly in historically marginalised and rural areas. There is an acknowledgement that impoverished households frequently allocate a disproportionately high share of their income to

⁴¹⁹ UN *Policy brief 6 Energy and SDG 10 Reduced Inequalities* 4.

⁴²⁰ The IEA defines energy access as "a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average".

⁴²¹ Riva *et al.* 2018 *Energy for sustainable development* 203.

⁴²² Sarkodie and Adams 2020 *Energy Strategy Reviews* 2.

⁴²³ Sarkodie and Adams 2020 *Energy Strategy Reviews* 2.

⁴²⁴ NPC: National Development Plan 163.

⁴²⁵ NPC: National Development Plan 163.

⁴²⁶ NPC: National Development Plan 171,177.

⁴²⁷ UNDP *Energizing the millennium development goals* 4.

inefficient and costly energy sources, thereby reinforcing existing inequalities.⁴²⁸ In pursuing its energy objectives, the NDP underscores the importance of balancing affordability, energy security, economic development and climate change mitigation.⁴²⁹ This involves not only ensuring a reliable energy supply but also maintaining affordability for all.

Research on the potential impacts on employment arising from the expansion of the generation and distribution of renewable energy projects an increase of 40% in the availability of employment between 2018 and 2030, accounting for 580 000 job years.⁴³⁰ Under more ambitious decarbonisation pathways, this figure rises to 1.2 million job years created along the renewable energy value chain.⁴³¹ Employment in renewable energy value chains differs fundamentally from coal-dependent work: solar and wind jobs are predominantly distributed across the services, construction and manufacturing sectors⁴³² rather than concentrated in specific geographic regions, creating opportunities for the spatial redistribution of economic activity and income generation. This geographic dispersal holds particular significance for the reduction of inequality, as it would enable employment creation in rural and historically marginalised areas currently dependent on limited economic opportunities.⁴³³ However, realising these employment benefits requires intentional policy frameworks ensuring training, skills development, and preferential access for historically excluded groups. To maximise the benefits of poverty reduction, renewable energy employment pathways must prioritise skills development initiatives targeting women, the youth, and rural communities.⁴³⁴

Renewable energy contributes to poverty alleviation by extending grid-based and decentralised renewable systems into under-served regions, thus increasing access to reliable and affordable electricity, which is foundational to improved health,

⁴²⁸ NPC: National Development Plan 161.

⁴²⁹ NPC: National Development Plan 168.

⁴³⁰ COBENEFITS *Future skills and job creation through renewable energy in South Africa 2*.

⁴³¹ COBENEFITS *Future skills and job creation through renewable energy in South Africa 2*.

⁴³² COBENEFITS *Future skills and job creation through renewable energy in South Africa 2*.

⁴³³ COBENEFITS *Future skills and job creation through renewable energy in South Africa 2*.

⁴³⁴ NBI 2024 <https://www.nbi.org.za/jet-sep/>.

education and entrepreneurial activity.⁴³⁵ Second, renewable projects provide both short-term and longer-term employment opportunities, often targeting rural and peri-urban populations excluded from the mainstream economy.⁴³⁶ Third, many contemporary projects incorporate mechanisms such as community trusts, equity participation and social investment programmes, thus ensuring that energy infrastructure translates into sustainable community level benefits rather than narrowly distributed profits.⁴³⁷ In this context the NDP positions the expansion of a green economy underpinned by the deployment of renewable energy as being integral to its poverty eradication objectives and as a driver of broader socio-economic transformation.⁴³⁸

3.7 The plan of the NDP

The NDP aims to reduce inequality and eliminate poverty through a comprehensive, multifaceted strategy focussed on inclusive economic growth, social development and structural transformation.⁴³⁹ It emphasises the need for an economy that benefits all South Africans, especially the poor, youth and women. The emphasis on inclusive economic growth is a response to the issue on income inequality and poverty as well as the recognition that economic growth does not impact on all population groups uniformly.⁴⁴⁰ It is increasingly acknowledged that the way individuals participate in the process of growth is just as crucial as the outcomes it produces.⁴⁴¹ Inclusive growth addresses both the processes and outcomes of economic growth, particularly in relation to their effects on inequality and poverty.⁴⁴²

⁴³⁵ Lesala and Mukumba "Hybrid Mini-Grid Solutions to Rural Energy Poverty" 173-192.

⁴³⁶ SAEI <https://www.saeiconfed.org.za/the-just-energy-transition-a-pathway-to-sustainable-and-equitable-development/>.

⁴³⁷ UJ <https://www.uj.ac.za/faculties/humanities/research/research-centres/centre-for-social-development-in-africa-csda/research-excellence/thematic-area-4-projects/communities-and-the-private-renewable-energy-sector-distributing-social-development-benefits-in-south-africa-com-pres/>.

⁴³⁸ South African Worker and Student Portal 2025 <https://joub.co.za/south-africas-ndp-2030-a-renewable-energy-pathway-to-job-creation-and-economic-growth/>.

⁴³⁹ NPC: National Development Plan 26, 35.

⁴⁴⁰ Cwele *Towards an inclusive, green growth path: A review of South Africa's National Development Plan's approach to economic growth* 35.

⁴⁴¹ Ranieri and Ramos *Inclusive growth: Building up a concept* 1.

⁴⁴² Ranieri and Ramos *Inclusive growth: Building up a concept* 1.

