

OPPORTUNITIES FOR UNLOCKING FINANCE FOR SOUTH AFRICA'S JUST ENERGY TRANSITION AND IMPLICATIONS FOR SOCIAL DIALOGUE





International
Labour
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ABOUT THIS REPORT

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- Trade & Industry Policy Strategies
- Standard Bank
- South African National Energy Development Institute
- Enel
- Zenizeni
- World Intellectual Property Organization
- Infinium Innovations
- Daimler Truck
- ICLEI Africa
- Third Generation Environmentalism

LIST OF ACRONYMS

Acronym	Definition
AFOLU	Agriculture, Forestry, Other Land Use
AGDA	Agricultural Development Agency
APDP2	Automotive Production and Development Programme
AU	African Union
BNDES	Brazilian Development Bank
BIOFIN	Biodiversity Finance Initiative
BRT	Bus Rapid Transit
CFF	C40 Cities Finance Facility
CIF	Climate Investment Fund
COP	Conference of Parties
CPI	Climate Policy Initiative
CSP	Cities Support Programme
COVID-19	Coronavirus disease 2019
DBSA	Development Bank of Southern Africa
DFFE	Department of Forestry, Fisheries and the Environment
DFI	Development Finance Institution
DMRE	Department of Mineral Resources and Energy
EEDSM	Energy Efficiency and Demand Side Management
ESCO	Energy Service Company
ESG	Environmental, Social, and Governance
EU ETS	European Union Emissions Trading System
EPR	Extended Producer Responsibility
E-Waste	Electronic Waste
GBCSA	Green Building Council of South Africa
GEF	Global Environment Facility
GCF	Green Climate Fund
GHG	Greenhouse Gas
HIC	High-income Country
IEE	Industrial Energy Efficiency
ICLEI	International Council for Local Environmental Initiatives
IDC	Industrial Development Corporation
IFC	International Finance Corporation
IETA	International Emissions Trading Association
ILO	International Labour Organization
IPCC	The Intergovernmental Panel on Climate Change

JCTF	Just Coal Transition Forum
JET-IP	Just Energy Transition Investment Plan
JTFR	Just Transition Finance Roadmaps
LMIC	Low- and Middle-Income Countries
MRV	Monitoring, Reporting, and Verification
MCF	Multilateral Climate funds
MDB	Multilateral Development Bank
NbS	Nature-based solutions
NCCF	Natural Capital Financing Facility
NCFS	National Climate Finance Strategy
NEF	National Empowerment Fund
NDC	Nationally Determined Contributions
NEV	New Energy Vehicle
NGO	Non-governmental Organization
OECD	Organisation for Economic Co-operation and Development
PES	Payment for Ecosystem Services
PPP	Public-Private Partnership
PPA	Power Purchase Agreements
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
ReLiSA	Restoring Landscapes in South Africa
SALGA	South African Local Government Association
SANBI	South African National Biodiversity Institute
SAPG	Solar-Assisted Power Generation
SAUGA	South African Underground Coal Gasification Association
SDG	Sustainable Development Goal
SEFA	Small Enterprise Finance Agency
SLL	Sustainability-linked loan
SMEs	Small and Medium-sized Enterprises
SSA	Sub-Saharan Africa
UCG	Underground Coal Gasification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VCM	Voluntary Carbon Market
WPO	Water Partnership Office

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EXECUTIVE SUMMARY

The report presents a scoping review of South Africa's climate finance landscape, focusing on opportunities to mobilise and channel financial resources toward implementing sectoral climate policies under the Presidential Climate Commission. Its central purpose is to identify mechanisms, instruments, and enabling conditions that can unlock climate finance in support of South Africa's transition to a low-carbon, climate-resilient, and socially inclusive economy. The study responds to persistent financing gaps that hinder the realisation of the country's Nationally Determined Contribution (NDC) and Just Energy Transition objectives. Available tracking data indicate that Africa receives less than 4% of global climate finance relative to its adaptation needs, with the continent estimated to require in excess of USD 270 billion annually to meet its climate objectives. Estimates show South Africa's annual investment requirement at approximately R334 billion toward a net-zero pathway by 2050, and approximately R535 billion to implement NDC commitments by 2030 - indicative figures based on 2021–2022 Rand values and subject to revision. It also situates South Africa's efforts within the broader context of global and African climate finance dynamics, recognising that achieving national climate goals depends on strengthening institutional readiness, fostering multi-stakeholder collaboration, and aligning fiscal and policy frameworks with international best practices.

The report provides a review of the climate finance ecosystem supporting South Africa's Just Energy Transition. Specifically, it maps the current landscape of climate finance instruments, evaluates the institutional, policy and market conditions influencing their deployment, examines barriers and enabling opportunities across priority sectors, and synthesises lessons from international experience to identify practical financing approaches that are relevant to South Africa. Financial decisions play a critical role in shaping not only environmental outcomes but also broader social and economic development trajectories. While emissions reductions and investment volumes are important indicators of success, they do not capture the distributional consequences of climate and transition investments. Financing choices can affect employment, livelihoods, income distribution, access to services, and the resilience of vulnerable communities. Therefore, evaluating finance flows through a social equity lens is essential to ensure that the transition contributes to inclusive and sustainable development rather than exacerbating existing inequalities.

Using a scoping review as its primary methodology, the study synthesises evidence from peer-reviewed literature and published climate finance assessments, including national climate finance tracking undertaken by institutions such as the Presidential Climate Commission (PCC) and Climate Policy Initiative (CPI). Rather than generating new estimates of climate finance flows, the report draws on existing evidence to assess financing instruments, institutional arrangements, implementation barriers, enabling conditions, and international lessons relevant to South Africa's Just Energy Transition and social dialogue. Therefore, its main objective is to generate a structured understanding of the strengths, limitations, implementation requirements, and policy implications of different financing approaches, while identifying the enabling conditions required to translate climate finance commitments into investable projects and measurable socio-economic outcomes. As such, this report should be interpreted as a scoping review for social dialogue, not yet a full financing roadmap or investment plan.

Throughout the analysis, social dialogue is treated as a cross-cutting mechanism for improving governance, strengthening institutional coordination, and ensuring that financing decisions support equitable and inclusive transition outcomes. Social dialogue is proposed as the primary implementation mechanism because the barriers identified in this report are not solely financial, but institutional, governance and coordination challenges that cannot be resolved by individual actors acting independently. Unlike conventional consultation processes, social dialogue provides a structured platform through which government, business, labour, civil society, development finance institutions and affected communities can jointly identify priorities, negotiate trade-offs, build consensus on financing and policy reforms, and establish shared accountability for implementation. By bringing together both the providers and users of climate finance, social dialogue helps align public policy with investment decisions, improves the bankability of climate projects, strengthens institutional coordination, and builds the trust necessary to mobilise private capital. It therefore transforms broad policy recommendations into jointly owned implementation commitments with clearly defined responsibilities, timelines and monitoring arrangements, thereby addressing many of the governance failures that have constrained climate finance mobilisation in South Africa.

