Comparative Analysis of Low-Carbon Energy Transition in Nigeria and South Africa

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ABSTRACT

This study conducts a qualitative comparative analysis of Nigeria and South Africa to examine how both countries are navigating low-carbon energy transitions in alignment with the Paris Agreement and the Sustainable Development Goals (SDGs 7, 8, and 13). Relying on systematic documentary analysis of national policy frameworks, legislative instruments, institutional reports, and international databases, the study evaluates the transition pathways across three core dimensions: policy alignment, governance and institutional capacity, and socioeconomic and just transition outcomes. The findings reveal that while both countries demonstrate formal commitment to global climate objectives, South Africa exhibits stronger policy coherence and institutional coordination through instruments such as the Integrated Resource Plan (IRP 2019) and the Just Energy Transition Investment Plan (JET-IP 2022). Nigeria's transition trajectory, though ambitious, remains limited by fragmented governance structures, fiscal dependence on fossil fuels, and modest progress in renewable energy deployment. Socioeconomic implications also diverge: South Africa's transition incorporates structured just transition mechanisms, whereas Nigeria's approach remains largely technocratic with limited social safeguards. The study concludes that institutional capacity, policy integration, and social inclusivity are the decisive determinants of transition success. It offers targeted country-specific and continental policy recommendations to enhance governance effectiveness, accelerate renewable adoption, and ensure equitable outcomes across Africa's broader decarbonisation agenda.

Keywords: Low-carbon energy transition; Nigeria; South Africa; Paris Agreement; SDGs; Energy governance; Comparative analysis; Decarbonization; Energy poverty.

INTRODUCTION

The imperative to mitigate climate change and advance sustainable development has catalysed the global transition towards low-carbon energy systems. The Paris Agreement, adopted in 2015, provides a comprehensive framework for international climate governance by committing countries to limit global temperature rise to well below 2°C and to pursue efforts to limit it to 1.5°C above pre-industrial levels (Godswill et al., 2023). Achieving these targets requires a radical transformation of the world's energy systems, phasing out reliance on fossil fuels and embracing renewable and sustainable energy solutions. This transformation is inherently linked to the United Nations Sustainable Development Goals, particularly SDG 7 on Affordable and Clean Energy and SDG 13 on Climate Action, which underscore the nexus between energy access, decarbonisation, and socioeconomic development. Developing countries face specific challenges in this energy transition due to their reliance on fossil fuel revenues, underdeveloped infrastructure, and limited energy access (Okoh & Okpanachi, 2023; Adewuyi et al., 2020).

Nigeria and South Africa, two of Africa's largest economies, illustrate the divergent pathways and challenges inherent to low-carbon energy transitions. Nigeria suffers from energy poverty, with more than 85 million people lacking access to grid electricity, despite substantial renewable energy potential (Toyin et al., 2024). The country has a long-term vision of achieving carbon neutrality by 2060; however, it faces significant challenges in pursuing an unconditional 20% reduction in emissions by 2030 and a conditional 47% reduction due to

infrastructure deficits, budget constraints, and the challenge of simultaneously pursuing economic growth and decarbonisation (Johnson et al., 2024; Okoh et al., 2018).

On the other hand, coal still makes up most of South Africa's energy system, supplying about 90% of the country's electricity (Uhunamure & Shale, 2021). Decarbonisation is particularly challenging from an infrastructure and socioeconomic perspective since thousands of jobs and towns depend on the coal value chain. Consequently, under its revised Nationally Determined Contributions, South Africa has adopted a Just Energy Transition approach that emphasises fairness, job protection, and community resilience while aiming for significant reductions in emissions (Xaba, 2023; Bohlmann et al., 2023). This country has pursued structural reforms and built its renewable energy capacity with support from external partners, such as the Just Energy Transition Partnership (Merven et al., 2022).

Both countries face significant challenges in achieving a meaningful low-carbon transition, even though they are both committed to the SDGs and the Paris Agreement. For Nigeria, it is about decoupling economic growth from dependence on fossil fuels while addressing widespread energy poverty. For South Africa, it is about the financial burden of updating infrastructure, the need to balance industrial competitiveness with decarbonisation, and the social impacts of moving away from coal. These are all challenges in addition to the more general systemic problems that both economies face at the national level, common to developing countries: limited access to climate finance, low technological capacity, and geopolitical issues affecting energy markets.