Inclusive economic growth is inherently aligned with pro-poor growth objectives as it seeks to reduce poverty and improve the conditions of disadvantaged groups.⁴⁴³

In terms of the NDPs vision this requires a transition away from an exclusionary and extractive economic framework towards a more inclusive model that prioritises employment creation and expands economic participation across all parts of society.⁴⁴⁴ Thus, increasing the number of the country's available employment opportunities is central, especially in sectors like agriculture, manufacturing, mining and services.⁴⁴⁵ A significant proportion of future employment is expected to emerge from domestically focussed activities and the services sector.⁴⁴⁶ The NDP sets an ambitious target of achieving annual economic growth exceeding 5% as a means to generate employment and improve income levels.⁴⁴⁷ While the growth target is ambitious, it is deemed essential for the creation of approximately 11 million new employment opportunities by 2030, an imperative step toward substantially reducing unemployment and enhancing the quality of life for South Africans.⁴⁴⁸ Faster economic growth would expand the economy's capacity to absorb more workers, which is essential for reducing poverty.⁴⁴⁹

Inclusive growth also means creating an enabling environment for small businesses and informal sector businesses, which are key to job creation in poor communities.⁴⁵⁰ Approximately 90 per cent of jobs are expected to originate from small and growing enterprises.⁴⁵¹ By 2030 the contribution of small and medium enterprises to the overall economic output is expected to increased notably.⁴⁵² In addition to fostering employment, expanding the number of new and growing enterprises offers several other benefits such as decreasing economic concentration, enhancing market competition and promoting broader opportunities for Broad Based Black Economic

⁴⁴³ Dash 2015 *International Journal of Application or Innovation in Engineering & Management* 68.

⁴⁴⁴ NPC: National Development Plan 110.

⁴⁴⁵ NPC: National Development Plan 124; 126.

⁴⁴⁶ NPC: National Development Plan 119.

⁴⁴⁷ NPC: National Development Plan 50.

⁴⁴⁸ NPC: National Development Plan 39.

⁴⁴⁹ Erumban and de Vries 2024 *World Development* 1.

⁴⁵⁰ NPC: National Development Plan 140.

⁴⁵¹ NPC: National Development Plan 119.

⁴⁵² NPC: National Development Plan 119.

Empowerment (BBBEE).⁴⁵³ BBBEE constitutes a legally mandated and regulated framework of legislation and policies designed to advance economic inclusion for Black South Africans, who were systematically excluded from meaningful participation in the formal economy under apartheid.⁴⁵⁴ The cornerstone of this framework is the Broad-Based Black Economic Empowerment Act.⁴⁵⁵ The NDP stresses the need to expand participation in the economy by removing barriers that prevent certain groups from accessing education, jobs, land, credit and markets.⁴⁵⁶ Economic inclusion is a vehicle for poverty elimination and inequality reduction.

The NDP sees people as the country's most valuable resource and building their capabilities means improving access to quality education, healthcare, nutrition and social protection so that individuals are empowered to reach their potential.⁴⁵⁷ It represents a shift in approach from viewing citizens as passive recipients of government services to actively promoting the inclusion of socially and economically marginalised groups in the development process.⁴⁵⁸ Building capabilities is fundamental to enhancing economic performance and restructuring the economy for improved productivity and growth.⁴⁵⁹ The NDP draws on the concept of capabilities, highlighting that a developmental state enhances individuals' capabilities to improve their own lives, while actively addressing and redressing historical injustices and inequalities.⁴⁶⁰ By building capabilities the NDP aims to reduce inherited disadvantage. A core aspect of capacity building is ensuring that all persons have access to quality basic and higher education, technical and vocational training and lifelong opportunities.⁴⁶¹ In this context it prioritises early childhood development (ECD) as a foundation for lifelong learning and opportunity.⁴⁶² In addition the NDP also prioritises the development of capabilities across all levels of government and

⁴⁵³ NPC: National Development Plan 141.

⁴⁵⁴ CDH 2024 <https://www.cliffedekkerhofmeyr.com/news/publications/2024/Sector/BEE/bee-alert-12-december-what-is-bbbbee-and-why-is-it-important>.

⁴⁵⁵ Broad-Based Black Economic Empowerment Act 53 of 2003 (BBBEE Act).

⁴⁵⁶ NPC: National Development Plan 119. 24;128.

⁴⁵⁷ NPC: National Development Plan 119.44; The vision statement describes a South Africa where "everyone embraces their full potential and where the country's development is rooted in unleashing the energies of its people.

⁴⁵⁸ Tebogo 2023 *African Journal of Democracy and Governance* 43.

⁴⁵⁹ Mle and Ngumbela 2020 *Journal of Local Government Research and Innovation* 4.

⁴⁶⁰ NPC: National Development Plan 27.

⁴⁶¹ NPC: National Development Plan 302; 315.

⁴⁶² NPC: National Development Plan 296.

underscores the importance of forming strategic partnerships and fostering cross-sectoral collaboration with diverse stakeholders across multiple programmes and sectors.⁴⁶³

According to the NDP, enhancing the capacity of the state refers to strengthening the ability of government institutions at all levels of government to deliver on their mandates effectively and in a development-oriented manner.⁴⁶⁴ The plan stresses the importance of coherent, integrated planning across the three spheres of government to promote effective service delivery.⁴⁶⁵ It envisions a state that plays a transformative and developmental role, which necessitates effective and well-coordinated public institutions, along with competent, ethical and professional public servants.⁴⁶⁶ Public servants should be selected based on competence, merit, skills and their appointment should be insulated from political interference.⁴⁶⁷ The developmental state that the country seeks to establish must be deeply rooted in society through the cultivation of constructive relationships, collaborations across all sectors and the active engagement of a mobilised, responsible citizenry.⁴⁶⁸ A developmental state is characterised by its proactive and sustained efforts to achieve rapid and lasting improvements in a nation's economic and social conditions.⁴⁶⁹

The NDP underscores that promoting leadership and partnerships throughout society is a critical enabler for achieving long-term development goals. Leadership is not confined to political elites; the NDP calls for nurturing leadership at all levels of society, including in communities, schools, workplaces and civil society organisations.⁴⁷⁰ It views partnerships and collective action as essential for social cohesion. By encouraging inclusive dialogue, mutual respect and shared national values, it seeks to foster unity and cooperation across racial, class and regional divides.⁴⁷¹ It also promotes active citizenship where individuals and communities

⁴⁶³ NPC: National Development Plan 45.