The review identified a diverse portfolio of market- and non-market-based financial instruments that could support South Africa's climate and just transition objectives. However, the maturity of these instruments varies, with only a limited number of these instruments being actively deployed, while others are still emerging, under development, or being considered for future implementation. While a detailed evaluation of the relative merits of these financing options falls outside the scope of this report, it is important to acknowledge the ongoing debate surrounding market-based instruments such as carbon credits and carbon tax. These debates relate both to their implementation, negative impacts and effectiveness in delivering intended environmental and social outcomes, as well as broader concerns about the reliance on market mechanisms rather than regulatory or public policy interventions. Similar considerations have also been raised in relation to emerging biodiversity credit markets.

The analysis recognises that South Africa's climate finance ambitions are shaped not only by domestic policy and institutional factors but also by broader constraints within the global financial architecture. Lessons are drawn from case studies and best practices across Africa, Asia, Latin America, and coal-dependent countries, highlighting how innovative financial instruments, such as blended finance, green bonds, and carbon markets, can be leveraged to attract private capital while ensuring equitable outcomes. To complement the existing literature on just energy transitions from the Global South perspective, the report incorporates selected case studies from developed economies to fill in identified gaps on fossil fuel depended regions, provide a more balanced and comparative perspective on transition pathways, financing mechanisms, institutional arrangements, and implementation experiences. While innovative mechanisms such as blended finance, carbon markets, and debt-for-nature swaps can help mobilise resources, their success depends on broader global financial reforms and stronger support from developed countries. Climate finance should

complement, rather than replace, public expenditure by mobilising additional investment for priority development and climate objectives, including energy access, resilience, water security, and social protection.

The analysis highlights that South Africa's Just Energy Transition (JET) requires a more balanced, technology-inclusive, and project-driven financing framework that moves beyond a narrow focus on renewable energy. While the JET framework identifies five major transition pathways, i.e., electricity, new energy vehicles, green hydrogen, skills development, and municipal finance, the findings indicate that the current approach would be strengthened by incorporating clean coal technologies, hybrid energy systems, and transitional technologies already recognised within South Africa's Coal Roadmap and broader policy framework. Key technology pathways identified include Underground Coal Gasification (UCG), Solar-Assisted Power Generation (SAPG), circulating fluidised bed (CFB) technologies for discard coal, ammonia co-firing, and coal value-addition opportunities such as coal-to-chemicals and carbon products. The analysis further argues that coal should not be viewed solely as an environmental liability, but also as a strategic economic and energy security asset that can be responsibly managed within a gradual transition pathway. In this regard, the report identifies significant near-term opportunities in flexible coal operations, mine rehabilitation and repurposing, municipal energy efficiency retrofits, and hybrid energy systems that offer relatively low-cost, self-financing, and employment-supporting interventions.

The findings further demonstrate that successful energy transitions depend not only on technology choices, but also on institutional readiness, innovative financing mechanisms, and socially anchored implementation strategies. International case studies from the Global South and first world countries illustrate the importance of hybrid transition models, targeted financial instruments, state-supported transition funds, concessional finance, public-private partnerships, and strong regulatory coordination. Importantly, the analysis emphasises that different technologies require different financing instruments based on their risk profiles, with concessional finance and guarantees being more appropriate for first-of-a-kind technologies such as UCG, while green bonds, ESCO models, and capacity charge arrangements are better suited for mature or utility-scale projects. To address implementation challenges, the study proposes a diversified and actionable project pipeline aligned with the JET-IP framework, including transmission expansion, renewable energy zones, green hydrogen, electric vehicles (EVs) infrastructure, municipal embedded generation, mine rehabilitation, industrial diversification, and strategic coal-related transition projects. Overall, the analysis concludes that South Africa's Just Energy Transition must balance decarbonisation with affordability, reliability, industrial development, and socio-economic stability, supported by a pragmatic and diversified investment strategy capable of mobilising both international climate finance and domestic development finance.

The findings reveal that while South Africa has developed strong climate policy foundations, including the Climate Change Act 22 of 2024, Carbon Tax Act 15 of 2019, and Just Energy Transition Investment Plan, significant challenges persist, particularly around institutional fragmentation, limited concessional finance, and the dominance of market-rate debt. Drawing from international experience, the report recommends six key policy priorities for

social dialogue: (i) strengthening enabling frameworks and climate governance; (ii) scaling up innovative finance instruments such as green and sustainability-linked bonds; (iii) enhancing coordination across government and financial institutions; (iv) promoting inclusive and gender-responsive financing; (v) improving monitoring, reporting, and verification (MRV) systems; and (vi) incentivising private sector participation through de-risking mechanisms and fiscal incentives. Collectively, these recommendations aim to support South Africa in strengthening its climate finance architecture in support of its NDC and just transition commitments.

The report highlights three key messages: (i) governance and social dialogue as cornerstone of climate finance; (ii) translating structural barriers to scalable solutions; (iii) mobilising climate finance for an inclusive energy transition, elaborated as follows.

(i) Governance and social dialogue as cornerstone of climate finance

Section 3 identified a wide range of existing climate finance instruments including green bonds, grants, concessional loans, sustainability linked loans, guarantees, equity investments, carbon markets, climate insurance and tax incentives that can be deployed to accelerate South Africa's just energy transition. However, evidence from the literature shows that access to finance alone is not sufficient to guarantee a just energy transition. Lessons based on international case studies discussed in Section 5 suggest that the effectiveness and legitimacy of climate finance depend on robust governance and inclusive social dialogue, ensuring that worker protection, reskilling and local economic development and affordability are treated as core performance outcomes, alongside emission reductions.

(ii) Translating structural barriers to scalable solutions

The analysis in Section 4 reveals that structural, institutional, policy and financial constraints, not absence of the global climate finance, remain the primary barriers to financing a just energy transition in South Africa and other developing countries. These challenges translate into a critical mismatch between available sources of climate finance and the readiness of projects seeking funding. Many municipalities, public institutions, and local enterprises face constraints in project preparation, technical capacity, monitoring systems, and access to financial expertise, limiting their ability to develop bankable projects that meet investor and donor requirements. Addressing these capacity gaps is therefore as important as mobilising additional finance, as it enables the translation of climate finance commitments into investable and scalable projects with measurable social and environmental outcomes. However, lessons based on international case studies show that South Africa has significant opportunities to scale finance through strengthened policy certainty, blended finance, concessional loans and de-risking mechanisms, domestic financial market innovation and sector specific investment pipelines that align mitigation, adaptation and social inclusion.