Despite numerous studies assessing energy transition initiatives within each country, there remains a gap in systematic comparative research, mainly consisting of qualitative analyses of policy implementation, governance dynamics, and stakeholder perceptions. Understanding the divergent experiences of these two major African economies is essential for identifying context-relevant lessons and designing future pathways for efficient, equitable, and sustainable energy transitions across the continent. This paper addresses that gap by analysing the policy frameworks, socioeconomic contexts, governance structures, and justice dimensions shaping low-carbon transition trajectories in South Africa and Nigeria, and deriving recommendations for better alignment with the Sustainable Development Goals and global climate objectives.

LITERATURE REVIEW

Conceptual Review

Some basic ideas that shape energy transitions toward lower carbon emissions should be well-known for an in-depth comparison of Nigeria and South Africa. This part brings together essential words and concepts that form the base of the talk.

Low-Carbon Energy Transition

A low-carbon energy transition is the gradual shift from energy systems that rely on fossil fuels to those that utilise cleaner, renewable, and more sustainable sources such as solar, wind, hydro, geothermal, and sustainable biomass. It is a process driven by global efforts to mitigate climate change, reduce greenhouse gas emissions, enhance energy security, and promote sustainable development. This transition encompasses not only technological innovation but also policy reform, infrastructure adaptation and development, economic restructuring, and behavioural changes. In developing countries like South Africa and Nigeria, it must simultaneously address inadequate access to energy, the need for economic development, and commitments to mitigate climate change (Okoh & Okpanachi, 2023; Adewuyi et al., 2020).

Just Energy Transition

The Just Energy Transition (JET) speaks to decarbonisation in a just, equitable, and socially inclusive manner. It articulates the need to protect communities and individuals dependent on fossil fuel industries while seizing the new opportunities renewable energy offers. Key components include affordable energy access, transformation of corporate models, empowerment of communities to control energy infrastructure, and the creation of decent job opportunities (Bohlmann et al., 2023). This JET framework has been directly integrated

into South Africa's national decarbonisation policy, given the country's socioeconomic impacts from its coal phase-out.

Paris Agreement

The Paris Agreement, adopted in 2015 under the United Nations Framework Convention on Climate Change, aims to limit global warming to 1.5°C and to keep it well below 2°C (Godswill et al., 2023). Each country expresses its emission reduction and adaptation intentions through Nationally Determined Contributions (NDCs). As active parties, South Africa and Nigeria have set mitigation ambitions with considerable implications for their respective energy transition strategies (Johnson et al., 2024; Merven et al., 2022). The Agreement also underscores that developing countries on transition pathways require financial and technological support.

Sustainable Development Goals

The Sustainable Development Goals (SDGs) provide a global framework for achieving sustainable development by 2030. This study focuses particularly on:

- **SDG 7 – Affordable and Clean Energy**, which aims to ensure universal access to reliable, modern, and sustainable energy. This is especially relevant for Nigeria with its significant energy access disparities (Toyin et al., 2024).
- **SDG 13 – Climate Action**, which calls for urgent steps to combat climate change and directly aligns with the requirements of low-carbon energy futures.

Progress on SDG 7 and SDG 13 inherently influences other SDGs related to poverty reduction, employment, health, and sustainable urban development.

Theoretical Review

The energy transition in South Africa and Nigeria will be better understood through a combination of socio-technical, political-economy, and energy-justice theoretical perspectives. This study integrates the Multi-Level Perspective, the Political Economy of Energy, and Energy Justice into one framework. The latter provides insights into power relations, governance structures, and resource dependencies that shape energy decisions; the former describes socio-technical networks and dynamics of transitions. It is possible to assess equity, inclusiveness, and fairness in transition processes when using the Energy Justice framework. Together, these perspectives provide a comprehensive yet contextual understanding of low-carbon transitions in South Africa and Nigeria.

Theories of Energy Transition and Innovation Diffusion

As stated by Godswill et al. (2023), the Multi-Level Perspective (MLP) conceptualises energy transitions as the outcome of interactions among niche innovations (e.g., renewable technologies), dominant socio-technical regimes (e.g., fossil fuel dependence), and landscape pressures (e.g., international treaties, market dynamics, and global climate change). The paradigm describes the coal-based regime in South Africa and the entrenched fossil-fuel systems in Nigeria as either resisting or accommodating new renewable energy technologies. Rogers' Diffusion of Innovations Theory describes factors such as relative advantage, compatibility, and complexity that further explain how innovations spread within a society. It is essential for understanding the diffusion of renewable energy across both countries.