⁴⁶⁴ NPC: National Development Plan 407.

⁴⁶⁵ NPC: National Development Plan 410.

⁴⁶⁶ NPC: National Development Plan Implementation pathways towards 2030 and critical actions 7.

⁴⁶⁷ NPC: National Development Plan 411.

⁴⁶⁸ NDP Implementation pathways towards 2030 and critical actions 15.

⁴⁶⁹ National Development Plan 409.

⁴⁷⁰ NPC: National Development Plan 18; 19; 26.

⁴⁷¹ NPC: National Development Plan 1;25; 457.

engage in shaping policies holding leaders accountable and contributing to development.⁴⁷² This requires platforms for public participation, civic education and support for community-based initiatives. Development cannot be driven by the state alone. The NDP advocates the establishment of partnerships between the public and private sectors, NGOs, and labour and faith-based organisations to pool their resources, expertise and ability to innovate.⁴⁷³ The NDP promotes the idea that all sectors of society must share responsibility for South Africa's progress.

3.8 Conclusion

This chapter has undertaken a comprehensive analysis of the NDP, focussing on its historical evolution, core objectives and the socio-economic and developmental challenges it seeks to address. The central concern of this chapter was to understand how the NDP articulates the objectives of reducing inequality and eliminating poverty, which form the foundation of this research. The chapter has contextualised the emergence of the NDP within the country's broader policy trajectory, starting with the RDP and GEAR, illustrating how earlier frameworks laid the groundwork, albeit with limitations, for the integrated and transformative approach embodied in the NDP. Through a detailed exploration of inequality and poverty the chapter has shown that both challenges are deeply rooted in the country's colonial and apartheid history. The chapter has demonstrated that inequality is multidimensional, extending beyond income inequalities to include unequal access to education, among other issues. Similarly, poverty is not only a function of low income but also of limited capabilities and chronic exclusion from socio-economic development. Poverty and inequality were explored as interrelated objectives in order to show that poverty cannot be meaningfully addressed without addressing the structural factors that sustain inequality.

Another focus of the chapter was the role of energy as a cross-cutting enabler in achieving the objectives of the NDP. Its commitment to ensuring universal and affordable energy access is central to addressing both inequality and poverty. Lastly,

⁴⁷² NPC: National Development Plan 26; 460.

⁴⁷³ NPC: National Development Plan 315.

the chapter explored how the NDP plans to achieve the objectives of reducing inequality and eliminating poverty.

The next chapter will present the existing barriers and challenges to the development and distribution of renewable energy.

Chapter 4 CHALLENGES AND BARRIERS TO RENEWABLE ENERGY ADOPTION

4.1 *Introduction*

This chapter critically examines the various challenges and barriers that impede the large-scale adoption of renewable energy in South Africa. While the country possesses vast solar and wind resources, the transition from a coal-dominated energy system to a low-carbon sustainable energy future has been slow. The chapter explores the multifaceted constraints hindering this transition, ranging from economic and financial limitations to infrastructural, technological, policy, regulatory, social and institutional challenges.

The discussion begins with a brief background on South Africa's energy landscape, highlighting the country's significant renewable energy potential and its strategic importance in decarbonising the economy. It then systematically analyses the major barriers confronting renewable energy deployment. The first section examines the economic and financial challenges, including the high investment costs, limited access to credit and entrenched economic interests that favour coal-based energy production. The second section turns to infrastructural and technological obstacles, such as insufficient grid capacity and technological capabilities.

Further, the chapter explores the policy and regulatory challenges marked by ambiguous policy frameworks, bureaucratic delays and inconsistent government support. The social dimension is then addressed, with particular emphasis on issues of community acceptance and the socio-economic implications of transitioning away from coal for workers and communities reliant of that sector. Finally, the chapter examines institutional challenges, including weak governance and the dominance of Eskom in the energy sector, which together create structural inertia that inhibits the diversification of energy sources.

4.2 *Background*

South Africa is at a pivotal moment in its energy landscape, being uniquely positioned to harness renewable energy to meet its growing energy demands, decarbonise its economy and reduce reliance on fossil fuels. The country possesses substantial renewable energy potential, particularly in solar and wind resources.⁴⁷⁴ The effective utilisation of these natural resources is crucial for facilitating the transition from coal-based electricity to a decarbonised economy.⁴⁷⁵ South Africa's geographical and climatic attributes are highly favourable for solar energy generation, with the country receiving over 2,500 of sunlight each year, with average solar radiation levels between 4.5 and 6.5 kWh/m² per day.⁴⁷⁶ The Northern Cape in particular ranks among the highest solar resource areas globally, making it most suitable for both large-scale and decentralised solar energy developments.⁴⁷⁷ An estimate of the country's solar energy potential exceeds 6,000 GW, a fact that suggests that solar power will be a key component of the future energy mix.⁴⁷⁸ Projections indicate that the solar photovoltaic (PV) sector will expand from 6.05 GW in 2024 to approximately 10.27 GW by 2029, representing a compound annual growth rate of 11.17%.⁴⁷⁹

Similarly, wind energy presents significant opportunities, particularly in coastal and elevated inland regions. As the continent's second largest economy South Africa is strategically positioned to capitalise on its vast, untapped wind energy potential, both inland and along its extensive coastlines adjacent to two oceans.⁴⁸⁰ Coastal provinces like the Western Cape and Eastern Cape experience consistently high wind speeds, positioning them as optimal locations for wind energy development.⁴⁸¹ The national energy strategy places substantial emphasis on wind power and proposes to install at

⁴⁷⁴ NPC: National Development Plan 198.