(iii) Mobilising climate finance for an inclusive energy transition

Evidence from comparable economies presented in Section 5 suggests that innovative blended and de-risking finance instruments are critical enablers of just energy transitions.

For South Africa, the challenge is to ensure that climate investments are aligned with national development priorities and just transition objectives. Mobilising these instruments requires coherent governance, regulatory stability, and meaningful community engagement. This requires climate finance to complement public investment, support vulnerable communities, expand access to energy and resilience infrastructure, and promote inclusive economic opportunities alongside decarbonisation.

Finally, priority actions are essential to address the most significant and systemic barriers to mobilising and effectively deploying climate finance in support of a just transition. Evidence from the literature review indicates that governance weaknesses, institutional fragmentation, limited coordination, and capacity constraints often undermine the effectiveness of climate finance instruments and investment programmes. Consequently, actions that strengthen the enabling environment for climate finance are prioritised ahead of interventions focused on specific financing mechanisms or sectoral investments. The sequence therefore follows a logical progression from addressing foundational governance and coordination challenges to expanding financial flows, enhancing implementation capacity, strengthening accountability, and ensuring that the benefits of climate finance are distributed equitably across society. Based on this assessment, a ranked set of five priority actions for the Presidential Climate Commission (PCC) and its social partners is proposed to support the mobilisation, coordination, and effective utilisation of climate finance for South Africa's just transition.

1. **Strengthen climate finance governance and coordination mechanisms** by improving alignment between national, provincial, and local government institutions, strengthening the role of coordinating structures such as the JET PMU, and embedding climate finance considerations within integrated planning processes.
2. **Expand access to concessional and blended finance** by developing innovative financing mechanisms, de-risking instruments, and project preparation facilities that can mobilise both public and private investment, particularly for adaptation, resilience, and just transition initiatives.
3. **Enhance project preparation, technical capacity, and climate finance readiness** through targeted support for municipalities, public institutions, communities, and small enterprises to develop bankable projects and meet climate finance access requirements.
4. **Improve transparency, accountability, and social dialogue arrangements** by establishing clear stakeholder participation processes, information disclosure protocols, monitoring frameworks, and reporting mechanisms to ensure climate finance delivers equitable and measurable outcomes.
5. **Promote inclusive and equitable access to climate finance benefits** by prioritising investments that address energy poverty, support vulnerable communities and workers, advance gender-responsive financing, and expand access to decentralised renewable energy and other inclusive development opportunities.

1 INTRODUCTION

According to the Intergovernmental Panel on Climate Change, human-induced warming reached approximately 1.1°C above pre-industrial levels as of the early 2020s, with the most severe and irreversible climate impacts projected beyond 1.5°C (IPCC, 2021). Remaining within this threshold is essential to prevent the most severe and irreversible impacts on ecosystems, economies, and human well-being. Modelled pathways consistent with limiting warming to 1.5°C require deep and rapid emissions reductions across all sectors this decade (IPCC, 2022; UNEP, 2024). However, securing adequate finance is among the top ten pressing challenges in advancing the global climate agenda because of its critical role as an enabler for translating sectoral climate policies into concrete action (Sieber and Erzini-Vernoit, 2024). While ambitious strategies have been developed across the globe for different sectors such as energy, agriculture, water, forestry, and transport, effective implementation of climate policies is constrained by limited financial resources required to operationalize these commitments and competing development priorities.

A just, equitable, and predictable transition to net-zero requires massive investment, especially in Low- and Middle-Income Countries (LMICs), where population growth and economic growth are projected to drive essentially all global future increase in greenhouse gas emissions (GHGs). However, a mismatch exists between mobilization and on-the-ground implementation, despite growing climate finance initiatives across the region. Available tracking data indicate that Africa receives a disproportionately small share of global climate finance relative to its adaptation needs, with the continent estimated to require in excess of USD 270 billion annually to meet its climate objectives (Shabalala et al., 2025; African Development Bank et al., 2024). The amount of climate finance needed to push the just energy transition initiative as well as climate mitigation and adaptation projects in Africa is huge.

South Africa's climate finance landscape has been systematically documented through national climate finance tracking exercises, beginning with the Climate Policy Initiative (CPI)'s baseline assessment and subsequently updated by the Presidential Climate Commission (PCC) to provide a more comprehensive understanding of climate finance flows across sectors and funding sources (Cassim et al., 2021; Meattle et al., 2023; 2024, 2025). Throughout this report, estimates of climate finance flow used as supporting evidence for the deployment of various financing instruments are drawn from existing climate finance tracking studies rather than being independently estimated. In particular, the analysis builds on nationally recognised climate finance assessments undertaken by the PCC and the CPI, which provide comprehensive assessments of climate finance flows and investment trends in South Africa. The present study complements these efforts by examining the policy, institutional, governance, financing instrument and social dialogue dimensions required to translate finance into effective implementation.

While tracked climate finance in the country has grown in recent years, it still remains well below what is required and often amounting to less than half of the needed investment (Meattle et al., 2023). Despite increasing climate finance flows, substantial investment gaps remain across mitigation, adaptation and just transition priorities, necessitating significant mobilisation of domestic and international capital alongside innovative financing instruments (Cassim et al., 2021; Patel, 2021; Meattle et al., 2023; 2024; 2025). The PCC and CPI analysis estimates South Africa's annual investment requirement at approximately R334

billion toward a net-zero pathway by 2050, and approximately R535 billion to implement NDC commitments by 2030 – indicative figures based on 2021–2022 Rand values and subject to revision (Meattle et al., 2023). South Africa's updated NDC (2021) specifies emissions ranges: 398-510 Mt CO₂-eq in 2025 and 350-420 Mt CO₂-eq in 2030. Achieving net-zero by 2050 is a long-term aspirational goal from the Low-Emission Development Strategy, not a binding NDC commitment (NBI, 2022c). This gap highlights the urgent need to design innovative approaches for mobilising and directing finance towards national and sectoral priorities. OECD (2025) South Africa's climate ambitions can only be achieved through a major scale-up in climate financing. The National Business Initiative similarly highlights that mobilising climate finance requires coordinated public-private partnerships, stronger project preparation capacity, policy certainty and effective collaboration between government, financiers and business to unlock investment at scale (NBI, 2023).