Political Economy of Energy and Resource Curse Theory

The political economy perspective emphasises the power relations, governance structures, and vested interests that shape energy policy choices (Jakob et al., 2020). The dominance of the fossil fuel industry can obstruct or skew transition processes in resource-rich countries such as South Africa and Nigeria. The Resource Curse Theory explains why countries rich in natural resources often struggle to commit to long-term sustainability or

diversify their economies. Nigeria's dependence on oil and gas revenue illustrates how fossil fuel rents impede decarbonisation (Godswill et al., 2023), while South Africa's historical reliance on coal reveals similar political-economic constraints.

Development Theories and Energy Justice

Development theories, especially sustainable development perspectives, stress the need to balance social equity and economic growth with environmental protection. Energy justice, which can serve as an analytical framework for analysing equity issues in transitions, has three pillars: distributive justice (fair distribution of benefits and costs), procedural justice (inclusive decision-making processes), and recognition justice (acknowledging the diverse needs of communities and past injustices). These concepts are explicitly embedded in South Africa's JET framework, while in Nigeria, energy justice is critical for addressing glaring disparities in energy access. McCauley et al. articulated this framework in 2018. Toyin et al. wrote about its application to Nigeria in 2024.

Empirical Review

Nigeria’s Energy Transition Landscape

Nigeria's simultaneous battle to accomplish decarbonisation while addressing long-term energy poverty and infrastructure deficiencies is highlighted by empirical studies (Okoh & Okpanachi, 2023; Adewuyi et al., 2020). Nigeria's NDC commitments are to reduce emissions by 20% unconditionally and by 47% conditionally by 2030, but implementation remains sluggish due to inconsistent policies, budgetary constraints, and reliance on fossil fuels (Toyin et al., 2024). Despite the abundance of renewable resources, significant institutional, technological, and investment reforms are necessary to utilise them effectively (Godswill et al., 2023). There is an ongoing debate over whether Nigeria's portrayal of natural gas as a transition fuel is consistent with its long-term net-zero commitments.

South Africa’s Energy Transition Landscape

South Africa’s transition is framed within its acknowledged embrace of the Just Energy Transition narrative and its reliance on extensive coal use (Uhunamure & Shale, 2021; Xaba, 2023). The country's ambitious decarbonisation plan is underscored by its updated NDCs and significant foreign investments through the JET Partnership (Merven et al., 2022). Empirical data reveal socioeconomic risks associated with coal decommissioning, particularly job losses in mining regions (Hanto et al., 2021). Policy responses include renewable energy procurement, carbon pricing instruments, and targeted support for workers and communities.

Comparative Empirical Insights

The comparative data reveal some differences and similarities. The coal phase-out and the expansion of renewable energy predominantly shape the South African narrative. In contrast, the Nigerian narrative is shaped by its emphasis on natural gas as a transition fuel. South Africa faces the challenge of transitioning from an already highly industrialised, coal-dependent energy economy, whereas Nigeria's primary challenge is expanding electricity access in tandem with decarbonisation efforts. Both countries face governance challenges, albeit manifested differently due to varying institutional capacities. Nigeria can also leverage climate finance through coordinated international funding, similar to South Africa's JETP.

Gaps in Literature

Several gaps remain in the emerging literature on energy transitions in Africa. A limited understanding of how national contexts shape transition dynamics stems from the fact that few studies provide direct, comparative qualitative assessments of South Africa and Nigeria within a single framework. There is still insufficient research on perceptions of "justness" concerning the various dimensions of distributive, procedural, and recognition justice across different communities in both countries. Moreover, current studies mainly assess alignment with the SDGs or the Paris Agreement, but rarely use both frameworks to comprehensively evaluate national

transition programs. Finally, despite clear opportunities for lesson-sharing between Nigeria's gas-based transition strategy and South Africa's JET experience, there has been minimal policy learning among large African countries.