⁴⁷⁵ NPC: National Development Plan 202.

⁴⁷⁶ Smarte Anekwe *et al.* 2024 *Science Progress* 4.

⁴⁷⁷ Mordor Intelligence <https://www.mordorintelligence.com/industry-reports/south-africa-solar-energy-market>
<https://www.mordorintelligence.com/industry-reports/south-africa-solar-energy-market>.

⁴⁷⁸ Evident <https://evident.global/news/south-africas-renewable-energy-potential>.

⁴⁷⁹ Evident <https://evident.global/news/south-africas-renewable-energy-potential>.

⁴⁸⁰ Merem *et al.* 2022 *Energy Power* 9.

⁴⁸¹ DMRE <https://www.dmre.gov.za/energy-resources/energy-sources/renewable-alternative-fuels/wind-power>.

least 17.7 GW by 2030 and potentially expand this to between 69 and 76 GW by 2050.⁴⁸² A study conducted from May 2015 to March 2016 affirmed that South Africa's capacity for wind-generated electricity is far greater and more geographically widespread than had been previously assumed.⁴⁸³ While conventional power sources still dominate, wind energy is gaining ground, with projections indicating that it could contribute up to 14% of the country's electricity supply by 2030.⁴⁸⁴

Although South Africa possesses substantial wind and solar energy potential, the transition towards renewable energy has progressed slowly, with multiple obstacles impeding the effective integration of these technologies into the national energy system.⁴⁸⁵

4.3 *Economic and financial challenges*

The transition to renewable energy in South Africa is confronted by significant economic barriers or challenges that undermine its feasibility and scalability.⁴⁸⁶ While the long-term benefits of renewable energy such as reduced operational costs, environmental sustainability and energy security are well documented, the upfront economic realities remain a deterrent to widespread adoption. South Africa's heavy reliance on coal poses significant challenges to its adoption of renewable energy, with entrenched economic interests serving as major obstacles to phasing out the use of coal.⁴⁸⁷ The country possesses approximately 35 billion tonnes of coal reserves, equivalent to around 3% of the global reserves, ranking seventh globally in coal consumption.⁴⁸⁸ At current consumption rates, these reserves could sustain coal use for the next two centuries, reinforcing the dominance of coal as a significant economic driver.⁴⁸⁹ This heavy reliance on coal has notably constrained the country's transition to renewable energy sources.⁴⁹⁰

⁴⁸² Evident <https://evident.global/news/south-africas-renewable-energy-potential>.

⁴⁸³ CSIR <https://www.csir.co.za/wind-power-potential-south-africa-par-solar-recent-csir-study-shows>.

⁴⁸⁴ Merem et al. 2022 *Energy Power* 9.

⁴⁸⁵ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 1.

⁴⁸⁶ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

⁴⁸⁷ Mirzania et al. 2023 *Energy Research & Social Science* 10.

⁴⁸⁸ Smarte Anekwe et al. 2024 *Science Progress* 8.

⁴⁸⁹ Smarte Anekwe et al. 2024 *Science Progress* 8.

⁴⁹⁰ Smarte Anekwe et al. 2024 *Science Progress* 8.

The task of adopting renewable energy is profoundly complex, particularly for South Africa, a heavily fossil fuel-dependent nation.⁴⁹¹ As such, it is expected that the initial capital expenditure for renewable energy projects would be high. These costs would primarily cover the initial construction and installation of infrastructure such as solar energy and wind farms.⁴⁹² For instance, the installation of a utility scale solar power plant is higher than that of a fossil fuel power plant.⁴⁹³ As a result, investors often perceive renewable energy projects as higher risk ventures, while viewing fossil fuel-based plants as more economically viable due to their comparatively lower capital costs.⁴⁹⁴

In South Africa such financial burdens continue to hinder the implementation and expansion of renewable energy initiatives, even at a small scale.⁴⁹⁵ The broader South African structural inequalities and low household incomes limit the market demand for newer, cleaner technologies. On a household basis, the high cost of rooftop solar installations remains prohibitive, perpetuating dependence on Eskom's electricity supply.⁴⁹⁶ Many households, especially low and middle income households, cannot afford the initial capital costs of renewable technologies⁴⁹⁷ and would thus struggle to transition from subsidised fossil fuel-dependent energy sources. Beyond upfront costs, the lack of accessible credit facilities also poses a challenge.⁴⁹⁸ While adequate funding mechanisms are available to support renewable energy development, the key issue lies in the accessibility of these funds.⁴⁹⁹

4.4 *Infrastructural and technological challenges*

The effective development of renewable energy is hindered by inadequate infrastructure, as the existing electricity grid was originally designed to support

⁴⁹¹ Pegels 2010 *Energy policy* 4945.

⁴⁹² Smarte Anekwe *et al.* 2024 *Science Progress* 9.

⁴⁹³ Smarte Anekwe *et al.* 2024 *Science Progress* 9.

⁴⁹⁴ Smarte Anekwe *et al.* 2024 *Science Progress* 9.

⁴⁹⁵ Uhunamure and Shale 2021 *Sustainability* 10.

⁴⁹⁶ Zhou 2025 <https://www.climatecorecard.org/2025/01/due-to-economic-challenges-both-urban-and-rural-communities-in-south-africa-seem-to-be-struggling-to-accept-and-adopt-renewable-energy/>.

⁴⁹⁷ Nkuna *Adoption of Solar Photovoltaic (PV) Technology in Residential Sectional-Title and Townhouse Community Schemes Market in South Africa* 30.

⁴⁹⁸ Mutumbi, Thondhlana and Ruwanza 2024 *Heliyon* 6.