Unlocking climate finance in South Africa therefore represents both a necessity and an opportunity to accelerate mitigation and adaptation interventions at scale. Opportunities lie in leveraging multiple streams of finance including international climate funds such as bilateral and multilateral donors, and domestic climate finance such as government budget allocations and increasingly, private sector investments through mechanisms such as blended finance, carbon markets, and green bonds. Each of these financing avenues requires enabling institutional frameworks, transparent governance systems, and strong technical capacities to design and deliver bankable projects.

Instruments such as the Just Transition Finance Roadmaps (JTFR), launched in 2021 to mobilise capital aligned with the transition in South Africa and India, demonstrate emerging financing pathways with the private sector playing a critical role. However, private sector funding still remains fragmented, unpredictable and inadequate despite the recognition of financial institutions in enabling South Africa's Just Transition (NBI, 2022a). This situation suggests a challenge in translating climate initiatives into sector-specific implementation policies. Thus, the mobilisation of climate finance in the country could be strengthened by aligning sectoral policies with national climate objectives and the Paris Agreement commitments. For example, agriculture and land-use policies open avenues for climate-smart agriculture funding, while renewable energy and energy efficiency policies provide entry points for sustainable infrastructure investment in the country. Similarly, water and ecosystem management policies can attract adaptation funding linked to resilience building and biodiversity protection. Moreover, limited technical analysis and insufficient dialogue around the socio-economic impacts of transition such as those associated with coal phase-out risk undermining stakeholder buy-in and delaying progress.

Against this backdrop, this report supports South Africa's PAGE 2.0 activity in addressing both the financing gap and the enabling conditions that underpin effective energy transition and climate action. Rather than developing a financing roadmap or investment strategy, this report provides a strategic evidence base for decision-making. It examines how existing climate finance instruments operate, the institutional and policy conditions required for their effective implementation, the principal barriers limiting climate finance mobilisation, and the opportunities for strengthening South Africa's climate finance architecture. The report also draws on international experience to identify financing approaches and governance practices that may be adapted to South Africa's Just Energy Transition while recognising the country's unique institutional and socio-economic context. The report focuses not only on the just energy transition, but also on wider sectoral climate finance needs and opportunities

across key sectors including energy, water, agriculture, transport, biodiversity, human settlements, and waste management. By focusing on opportunities for unlocking finance, the activity aims to provide insights into how sectoral policies can be better supported through targeted financial mechanisms, evidence-based social dialogue, and strengthened institutional readiness.

Accordingly, the report pursues five complementary objectives. First, it characterises the existing landscape of climate finance instruments available to support South Africa's Just Energy Transition. Second, it analyses the institutional, governance, policy and market barriers that constrain effective mobilisation and deployment of finance while identifying opportunities to strengthen climate finance readiness. Third, it evaluates international case studies to identify innovative financing models and transferable lessons applicable to South Africa. Fourth, it considers the implications of these findings for evidence-based social dialogue and stakeholder engagement. Finally, it synthesises these insights into practical policy recommendations that can support the Presidential Climate Commission and its social partners in strengthening climate finance governance and implementation. This report therefore investigates the specific opportunities for mobilising and channeling finance towards the implementation of sectoral policies, with a focus on:

- Identifying untapped and underutilised funding instruments such as international climate funds, multilateral and bilateral development partners, private sector mechanisms and domestic resource mobilisation.
- Leveraging on partnerships with the private sector, development finance institutions, and international climate funds.
- Exploring innovative financing models, such as blended finance, green bonds, carbon markets, and sustainability-linked loans, which may catalyse additional resources.
- Highlighting enabling conditions such as institutional readiness, policy coherence, and governance mechanisms.
- Facilitating evidence-based social dialogue to ensure financing decisions account for socio-economic and environmental realities.
- Providing policy-relevant insights into the enabling conditions including institutional frameworks, governance, and capacity building necessary to attract and sustain finance.
- Drawing lessons from best practices and innovative financing models across Africa and other regions.
- Supporting an inclusive green economy, by ensuring that financial flows advance both climate goals and equitable development outcomes.

By doing so, the study aims to provide actionable insights into how climate finance can be unlocked, scaled up, and directed towards priority sectoral interventions that support national and regional sustainable development pathways. In addition, the analysis identifies (i) opportunities to assist the South African government in identifying the areas where climate finance can deliver the greatest impact in advancing sustainable, low-carbon development, and (ii) highlight the key challenges and knowledge gaps that must be addressed to unlock and accelerate the necessary shifts in climate investment flows.

1.1 Purpose and Scope

The purpose of this report is to provide a strategic assessment of South Africa's climate finance landscape in support of the Just Energy Transition. Specifically, the report maps existing climate finance instruments, analyses the barriers and enabling conditions affecting their mobilisation and implementation, evaluates international good practices and innovative financing approaches, and identifies policy-relevant opportunities for strengthening climate finance governance, institutional coordination, and evidence-based social dialogue. Through this assessment, the report aims to support the Presidential Climate Commission and its social partners in improving the mobilisation, coordination, and effective deployment of climate finance across priority sectors. It is important to distinguish the scope of this study from national climate finance tracking exercises. Unlike the Presidential Climate Commission's biennial Climate Finance Landscape reports, which quantify and monitor climate finance flows across South Africa, this report does not undertake primary climate finance accounting or tracking. Instead, it synthesises existing evidence to examine the effectiveness of financing instruments, implementation barriers, enabling conditions, international lessons and implications for social dialogue supporting South Africa's Just Energy Transition.

The report seeks to bridge the persistent financing gap by exploring diverse sources of funding including international climate finance, and the broader domestic public and private sector investment in relation to climate finance while assessing innovative mechanisms such as blended finance, green bonds, carbon tax and carbon markets. Its scope extends beyond financial flows to include the enabling policy, institutional, and governance frameworks required to attract, channel, and sustain investment in climate-related sectors. To broaden the scope and ensure a more comprehensive assessment of transition options, the analysis incorporates financing considerations for clean coal and hybridisation pathways. This inclusion is justified on the basis that these technologies are already recognised within South Africa's Coal Roadmap and broader energy policy framework as viable transitional solutions. Their integration into the analysis strengthens policy relevance by reflecting existing national planning priorities while also supporting a more balanced approach to energy system transformation that accommodates both decarbonisation objectives and energy security imperatives. The report aims to facilitate evidence-based dialogue to ensure that financing strategies are socially inclusive, economically viable, and environmentally sustainable. The focus is on supporting the Presidential Climate Commission to identify potential opportunities for unlocking finance for implementing sectoral and thematic policies.