METHODOLOGY

Research Design and Approach

This study adopts a qualitative comparative case study design to examine how Nigeria and South Africa are pursuing low-carbon energy transitions in line with the Paris Agreement (2015) and Sustainable Development Goals 7 and 13. A qualitative approach is most appropriate because the research seeks to understand contextual, institutional, and policy dynamics rather than quantify emissions or energy trends. It emphasises the "how" and "why" behind transition pathways, institutional choices, and governance outcomes.

The comparative case study design enables a structured assessment of two African economies with distinct carbon profiles—Nigeria, which is predominantly oil- and gas-dependent, and South Africa, which relies heavily on coal. This contrast provides a rich basis for identifying institutional enablers, policy coherence, and governance challenges shaping their respective transition trajectories.

Research Paradigm

The study is grounded in a constructivist–interpretivist paradigm, which assumes that reality is socially constructed through policy narratives, institutional practices, and political-economic dynamics. Knowledge is therefore generated through the interpretation of policy texts, legislative frameworks, and governance arrangements rather than through numerical generalisation. This paradigm is well-suited to exploring the complex interactions between climate policy, energy governance, and development priorities characteristic of low-carbon transition research.

Conceptual and Analytical Framework

The research is guided by a Low-Carbon Energy Transition Governance Framework built around three interrelated dimensions:

- Policy Alignment: The extent to which national energy and climate policies reflect commitments under the Paris Agreement and SDGs 7 and 13.
- Institutional Capacity and Governance: The adequacy of legislative structures, coordination mechanisms, and regulatory institutions in facilitating transition implementation.
- Just Transition and Development Outcomes: The socioeconomic implications of low-carbon strategies, including employment shifts, equity concerns, and energy access outcomes.

These dimensions structure the analytical process, which is based on systematic content analysis of national and international policy documents.

Case Selection Rationale

Nigeria and South Africa were purposively selected as information-rich cases representing Africa's two largest carbon-emitting economies with contrasting energy systems and transition pathways.

- Nigeria is an oil- and gas–dependent economy, diversifying through the Energy Transition Plan (2022) and the Renewable Energy Master Plan.
- South Africa is a coal-intensive economy undergoing decarbonisation through the Integrated Resource Plan (2019) and Just Energy Transition Investment Plan (2022).

The divergent fossil fuel structures and policy instruments used in both countries deepen the comparative value, enabling analysis of varied institutional responses under shared global climate obligations.

Data Sources and Types

The study relies entirely on secondary, documentary data sourced from official government portals, international databases, and peer-reviewed policy documents. Data categories include:

- Policy and Governance Data: National policy frameworks, energy transition strategies, and legislative instruments (e.g., Nigeria's Renewable Energy Master Plan, Petroleum Industry Act; South Africa's IRP 2019 and JET-IP 2022; NDC updates).
- Climate Legislation and Institutional Frameworks: Documents outlining institutional mandates and governance architecture (e.g., Nigeria's Climate Change Act 2021; reports from South Africa's DFFE and energy ministries).
- Socioeconomic and Development Indicators: Statistics on employment, energy access, and development (World Bank, ILO, UNDP, national agencies).
- Financing and Investment Documents: Climate finance reports, subsidy assessments, and fiscal frameworks (OECD, IMF, BloombergNEF, national budgets).

Data Collection Procedures

Data collection followed a structured documentary review spanning 2000–2023 and involved three stages:

1. Identification: Compilation of policy instruments, legislative documents, climate strategies, and institutional reports relevant to energy transition and SDG implementation.
2. Screening: Selection based on relevance, official publication status, and time validity, prioritising post-2000 documents.
3. Extraction and Coding: Systematic extraction of key provisions and institutional structures for thematic coding and comparative interpretation.

Documents analysed included NDC submissions, energy and climate legislation, renewable energy frameworks, institutional reports, and international assessments on transition progress.

Data Analysis Method

Analytical Strategy

Data were analysed using qualitative content analysis supported by thematic comparison. The study focused on identifying patterns, consistencies, and divergences across policy frameworks and institutional arrangements. The analytical steps included:

- Thematic Coding: Using NVivo, documents were coded into relevant categories, including policy alignment, institutional coordination, financing mechanisms, just transition, and implementation challenges.
- Pattern Matching: Comparison of emerging themes across the two countries to assess convergence or divergence.
- Contextual Interpretation: Interpretation of findings within each country's socio-political and economic context.

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- Cross-Case Synthesis: Integration of case insights to formulate broader implications for Sub-Saharan Africa's low-carbon transition pathways.