⁴⁹⁹ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

conventional energy sources.⁵⁰⁰ Grid infrastructure is limited in regions with the greatest renewable energy potential.⁵⁰¹ The integration of variable renewable energy sources, such as solar and wind, into the national grid necessitates enhanced infrastructure and advanced management systems.⁵⁰² However, the existing ageing infrastructure is ill-equipped to accommodate decentralised and fluctuating energy inputs effectively.⁵⁰³ Addressing these issues requires the facilitation of technology transfer and the promotion of local innovation to enable the large-scale viability of renewable energy solutions.⁵⁰⁴ The country faces a lack of appropriate technologies to effectively harness its energy sources.⁵⁰⁵ South Africa relies heavily on importing technological solutions and expertise from abroad because the country lacks domestic technological capacity to independently deploy renewable energy projects.⁵⁰⁶

Technological challenges encompass the limited availability of skilled labour, inadequate research and development capacity, and the intermittent nature of renewable energy sources, which creates a need for extensive battery energy storage systems.⁵⁰⁷

4.5 Policy and regulatory challenges

The adoption of renewable energy technologies in South Africa is hindered by facts such as that there is limited political will, ambiguous regulatory frameworks, policy misalignment and a general absence of government support.⁵⁰⁸ National policies intended to facilitate renewable energy have been marked by inconsistencies and poor interdepartmental coordination, rendering them largely ineffective in realising

⁵⁰⁰ Smarte Anekwe et al. 2024 *Science Progress* 9.

⁵⁰¹ Zhou 2025 <https://www.climatecorecard.org/2025/01/due-to-economic-challenges-both-urban-and-rural-communities-in-south-africa-seem-to-be-struggling-to-accept-and-adopt-renewable-energy/>.

⁵⁰² Kumba and Olanrewaju 2024 *Energies* 12.

⁵⁰³ Kumba and Olanrewaju 2024 *Energies* 12.

⁵⁰⁴ Kumba and Olanrewaju 2024 *Energies* 13.

⁵⁰⁵ Kumba and Olanrewaju 2024 *Energies* 13

⁵⁰⁶ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

⁵⁰⁷ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

⁵⁰⁸ Zhou 2025 <https://www.climatecorecard.org/2025/01/due-to-economic-challenges-both-urban-and-rural-communities-in-south-africa-seem-to-be-struggling-to-accept-and-adopt-renewable-energy/>.

the country's full renewable energy potential.⁵⁰⁹ Additionally, the lack of governmental backing for off-grid renewable energy solutions, whether through financial incentives, political endorsement or support for financing mechanisms such as energy service contracting and subsidies, further constrains widespread adoption.⁵¹⁰ Bureaucratic delays and frequently changing targets undermine investor confidence and act as deterrents to investment in emerging energy technologies.⁵¹¹

An example of poor interdepartmental coordination challenges was highlighted when NERSA⁵¹² launched the REFIT programme;⁵¹³ however, it was later determined by the DoE⁵¹⁴ that NERSA had exceeded its authority as defined by the Electricity Regulation Act.⁵¹⁵ According to the Act the responsibility for energy policy formulation lies with the DoE, while NERSA's role is limited to implementation. Consequently, the REFIT programme was discontinued and replaced by a competitive bidding process (REIPPPP) administered by the DoE. The licensing procedures for renewable energy development are highly complex, time consuming and burdensome.⁵¹⁶ The corresponding application procedures are often fragmented and inefficient, highlighting the need for their streamlining and acceleration to better support the timely implementation of renewable energy projects.⁵¹⁷ These processes typically involve multiple regulatory bodies, each requiring separate permits, which

⁵⁰⁹ Zhou 2025 <https://www.climatescorecard.org/2025/01/due-to-economic-challenges-both-urban-and-rural-communities-in-south-africa-seem-to-be-struggling-to-accept-and-adopt-renewable-energy/>.

⁵¹⁰ Zhou 2025 <https://www.climatescorecard.org/2025/01/due-to-economic-challenges-both-urban-and-rural-communities-in-south-africa-seem-to-be-struggling-to-accept-and-adopt-renewable-energy/>.

⁵¹¹ Kumba and Olanrewaju 2024 Energies 12.

⁵¹² The National Energy Regulator of South Africa (NERSA) is a statutory regulatory authority established as a juristic entity under section 3 of the National Regulator Act 40 of 2004. Its mandate includes the regulation of South Africa's electricity, piped gas and petroleum pipeline sectors in accordance with the Electricity Regulation Act 4 of 2006, the Gas Act 48 of 2001 and the Petroleum Pipelines Act 60 of 2003.

⁵¹³ The Renewable Energy Feed In Tariff (REFIT) is a policy mechanism designed to encourage the development of renewable energy by mandating designated entities to procure electricity from eligible renewable energy producers at fixed, pre-established tariffs.

⁵¹⁴ Department of Energy now Department of Mineral Resources and Energy (DMRE).

⁵¹⁵ Electricity Regulation Act.

⁵¹⁶ Uhunamure and Shale 2021 *Sustainability* 12.

⁵¹⁷ Montmasson-Clair and Ryan *Journal of Economic and Financial Sciences* 512.

significantly prolongs the approval timelines.⁵¹⁸ In South Africa the Environmental Impact Assessment (EIA)⁵¹⁹ process is particularly lengthy and resource-intensive.

4.6 *Social challenges*

The social dimensions of renewable energy development encompass a wide range of challenges, including community acceptance, local participation, environmental justice and the fair distribution of benefits. In South Africa these challenges are further complicated by the legacy of apartheid and enduring socio-economic inequalities. Effectively addressing these social barriers is crucial to ensuring that the transition to renewable energy promotes inclusive development rather than reinforcing the existing social and economic disparities. The notion of a social licence to operate has gained prominence as communities increasingly demand meaningful participation in decision-making processes affecting their local areas.⁵²⁰ IPPs are mandated to demonstrate contributions to local economic development through initiatives such as job creation, the use of local content, the establishment of community trusts to distribute project profits and the fulfilment of empowerment targets.⁵²¹ However, evidence indicates that IPPs frequently fall short of fully realising these obligations.