While this report focuses on climate finance instruments, it is important to recognise that climate finance represents only one component of the broader financing landscape and cannot substitute for conventional public expenditure, private investment, or core development budgets. Many climate finance mechanisms require demonstration of additionality, meaning that funded activities should generate climate benefits beyond what would have occurred under existing policies or business-as-usual investments (Michaelowa et al., 2019). Consequently, expectations regarding the scale and scope of climate finance should remain realistic. Furthermore, the financing discussion focused on sector-wide climate finance with energy as a central case situated within a broader development context where several inclusive economic development opportunities remain underexploited. For

example, decentralised renewable energy solutions for electrification, particularly in underserved and rural areas, continue to offer relatively low-cost opportunities to advance energy access, local economic development, job creation, and climate objectives simultaneously. Recognising these opportunities helps position climate finance as a complementary rather than standalone instrument for supporting South Africa's just energy transition.

1.2 Structure of the Report

The report is structured into six sections. Section 2 outlines the methodology employed in the study, with a particular focus on the scoping review approach. Section 3 examines existing financial mechanisms and instruments for accelerating the just energy transition. Section 4 analyses the key barriers and opportunities associated with financing a just energy transition in South Africa. Section 5 reviews case studies on innovative financing instruments to support a just energy transition, while Section 6 provides conclusions and policy recommendations.

2 METHODOLOGY AND DATA SOURCES

This section adopts and outlines the scoping review of secondary literature as its primary methodological approach. The report applies the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to scoping reviews (Tricco et al., 2018), which includes specific items for scoping studies such as the rationale for the scoping approach and the presentation of results by source characteristics. The scoping review methodology is appropriate for the study objective since the report aims to map the landscape of financial instruments, barriers, opportunities, and lessons from different regions. The scoping review approach, search strategy, databases, inclusion and exclusion criteria are discussed. The section further highlights the quality-assessment process used to validate the review findings. Finally, the section discusses the key methodological limitations of the study and their implications for the findings.

2.1 Scoping Review Purpose and Design

The study employed a scoping review to map the landscape of climate finance and identify gaps in relation to the implementation needs of sectoral climate policies in South Africa using case studies from the Global south perspective complemented by specific examples on fossil fuel dependent regions from first world countries. Accordingly, this review is not intended to serve as a climate finance tracking exercise. Instead, it leverages climate finance flow estimates from established tracking studies, most notably those undertaken by the Presidential Climate Commission (PCC) and the Climate Policy Initiative (CPI), to critically examine the utilization, scale, and constraints of climate finance instruments within the South African context. These studies provide the quantitative evidence base upon which the present qualitative assessment of financing mechanisms, governance arrangements and implementation challenges is built.

Lessons from international case studies were assessed for their transferability to South Africa by examining the extent to which the enabling policy environment, institutional arrangements, market maturity, regulatory frameworks, and financing ecosystems in the case study countries align with South African conditions. Particular attention was given to identifying context-specific factors that may facilitate or constrain implementation, thereby ensuring that recommendations are adapted to local realities rather than replicated uncritically. The scoping review also evaluated sector-specific opportunities. For instance, renewable energy policies may leverage concessional finance for grid modernisation; agriculture and land-use strategies can access climate-smart agriculture funding; water management policies may attract adaptation and resilience-focused investment; while nature-based solutions can open avenues for biodiversity-linked financing. The scope is broadened by the inclusion of financing mechanisms for clean coal and hybridisation pathways. The scoping review was designed to ensure transparency, breadth, and methodological rigour, following established guidance for scoping studies (e.g. Arksey and O'Malley, 2005).

2.1.1 Scoping Review Approach

The review process involved three main stages. First, a search strategy was developed to identify relevant literature such as published journal articles across popular databases (including Scopus, Web of Science, and Google Scholar) and official published reports

downloaded from various websites owned by multilateral development banks, international organisations (e.g., UNEP, OECD, World Bank, CPI), government departments, and policy think tanks between September and December 2025. The three databases were selected to ensure the inclusion of both scholarly literature and scientific reports. The search strategy employed in this report builds on key words applied in previous review studies. Search terms combined keywords related to "climate finance", "innovative financing mechanisms", "Green Bonds", "concessional financing", "Grants", "Guarantee", "equity investment", "carbon markets", "blended finance", "debt-for-nature swap", "sectoral policies", "mitigation finance", "adaptation finance", "just transition", "developing countries" and "South Africa", "Global South" ensuring coverage of both global and country-specific perspectives. The scoping review used Boolean algebra such as "AND", "OR" and "NOT" to combine and refine search terms, ensuring comprehensive retrieval of relevant literature while excluding irrelevant results.

Second, clear inclusion and exclusion criteria were applied. Sources were included if the study (i) addressed climate finance source, climate finance flows, instruments, or governance; (ii) provided evidence relevant to policy implementation or financing gaps; and (iii) focused on developing countries, Global South, Africa, or South Africa specifically. Documents that were purely conceptual without policy or financial relevance, non-English, duplicated earlier analyses, or lacked sufficient methodological transparency were excluded. A three-step screening process comprising identification, screening, and inclusion was applied. The identified articles were captured in a reference management software (EndNote X20) allowing the diagnosis and elimination of duplicate articles, after which the remaining studies were screened based on titles, abstracts and key words in a next step to select potential papers qualifying for a full-text review. In the final step, a full-text assessment of the selected articles was undertaken to determine the final set of articles included in the study. This screening process ensured that only credible and policy-relevant evidence informed the analysis.

Finally, data from the selected documents were systematically captured using an Excel based data-extraction template following the framework highlighted in step two. Information was captured on funding sources, financial instruments, sectoral allocation, geographic focus, institutional arrangements, and identified barriers to implementation. Attention was given to studies applying robust climate finance accounting methodologies, notably those developed by the Climate Policy Initiative and OECD, which were adapted to the South African context to enhance consistency and comparability of estimates. This step enabled the study to map existing financing flows and to assess gaps between current investment levels and the financial requirements implied by sectoral policies and national climate commitments.

2.1.2 Summary of the Scoping Review Results

The PRISMA flow diagram presented in Figure 1 illustrates each stage of the selection process, including identification, screening, and final inclusion, thereby providing a transparent account of how the final body of literature was derived. Following the removal of 654 duplicate records and documents that were inaccessible or required subscription fees, 1,746 records remained for preliminary screening. These records were subsequently imported into EndNote X20, where an additional 450 duplicate records were identified and removed, resulting in a final screening dataset of 1,296 records.