Analytical Dimensions

Each country case was examined under four interpretive dimensions:

- Policy Intent and Ambition: How transition strategies reflect international commitments.
- Governance and Institutional Structure: Coordination between ministries, agencies, and regulatory institutions.
- Implementation Mechanisms: Regulatory instruments, incentives, and financial frameworks supporting transition.
- Equity and Development Linkages: Alignment of transition outcomes with employment, poverty reduction, and energy access goals.

Data Validation and Reliability

Several procedures were adopted to strengthen validity and reliability:

- Source Triangulation: Verification of policy information across multiple credible sources.
- Use of Peer-reviewed Literature: Cross-validation with academic studies and international reports.
- Reflexivity: Ongoing reflection to minimise researcher bias during coding and interpretation.
- Audit Trail: Documentation of coding processes, analytical decisions, and data sources to enhance transparency and replicability.

Ethical Considerations

The study relies exclusively on publicly available secondary materials, posing minimal ethical concerns. All documents are appropriately cited, and interpretations are presented with academic integrity. Sensitive national policy information is treated with neutrality and respect for institutional confidentiality.

imitations of the Methodology

The study is subject to several limitations: reliance on secondary data limits the assessment of real-time implementation outcomes; variations in document availability and completeness across countries pose challenges; and the absence of primary stakeholder interviews limits insights into internal institutional dynamics. These limitations were mitigated through broad document triangulation and cross-referencing of policy narratives.

Data Analysis and Interpretation of Findings

This section presents the findings and interpretive analysis derived from the qualitative review of policy documents, legislative frameworks, and institutional reports on low-carbon energy transitions in Nigeria and South Africa. The analysis is organised around the three core thematic dimensions of the study's conceptual framework: the alignment of national policy with the Paris Agreement and the Sustainable Development Goals (SDGs), the governance and institutional capacity underpinning the transition, and the socioeconomic implications associated with just transition outcomes. The discussion highlights areas of convergence and divergence between the two countries, revealing how context, institutional arrangements, and political-economic dynamics shape their respective low-carbon development trajectories.

Policy Alignment with the Paris Agreement and SDGs

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Nigeria's policy environment reflects a growing recognition of the intersection between climate action and national development, although progress remains gradual and fragmented. Key policy instruments, such as the Renewable Energy Master Plan (2005), the updated Nationally Determined Contribution (2021), and the Energy Transition Plan (2022), outline renewable energy targets, emissions reductions, and long-term pathways to net-zero emissions by 2060. The Climate Change Act (2021) offers a statutory foundation for climate governance and mandates a national carbon budgeting system. Despite this, policy coherence is undermined by Nigeria's economic reliance on hydrocarbons, illustrated by continued investments under the "Decade of Gas" initiative. The tension between fiscal dependence on fossil revenues and climate ambitions results in partial alignment with SDG 7 (affordable and clean energy) and SDG 13 (climate action), with progress limited by low renewable penetration and inadequate institutional synergy.

South Africa demonstrates a more structured and legally grounded alignment with international climate commitments. The updated Nationally Determined Contribution (2021) reflects a 1.5°C-compatible emissions range, underscoring a stronger mitigation ambition. Sectoral policies such as the Integrated Resource Plan (2019) establish clear renewable energy targets and coal phase-down trajectories, while the Just Energy Transition Investment Plan (2022) articulates a comprehensive framework for mobilising climate finance and supporting coal-dependent communities. The Climate Change Bill (2022) further institutionalises carbon budgeting and reinforces the national carbon tax framework. Although operational constraints – notably implementation delays and resistance from coal-linked industries – remain, the coherence between climate legislation, energy planning, and financing mechanisms provides South Africa with a more integrated policy alignment. While the country performs strongly on SDG 13, persistent load shedding and rising tariffs continue to challenge the achievement of SDG 7.

A comparison of both countries reveals that, although Nigeria has formalised its climate commitments, South Africa's approach is more coherent and better institutionalised. Nigeria's transition architecture remains aspirational and fragmented, whereas South Africa provides clearer operational pathways backed by legislative authority and structured governance processes.