There is significant social opposition within communities to hosting renewable energy projects.⁵²² This resistance frequently stems from inadequate public awareness and ineffective communication regarding the socio-economic development initiatives linked to such projects.⁵²³ The involvement of local communities in the governance of IPP projects is characterised by significant fragmentation, enabling dominant stakeholders to capture a disproportionate share of the benefits at the expense of marginalised community members.⁵²⁴ A transition toward a low-carbon economy will

⁵¹⁸ Uhunamure and Shale 2021 Sustainability 12.

⁵¹⁹ An Environmental Impact Assessment (EIA) is a mechanism through which environmental authorisation is obtained. It involves a structured process aimed at identifying, evaluating and documenting the potential environmental impacts of a proposed activity. This process includes phases such as scoping, basic assessment and a detailed environmental study.

⁵²⁰ Nkoana 2018 *Journal of Energy in Southern Africa* 37.

⁵²¹ Nkoana 2018 *Journal of Energy in Southern Africa* 35.

⁵²² Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 12.

⁵²³ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 12.

⁵²⁴ Nkoana 2018 *Journal of Energy in Southern Africa* 34.

inevitably entail job losses in the coal value chain.⁵²⁵ The shift away from coal-based energy poses significant employment risks for workers in the sector, particularly affecting coal-dependent communities and labour unions.⁵²⁶ Approximately 90, 000 coal-sector workers are mainly concentrated in the economically vulnerable Mpumalanga Province, where coal mining and power generation are central. They will be directly impacted by the phasing out of coal.⁵²⁷ The livelihoods of numerous families and communities both within Mpumalanga and across the country are thus at considerable risk.⁵²⁸ Given South Africa's already elevated unemployment levels, economic diversification and the creation of alternative employment opportunities in coal-dependent regions are essential.⁵²⁹ An abrupt, poorly planned and non-transparent exit from coal risks exacerbating unemployment and poverty, potentially triggering social unrest and intensifying resistance to the low-carbon transition.⁵³⁰

Although renewable energy projects generate short-term employment opportunities for local communities during the construction phase, these positions are typically poorly paid and terminate upon the project's commissioning.⁵³¹ Owing to the limited skills of local communities, young people are frequently engaged in these temporary roles, resulting in unsustainable job creation.⁵³² While both skilled and unskilled labour is required, the unskilled workforce is commonly retrenched once construction activities conclude.⁵³³

4.7 Institutional challenges

Limited institutional capacity remains a significant barrier against renewable energy adoption in South Africa.⁵³⁴ Institutional capacity, which may be defined as the ability to effectively implement policy amid competing interests and is often reflected in

⁵²⁵ Hanto et al. 2022 *Energy for Sustainable Development* 171.

⁵²⁶ Kumba and Olanrewaju 2024 *Energies* 12.

⁵²⁷ Smarte Anekwe et al. 2024 *Science Progress* 9.

⁵²⁸ Smarte Anekwe et al. 2024 *Science Progress* 9.

⁵²⁹ Spencer et al. 2018 *Climate Policy* 343.

⁵³⁰ Hanto et al. 2022 *Energy for Sustainable Development* 171.

⁵³¹ Nkoana 2018 *Journal of Energy in Southern Africa* 34.

⁵³² Nkoana 2018 *Journal of Energy in Southern Africa* 38.

⁵³³ Nkoana 2018 *Journal of Energy in Southern Africa* 38.

⁵³⁴ Mirzania et al. 2023 *Energy Research & Social Science* 12.

governance quality and political stability, remains weak in South Africa.⁵³⁵ The dominance of Eskom in South Africa's energy sector has created a monopolist market structure, fostering a high degree of path dependency on coal. The renewable energy sector remains in its developmental phase and is currently unable to meet the country's deficit as renewables account for only approximately 8.8% of installed generation capacity.⁵³⁶ To mitigate power outages, three coal fired power stations initially slated for decommissioning by 2027 will now remain operational until 2030, thereby postponing the transition and increasing the country's coal dependence.⁵³⁷

When technologies become deeply integrated into an economy, their replacement by more efficient or sustainable alternatives becomes increasingly difficult, a phenomenon otherwise referred to as carbon lock-in.⁵³⁸ South Africa's continued reliance on coal-fired electricity exemplifies this lock-in, which poses a considerable barrier against the adoption of renewable energy.⁵³⁹ Eskom, which supplies most of the country's electricity, has historically channelled major investments into large-scale coal power stations.⁵⁴⁰ This investment pattern has created an inertia within the energy system, constraining the diversification of energy sources and impeding the expansion of renewable energy, despite the country's substantial solar and wind resource potential.⁵⁴¹ Programmes such as the Pilot National Cogeneration Programme, the Medium-Term Power Purchase Programme and the Multisite Base-load Independent Power Producer Programme developed by Eskom between 2007 and 2008 were primarily intended to increase generation capacity but were discontinued due to insufficient preparedness on the part of both government institutions and the private sector.⁵⁴²

⁵³⁵ Jewell and Cherp 2020 *Wiley Interdisciplinary Reviews: Climate Change* 5.

⁵³⁶ LRS 2025 <https://lrs.org.za/2025/05/02/transition-from-coal-to-renewables-progress-challenges-and-possibilities/>.

⁵³⁷ The decommissioning of Hendrina, Grootvlei and Camden has been delayed until at least 2030 to mitigate power outages. The initial plan was to retire these facilities between 2023 and 2027 as part of the country's Just Energy Transition; See also above.

⁵³⁸ Unruh 2000 *Energy policy* 817.