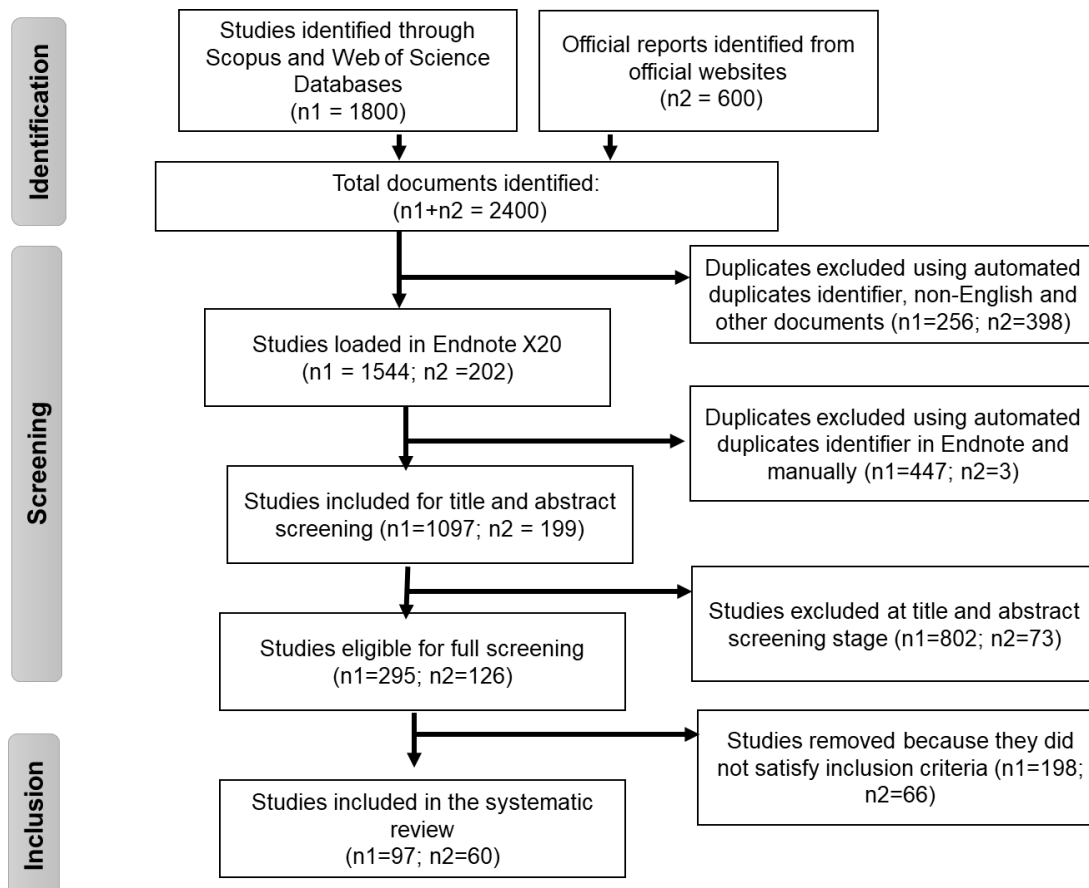


Figure 1: PRISMA flow chart showing the search results

The screening process involved a review of titles, abstracts, and keywords, leading to the exclusion of 875 records that were not directly relevant to climate finance, just transitions, energy transitions, or the South African and broader developing-country context. The remaining 421 records underwent full-text assessment, during which a further 264 records were excluded due to limited relevance, insufficient methodological rigor, duplication of findings, or inadequate coverage of climate finance mechanisms, barriers, opportunities, and social dimensions of the transition. Following this systematic and rigorous review process, 157 sources met the inclusion criteria and were retained for detailed analysis, consisting of 97 peer-reviewed journal articles and 60 reports, including 11 policy summaries and staff notes.

Figure 2 shows a clear dominance of peer-reviewed academic literature across the assembled evidence base, with published journal articles accounting for the largest share (54%). This indicates that the analysis is strongly grounded in rigorous, scholarly research, which enhances the credibility and academic robustness of the study. The second largest category is reports (36%), including full reports, summaries, and staff notes. This substantial proportion reflects the importance of policy-oriented and institutional knowledge, particularly in fields like climate finance and sustainable development where organisations and governments play a key role. In contrast, books and book chapters (6%) and discussion/working/white papers (4%) make up a relatively small share of the literature.

Distribution of Literature Sources

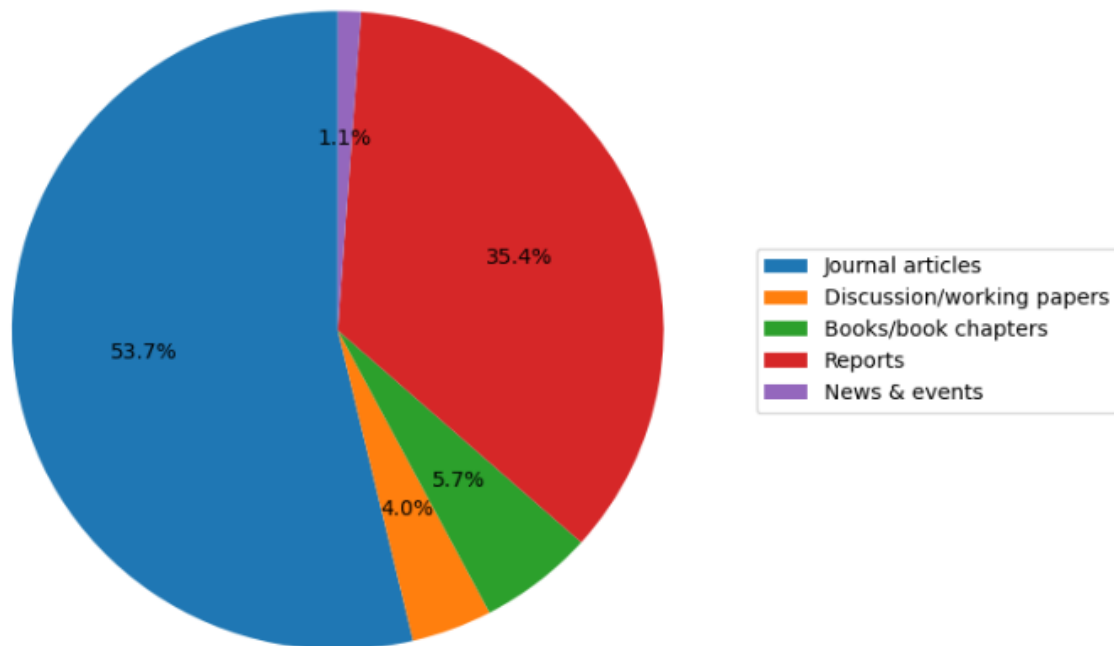


Figure 2: Distribution of literature by type of publication

While limited in number, these sources typically provide conceptual insights and emerging perspectives, complementing the empirical and policy-focused evidence. Finally, news and events sources (1%) represent a very small fraction of the dataset, indicating that the study relies minimally on non-academic or non-peer-reviewed information. This further strengthens the overall reliability of the analysis. Overall, the distribution demonstrates a well-balanced evidence base, combining academic rigor with practical and policy relevance, while maintaining limited reliance on less formal sources.