Governance and Institutional Capacity

Governance capacity emerges as a central differentiator in the transition experiences of both countries. In Nigeria, institutional arrangements are characterised by overlapping mandates and weak coordination mechanisms. The National Council on Climate Change serves as the apex governance institution but shares responsibilities with the Federal Ministry of Environment and the Energy Commission of Nigeria, creating ambiguity in leadership and accountability. While reforms under the Petroleum Industry Act (2021) restructure the hydrocarbon sector, they provide limited integration of decarbonisation objectives. Agencies such as the Rural Electrification Agency and the Nigerian Electricity Regulatory Commission face funding constraints and operational limitations, leading to siloed policy implementation. The absence of a unified transition authority, inadequate sub-national coordination, and weak data management systems further undermine institutional effectiveness.

In contrast, South Africa has developed a more cohesive institutional framework for managing its energy transition. Climate governance is coordinated through the Department of Forestry, Fisheries and the Environment, in collaboration with the Department of Mineral Resources and Energy and the National Treasury. The Presidential Climate Commission—an inclusive, multi-stakeholder institution—plays a pioneering role in mediating interests between labour, industry, and government and guiding the just transition agenda. Long-term integration is reinforced through the National Planning Commission, which embeds energy transition priorities into the country's development strategy. Despite these strengths, implementation is constrained by political trade-offs between economic growth and decarbonisation, Eskom's financial and infrastructural challenges, and labour resistance in coal-dependent regions.

Compared with South Africa's governance landscape, South Africa's governance landscape is more structured, participatory, and transparent, with stronger horizontal coordination and rule-based policy enforcement. Nigeria's governance environment remains programmatic and donor-dependent, impeding continuity and reducing transition credibility.

Socioeconomic Implications and Just Transition Outcomes

Nigeria's socioeconomic conditions pose significant challenges to its low-carbon transition. Widespread energy poverty persists, with national electricity access estimated at 55–60% and rural electrification lagging far behind. Historically high fossil fuel subsidies distort energy markets and inhibit the uptake of clean energy alternatives. Although the Energy Transition Plan projects substantial job creation across renewable energy industries, the implementation frameworks, reskilling, and labour inclusion remain underdeveloped. Social protection mechanisms for sectors vulnerable to decarbonisation are minimal, and tariff reforms remain politically sensitive, undermining the affordability of clean energy and limiting equity-oriented progress.

South Africa's transition carries more profound implications for labour, industry, and spatial inequality, particularly in coal-dependent provinces such as Mpumalanga. The Just Energy Transition Investment Plan integrates labour reskilling, community support, and social protection into national decarbonisation efforts, demonstrating a more operational approach to just transition. However, the country's high unemployment rate and the financial strain of Eskom's restructuring have resulted in rising household energy costs, challenging the affordability dimension of SDG 7. Nonetheless, the active involvement of labour unions, civil society, and industry through the Presidential Climate Commission makes South Africa’s transition more socially responsive and procedurally just than Nigeria’s.

Overall, Nigeria's socioeconomic challenges stem from structural deficits in energy access and fiscal dependence on hydrocarbons. At the same time, South Africa's problems stem from industrial restructuring and the economic burdens of shifting away from coal. Both nations face significant equity concerns, though South Africa has more institutional mechanisms in place to address them.

Synthesis of Findings

Three overarching insights emerge from the comparative analysis. First, although Nigeria and South Africa share similar global commitments, their transition pathways diverge significantly. Nigeria's transition remains policy-driven but institutionally weak, while South Africa's is institutionally grounded but constrained by economic and infrastructural pressures. Second, institutional capacity—not policy ambition—is the key determinant of transition credibility. South Africa's integrated governance model provides clearer implementation pathways, whereas Nigeria's fragmented institutional environment slows progress. Third, equity remains a cross-cutting challenge in both contexts. Without deliberate investment in skills, inclusion, and community engagement, low-carbon strategies risk worsening existing socioeconomic inequalities.

In this section, we examined how Nigeria and South Africa's low-carbon energy transition efforts align with global climate commitments and national development priorities. The findings underscore that South Africa's comparatively robust governance and policy coherence provide a more credible foundation for decarbonisation. At the same time, Nigeria's progress is hindered by institutional fragmentation, fiscal dependence on fossil fuels, and uneven policy implementation. These insights offer a basis for understanding the conditions under which African countries can advance ambitious, equitable, and sustainable energy transitions.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This section synthesises the comparative inquiry into the low-carbon energy transition pathways of Nigeria and South Africa, examining how each country aligns its domestic policies with the Paris Agreement and key Sustainable Development Goals, notably SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), and SDG 13 (Climate Action). Building on the empirical analysis presented in the preceding chapter, this section brings together the core findings, discusses their theoretical and policy implications, and proposes actionable recommendations tailored to each country, as well as broader regional perspectives relevant to Africa’s emerging energy transition architecture. The discussion concludes by reflecting on the overarching lessons for sustainable, inclusive, and coherent transition governance across the continent.