⁵³⁹ Mirzania et al. 2023 *Energy Research & Social Science* 10.

⁵⁴⁰ Bothongo and Kinyar 2025 *Sustainable Futures* 10.

⁵⁴¹ Lawrence 2020 *Renewable and Sustainable Energy Reviews* 2.

⁵⁴² Montmasson-Clair and Ryan *Journal of Economic and Financial Sciences* 509.

It is important to emphasise that affordability remains a central factor in shaping the energy choices of South Africa.⁵⁴³ The country's substantial coal reserves constituting 7% of the world's total⁵⁴⁴ limit the government's willingness to transition to comparatively costlier energy sources such as solar and wind.⁵⁴⁵ This challenge is particularly evident in the wind energy sector, where the geographical remoteness of many wind farms poses significant barriers to grid integration.⁵⁴⁶ Further, there is a lack of coordination among key stakeholders and institutions across both the public and private sectors.⁵⁴⁷ Stakeholders often operate in isolation, with inadequate communication between the DMRE and Eskom emanating as a major issue.⁵⁴⁸ Such fragmentation undermines the efficient utilisation of available knowledge and expertise, thereby further delaying progress in the deployment of renewable energy.⁵⁴⁹

4.8 Conclusion

This chapter has provided a comprehensive examination of the challenges and barriers hindering the large-scale adoption of renewable energy in South Africa. Although the country possesses vast solar and wind potential, the transition from a coal-dependent energy system to a low-carbon and sustainable energy future remains slow and fragmented. The analysis has revealed that economic and financial constraints continue to pose major obstacles with high upfront costs, limited access to credit facilities and entrenched economic interests in coal significantly undermining efforts to scale up renewable energy technologies.

Beyond economic barriers, infrastructural and technological limitations further constrain progress. The country's ageing electricity grid, originally designed for centralised coal-based power generation, lacks the capacity and sophistication required to integrate variable renewable energy sources effectively. The absence of

⁵⁴³ Smarte Anekwe et al. 2024 *Science Progress* 10.

⁵⁴⁴ Ndlovu and Inglesi-Lotz 2019 *Journal of Energy in Southern Africa* 17.

⁵⁴⁵ Smarte Anekwe et al. 2024 *Science Progress* 19.

⁵⁴⁶ Akinbami, Oke and Bodunrin 2021 *Alexandria Engineering Journal* 5076.

⁵⁴⁷ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

⁵⁴⁸ The outcomes of REIPPPP Bid Window 6 where several wind projects were unable to secure grid access illustrated the absence of effective collaboration between stakeholders; Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11

⁵⁴⁹ Molepo, Khaled and Mathaba 2025 *Energy for Sustainable Development* 11.

large-scale energy storage systems, insufficient local technological capacity, and heavy reliance on imported expertise also impede efforts to harness South Africa's abundant renewable resources.

Policy and regulatory challenges emerged as additional obstacles, with ambiguous frameworks, bureaucratic inefficiencies, and inconsistent government support creating uncertainty for investors and developers. Institutional fragmentation, illustrated by poor coordination between key stakeholders such as Eskom and the Department of Mineral Resources and Energy, reinforces this policy incoherence and limits the effective implementation of existing energy strategies.

The chapter has also underscored the importance of the social dimension in shaping renewable energy outcomes. Limited community participation, weak benefit-sharing mechanisms and the socio-economic risks associated with the coal phase-out particularly for vulnerable workers and communities in Mpumalanga highlight the need for a just and inclusive energy transition. The evidence reveals that renewable energy projects often create only temporary, low-paying employment opportunities, leaving long-term developmental benefits unrealised.

Finally, institutional barriers, including Eskom's dominance and South Africa's continued reliance on coal, have created a structural inertia commonly referred to as carbon lock-in. This path dependency, reinforced by decades of coal-centred investments, restricts the diversification of the energy mix and delays the decarbonisation agenda. Taken together, the chapter demonstrates that overcoming these interlinked economic, technological, social, policy and institutional barriers will require coordinated reforms, enhanced institutional capacity, stronger political commitment, and inclusive stakeholder engagement to unlock South Africa's full renewable energy potential.

Chapter 5 CONCLUSION AND RECOMMENDATIONS

5.1 *Conclusion*

This dissertation set out to critically examine how the increased deployment of renewable energy in South Africa would contribute to the realisation of the National Development Plan (NDP) 2030 objectives, particularly the elimination of poverty, the reduction of inequality, and the creation of a low-carbon, inclusive economy. The central research question guiding this study was: To what extent can increased renewable energy deployment contribute to achieving the objectives of the NDP, particularly the reduction of poverty and inequality, within the context of South Africa's transition to a low-carbon economy? To address this question the study pursued three primary objectives: first, to analyse the historical development of South Africa's energy sector; second, to analyse the legal and policy frameworks governing renewable energy deployment; and third, to identify the challenges and barriers that hinder large-scale renewable energy adoption.

Chapter 2 examined the historical and contemporary dimensions of South Africa's energy sector, providing critical insights into the evolution from a coal-dependent energy system toward a renewable energy trajectory.⁵⁵⁰ The chapter highlighted that South Africa's energy infrastructure has historically been shaped by its mineral-based industrialisation, racialised economic structures, and state monopolisation under Eskom. These historical legacies have entrenched systemic inefficiencies, constrained diversification, and perpetuated unequal access to energy services - an inequality that remains largely aligned with socio-economic and racial divisions. The chapter then analysed the primary drivers of renewable energy deployment, categorising them into three key clusters: environmental and climate commitments, policy and governance frameworks, and socio-economic imperatives.⁵⁵¹ Internationally, South Africa's obligations under the Paris Agreement and its Nationally Determined Contributions (NDCs) have accelerated efforts to decarbonise the energy sector. Domestically, the National Development Plan (NDP), the Integrated Resource Plan

⁵⁵⁰ See para 2.2 above in this regard.