The studies included in this analysis demonstrate a strong interdisciplinary focus on climate finance, just energy transition, blended finance, and nature-based solutions, with a dominant emphasis on South Africa and other coal-dependent Global South countries. As shown in Figure 3, most sources originate from Africa, particularly South Africa, followed by global institutional reports from the OECD, World Bank, IMF, and UNEP, which provide policy frameworks and comparative insights. Asia and Latin America contribute practical lessons on renewable energy finance, green bonds, and biodiversity financing, while Europe mainly offers institutional guidance. Overall, the literature is highly policy-oriented, contemporary, and grounded in blended finance, carbon markets, and inclusive just energy transition strategies.

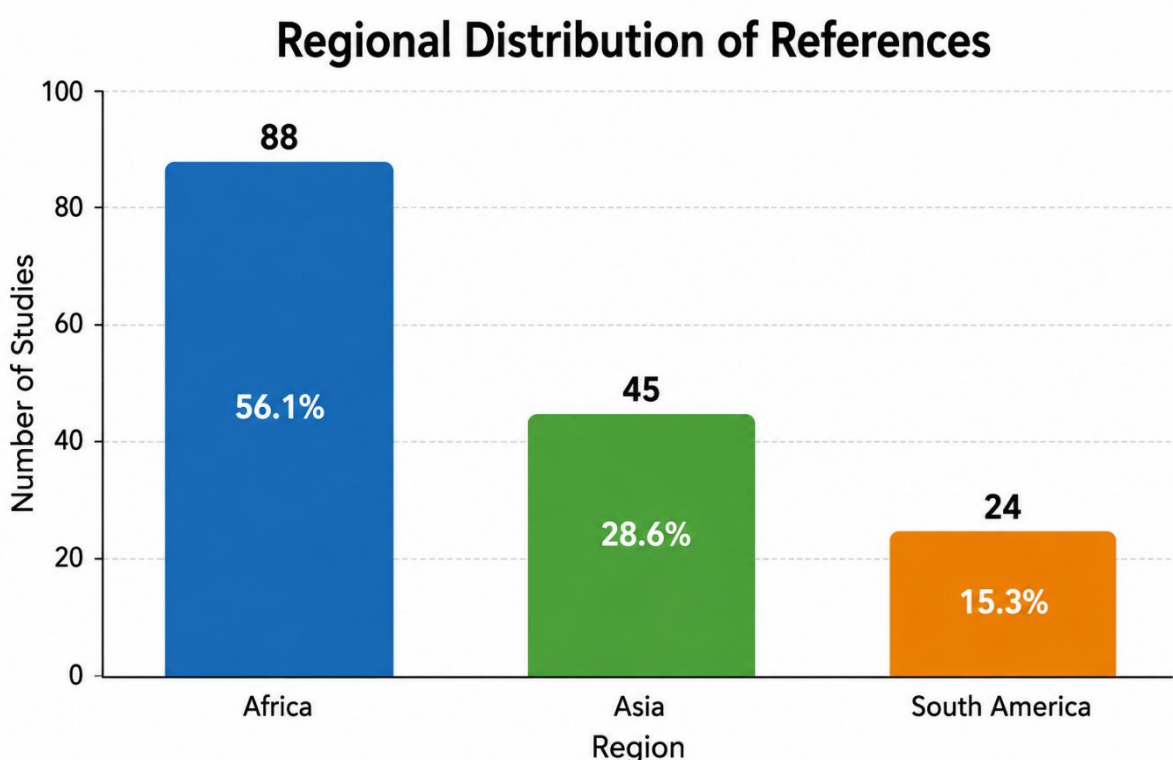


Figure 3: Regional distribution of the selected studies

2.2 Theory of Change for Just Transition Finance

This report proposes a theory of change shown in Figure 4 developed to guide the analytical framework, results and discussion. It should be noted that the theory of change presented in this report is preliminary, having been developed primarily from a review of the literature. As such, it should be validated and refined through structured engagement with relevant stakeholders to enhance its practical relevance, contextual appropriateness, and applicability to implementation. This theory is based on the premise that achieving climate and just transition objectives in South Africa requires more than simply mobilising financial resources. Climate finance can only generate meaningful mitigation, adaptation, and socio-economic outcomes when it is supported by enabling policy frameworks, strong governance systems, institutional capacity, and inclusive social dialogue processes. This systems perspective is consistent with the National Business Initiative's assessment that climate finance mobilisation depends not only on the availability of capital but also on a pipeline of bankable projects, institutional coordination, policy certainty and investment-ready governance structures (NBI, 2022b). In this context, climate finance instruments such as grants, concessional loans, blended finance, green bonds, carbon markets, and private sector investments act as catalytic mechanisms that support the implementation of sectoral climate interventions across energy, water, agriculture, transport, biodiversity, human settlements, and waste management (Lowitt, 2021). However, the effectiveness of these instruments depends on clear regulatory frameworks, transparent fiduciary systems, coordinated institutions, and technical capacity to develop and implement bankable projects.