The study employed a qualitative comparative approach based on documentary analysis of national policy frameworks, updated NDC commitments, legislative instruments, and institutional reports from both domestic and international bodies (UNFCCC, 2021; IEA, 2022; World Bank, 2023). The findings converge around three interrelated themes—policy alignment, governance capacity, and socioeconomic dimensions—which together explain the differential pace, ambition, and trajectory of transition efforts in both countries.

Nigeria and South Africa have formally embedded their climate ambitions within updated NDCs and supporting sectoral strategies; however, the coherence and operational clarity of these commitments vary significantly. South Africa's Integrated Resource Plan (IRP, 2019) and the Just Energy Transition Investment Plan (2022) provide a structured framework for renewable energy expansion, coal phase-down, and climate finance mobilisation, reflecting closer alignment with the Paris Agreement's 1.5°C pathway (DMRE, 2019; PCC, 2022). In contrast, while Nigeria's Energy Transition Plan (2022) and Renewable Energy Master Plan (2005) articulate ambitious targets, implementation remains hampered by heavy reliance on fossil fuels, fiscal constraints, and fragmented institutional oversight (Government of Nigeria, 2022). South Africa's emphasis on a just transition further distinguishes its approach by explicitly linking decarbonisation to labour-market and social equity objectives.

Governance maturity emerges as the strongest determinant of transition effectiveness. South Africa’s institutional landscape—anchored by the Presidential Climate Commission and the Department of Mineral Resources and Energy—fosters inter-ministerial coordination, transparency, and stakeholder participation (PCC, 2022). Nigeria’s governance framework remains burdened by overlapping mandates among the Ministries of Power, Environment, and Petroleum Resources, limited monitoring capacity, and weak enforcement (Climate Change Act, 2021; NUPRC, 2023). Although both countries face fiscal constraints and political trade-offs, South Africa’s participatory governance model demonstrates the importance of inclusive and accountable institutions in accelerating transition outcomes.

The socioeconomic outcomes of transition illustrate stark contrasts. South Africa has operationalised SDG 8 through targeted labour retraining, local economic diversification, and social-protection elements in its just transition agenda (JET-IP, 2022; ILO, 2023). Nigeria's transition remains more technocratic and growth-oriented, with limited integration of employment-generation, poverty-reduction, and equitable development considerations (NBS, 2023; UNDP, 2022). Both countries, however, continue to grapple with structural inequalities and energy poverty, which constrain the inclusiveness and legitimacy of their transitions.

The comparative analysis offers several important theoretical and policy insights for understanding low-carbon transitions in developing economies.

Policy coherence as an accelerator: Integrating climate, energy, and development strategies enhances the efficiency, credibility, and bankability of transition pathways. Fragmented policy regimes, such as in Nigeria, weaken implementation and discourage investment (IEA, 2021; UNDP, 2023).

Institutional capacity as the core determinant of decarbonisation depth: Strong institutions, with clear mandates and accountability structures, are essential for translating policy ambition into measurable outcomes. South Africa's PCC exemplifies the importance of institutional design in guiding complex transitions.

Social justice as a foundation for climate legitimacy: Transitions that fail to address inequality, labour displacement, and community vulnerability risk resistance and long-term instability. Just transition principles should therefore be integral, not peripheral, to national transition strategies (ILO, 2023).

Transnational learning and regional cooperation: The divergent experiences of Nigeria and South Africa underscore the importance of policy diffusion and peer learning across African states through regional platforms such as the African Union (2023).

Policy Recommendations

The policy recommendations for Nigeria emphasise the need for stronger institutional coordination, accelerated deployment of renewable energy, fiscal realignment, and the integration of just transition principles into national planning. A key step toward improving policy coherence is the establishment of a National Council on Energy Transition (NCET) to harmonise the overlapping mandates of the National Council on Climate Change (NCCC), the Ministry of Power, and the Ministry of Petroleum Resources. In addition, operationalising the proposed National Renewable Energy Agency (NREA) would provide a centralised mechanism for coordinating renewable energy initiatives across sectors and government levels.