⁵⁵¹ See para 2.3 above in this regard.

(IRP) and the White Papers on Energy Policy and Renewable Energy collectively provide a policy roadmap for this transition.

These frameworks illustrate the state's recognition of renewable energy as a vehicle for both environmental protection and economic transformation. A major finding of Chapter 2 was that renewable energy deployment has significant socio-economic implications beyond environmental benefits. Renewable energy can stimulate employment creation, attract investment, enhance energy security, and provide decentralised access to electricity in under-served regions. The REIPPPP was identified as a successful model of public-private partnership that has mobilised substantial private investment while delivering tangible developmental benefits. However, the chapter cautioned that the persistence of institutional constraints, weak grid infrastructure, and financial instability at Eskom threaten the sustainability of these gains. Consequently, the chapter underscored the need for integrated policy alignment, institutional reform and inclusive participation to fully realise the potential of renewable energy in meeting the objectives of the NDP.

Chapter 3 provided a comprehensive analysis of the National Development Plan, its historical evolution and its objectives in addressing poverty and inequality. It traced the development of national policy from the Reconstruction and Development Programme (RDP) and the Growth, Employment and Redistribution (GEAR) strategy, culminating in the adoption of the NDP in 2012 as a unified long-term vision for social and economic transformation. The chapter demonstrated that the NDP represents a synthesis of economic realism and social justice, premised on the dual objectives of eliminating poverty and reducing inequality by 2030. A key insight from this chapter is the recognition that poverty and inequality in South Africa are not isolated phenomena but are deeply intertwined and mutually reinforcing. Inequality undermines the effectiveness of economic growth in reducing poverty, while poverty entrenches social exclusion and limits participation in productive activities. The NDP therefore adopts an integrated approach that prioritises inclusive growth, employment creation, and capability development as the foundation for equitable development.

Chapter 3 also identified energy as a critical enabler of the NDP's objectives. Reliable, affordable and sustainable energy access supports economic growth, enhances human development and strengthens social inclusion. The NDP explicitly promotes a just transition toward a low-carbon economy, emphasising renewable energy as a strategic tool for sustainable industrialisation, job creation and rural development. Through this linkage the chapter established the theoretical and policy rationale for the central research question - demonstrating that energy transition is intrinsic to achieving the NDP's overarching developmental goals.

Chapter 4 explored the multifaceted challenges and barriers that constrain renewable energy adoption in South Africa. These barriers were categorised as economic and financial, technological and infrastructural, policy and regulatory, social and institutional. The chapter revealed that despite the state's progressive policies, renewable energy deployment remains impeded by structural and operational bottlenecks that require urgent attention. Economically, the high capital costs of renewable energy projects, currency volatility, and limited access to concessional financing hinder large-scale investment. Technologically, the inadequacy of the transmission infrastructure, particularly grid access in rural areas, restricts the integration of renewable power. Policy-wise, inconsistencies between the Department of Mineral Resources and Energy (DMRE), the National Energy Regulator (NERSA) and Eskom create regulatory uncertainty, discouraging investor confidence.

The chapter also highlighted the social dimension of resistance, where communities dependent on coal-based employment express concern about job losses and socio-economic displacement. Institutional challenges, particularly Eskom's financial instability and governance weaknesses, were identified as major impediments to a successful transition. Importantly, Chapter 4 argued that addressing these challenges requires not only technical reforms but also a coherent governance framework that aligns environmental, social and economic objectives. It called for a strengthened regulatory regime that balances investor confidence with social inclusion and environmental integrity. The findings underscore that achieving the NDP's objectives through renewable energy deployment is feasible but contingent upon systemic institutional reform, stakeholder participation and effective policy coherence.

5.2 Recommendations

Based on the findings of presented in this study, the following recommendations are formulated to help address the central research question of the extent to which increased renewable energy deployment can advance the NDPs objectives of eliminating poverty and reducing inequality.

1. Strengthen Policy Coherence and Institutional Alignment:

In this study I identified weaknesses in fragmented policy and regulation of renewable energy⁵⁵² and therefore, my recommendation is to establish a unified national renewable energy coordination body that harmonises policies among the DMRE, DFFE, NERSA and Eskom. Streamline overlapping mandates and ensure that environmental, social and energy policies are mutually reinforcing. Adopt a clear legislative framework that entrenches renewable energy targets within a just transition strategy.

2. Expand Financial and Investment Mechanisms:

The study identified financial and investment being insufficient for renewable energy deployment⁵⁵³ and therefore, I recommend that facilitation of access to concessional financing through partnerships with development finance institutions. Introduce tax incentives, green bonds and risk-mitigation instruments to attract private-sector participation. Prioritise community-based ownership models and local equity participation to ensure inclusive economic benefits.

3. Invest in Grid and Technological Infrastructure:

In this study, I identified grid constraints as an issue.⁵⁵⁴ I recommend modernising the grid infrastructure to enable large-scale renewable integration and decentralised systems such as microgrids. Invest in battery storage, digital monitoring, and grid resilience technologies.

⁵⁵² See para 4.5 above in this regard.

⁵⁵³ See para 4.3 above in this regard.

⁵⁵⁴ See para 4.4 above in this regard.

4. Promote Human Capital Development and Green Skills:

In this study, I identified critical skills shortages in renewable energy engineering, installation, management and maintenance.⁵⁵⁵ I recommend developing targeted vocational training and skills transfer programmes aligned with renewable energy industries. Partner with universities, TVET colleges and industry to create a skilled workforce capable of sustaining the green economy. Prioritise training opportunities for women, youth and rural populations to promote equitable participation.

⁵⁵⁵ See para 4.6 above in this regard.

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