To accelerate renewable energy expansion, Nigeria must prioritise decentralised energy systems—particularly solar mini-grids and off-grid solutions—which remain the most viable means of addressing rural access deficits (World Bank, 2023). Strengthening public–private partnerships through streamlined procurement processes and targeted fiscal incentives would accelerate deployment and attract domestic and foreign investment.

Fiscal and financial reforms also remain central to Nigeria's transition pathway. Phasing out fossil-fuel subsidies and redirecting the resulting fiscal space toward renewable infrastructure, clean-technology innovation, and energy efficiency programs would improve long-term sustainability. Complementary measures—such as expanding green bond frameworks, introducing carbon-pricing mechanisms, and offering investment tax credits—would create a more enabling financial environment for the energy transition.

A just transition approach is equally essential. This requires integrating labour-reskilling programmes for workers currently employed in the oil and gas sector, alongside support for small and medium enterprises in emerging renewable value chains. Ensuring that communities participate meaningfully in the planning and execution of transition-related projects and benefit from them is critical for equity and social acceptance (ILO, 2023). Strengthening Nigeria's monitoring, reporting, and verification (MRV) systems in line with UNFCCC standards would further enhance transparency, accountability, and the credibility of national climate action.

In contrast, the recommendations for South Africa focus on deepening the implementation of its existing Just Energy Transition Investment Plan (JET-IP). Strengthening institutional oversight—particularly the role of the Presidential Climate Commission—is necessary to ensure that transition commitments are effectively monitored and public accountability is maintained. Expanding and accelerating labour-reskilling programmes, especially in coal-dependent regions such as Mpumalanga, would ensure that workers and communities are not left behind as the energy system shifts away from coal.

South Africa also needs to diversify its energy mix and promote greater decentralisation. Supporting municipal-level renewable procurement and the development of localised energy markets would relieve pressure on the national grid while improving supply reliability. These measures should be complemented by sustained grid modernisation to accommodate intermittent renewable generation and integrate advanced digital monitoring technologies.

Addressing political and financial constraints is crucial to the progress of South Africa's transition. Reforms to Eskom's governance and operational structure would improve efficiency and foster competition within the electricity generation sector. Additionally, accessing concessional financing from the Green Climate Fund and other multilateral development banks would strengthen the financial foundations of the transition. South Africa is also well-positioned to promote regional leadership through its participation in platforms such as the Southern African Power Pool (SAPP) and the African Renewable Energy Initiative (AREI), thereby facilitating knowledge exchange and collaborative energy development across the region.

At the continental level, several cross-cutting recommendations emerge. Harmonising policy frameworks through an African Union–led energy transition platform would help align NDC commitments and renewable energy priorities across the region. Promoting climate-smart industrialisation would ensure that renewable energy growth contributes directly to manufacturing development, technological advancement, and job creation. Institutionalising just transition principles across African states would help ensure that decarbonisation is socially equitable and politically sustainable. South–South cooperation—particularly in technology transfer, research collaboration, and climate finance mobilisation (OECD, 2023)—remains essential for accelerating capacity-building across the continent. Finally, establishing an African Climate and Energy Transition

Observatory would enhance data transparency, enable consistent benchmarking, and strengthen evidence-based policymaking.

This study finds that the viability and depth of low-carbon transitions in developing contexts such as Nigeria and South Africa hinge on three mutually reinforcing pillars: coherent policy design, strong institutional capacity, and social inclusivity. While both countries express strong rhetorical commitment to global climate goals, their implementation capacities differ substantially. South Africa's more integrated governance framework, precise sectoral planning, and justice-oriented transition instruments offer a valuable model for other African economies. Nigeria's transition trajectory, though promising, requires more deliberate institutional reform, fiscal realignment, and meaningful integration of socioeconomic equity into its policy agenda.

Ultimately, Africa's low-carbon future will not depend solely on technological solutions but on states' ability to create transparent, inclusive, and resilient governance systems. Aligning national development priorities with global climate imperatives will require strategic leadership, societal consensus, and sustained policy coherence. These foundations are critical for building a just, equitable, and sustainable energy future across the continent.

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