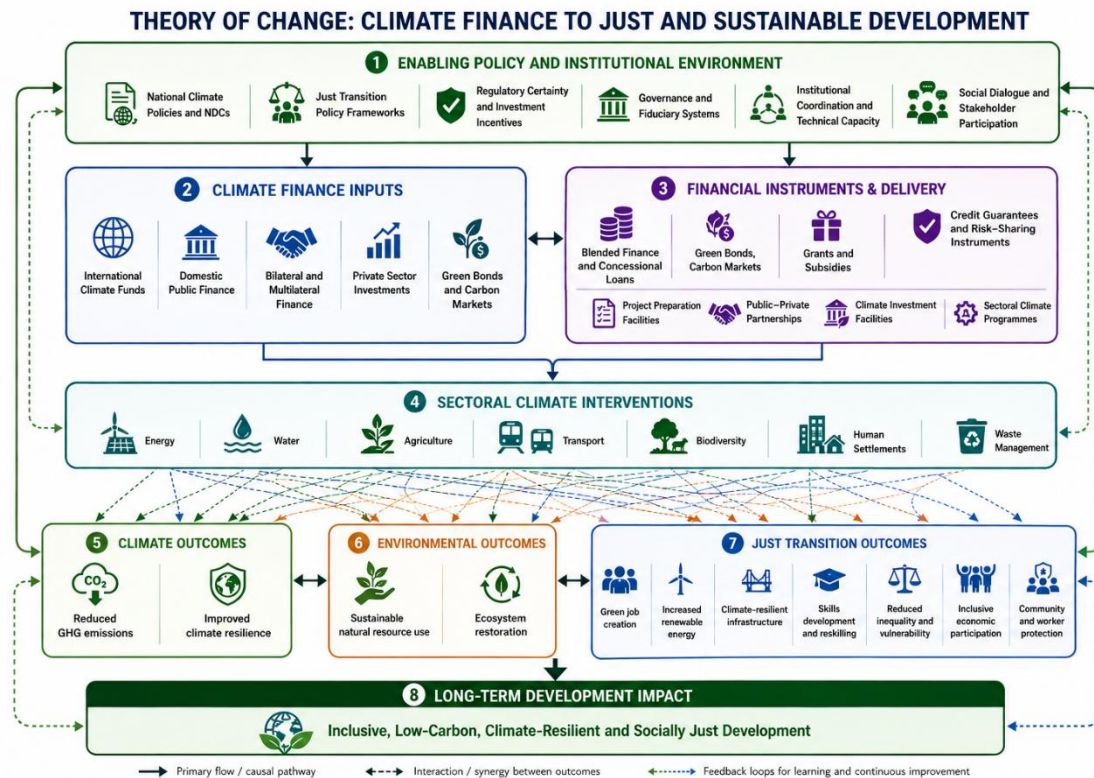


Figure 4: Theory of change

The theory of change further assumes that well-coordinated climate finance interventions contribute not only to environmental outcomes such as reduced greenhouse gas emissions, improved climate resilience, ecosystem restoration, and sustainable infrastructure development, but also to broader just energy transition outcomes. These include job creation, protection of vulnerable communities, skills development, reduced inequality, improved energy access, and enhanced socio-economic inclusion. Social dialogue, stakeholder participation, and institutional coordination are therefore critical cross-cutting enablers that help ensure climate investments are implemented in an equitable, inclusive, and socially acceptable manner (NBI, 2022a). The report therefore conceptualises climate finance as a mechanism that links policy and institutional reforms to climate and development outcomes through targeted financial instruments and governance processes.

2.3 Social Dialogue Framework for Climate Finance and Just Energy Transition

The conceptualisation of social dialogue adopted in this report is informed by the Presidential Climate Commission's work on facilitating an inclusive and procedural just transition in South Africa (PCC, 2021; 2022). The PCC emphasises that social dialogue extends beyond stakeholder consultation and should function as a continuous governance mechanism through which government, organised labour, business, civil society, communities and knowledge institutions jointly shape transition pathways, negotiate trade-offs, build trust and strengthen accountability. Accordingly, the framework presented in this report aligns with the PCC's approach by positioning social dialogue as a strategic enabler of climate finance mobilisation, institutional coordination and equitable implementation of sectoral climate policies rather than as a standalone consultation process. Figure 5 presents a proposed social dialogue framework for climate finance and just energy transition utilised

in this report. Social dialogue is a critical component of climate finance and the just energy transition policy engagement, providing a structured and inclusive platform for collaboration among government, private sector actors, financial institutions, labour unions, civil society organisations, academia, development partners, and affected communities. It plays an important role in addressing the uneven social and economic impacts of climate policies and investments by promoting transparency, trust, stakeholder ownership, and socially inclusive decision-making.

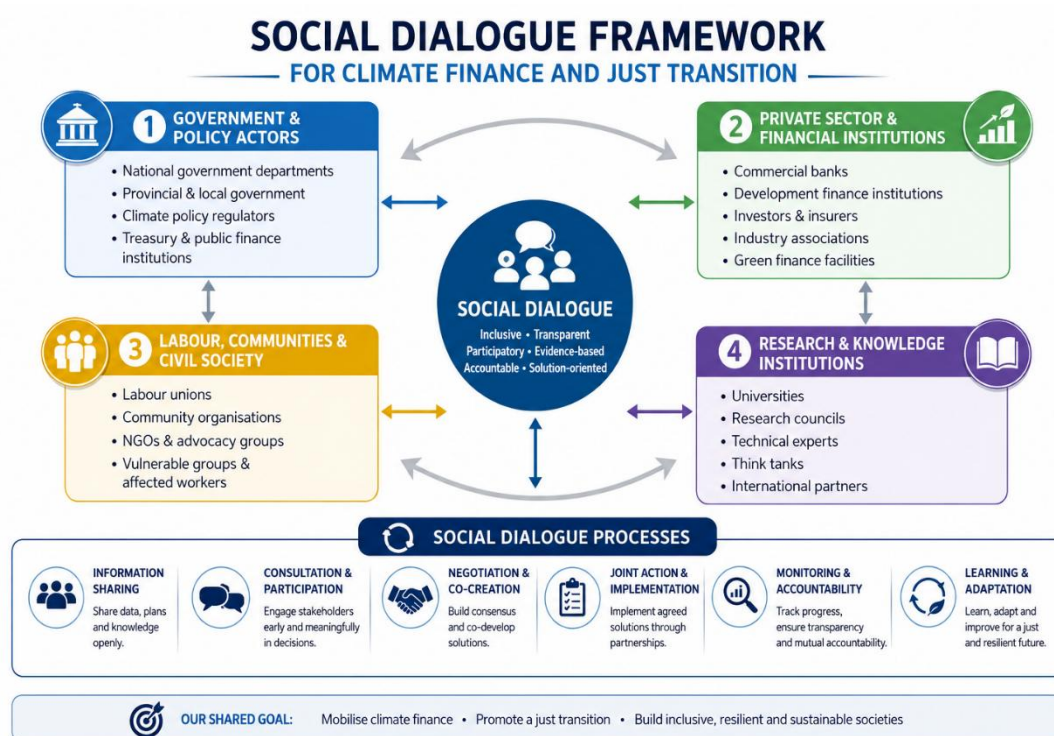


Figure 5: Social Dialogue Framework

Social dialogue has the potential to significantly advance climate finance flows by addressing the institutional, governance and coordination failures that often constrain investment rather than the availability of finance itself. Unlike conventional consultation processes, social dialogue brings together government, development finance institutions, private investors, labour, civil society and affected communities to jointly identify investment priorities, negotiate policy and regulatory reforms, improve project bankability, and build consensus on risk-sharing arrangements (PCC, 2022). Patel (2021) discusses as a mechanism for negotiating trade-offs and building consensus. This collaborative process strengthens transparency, trust and accountability, reduces policy uncertainty, and aligns public and private investment decisions, thereby creating a more predictable and enabling environment for mobilising climate finance (Montmasson-Clair, 2021). By transforming broad policy recommendations into jointly negotiated implementation commitments with clearly defined roles, responsibilities and monitoring mechanisms, social dialogue can accelerate the mobilisation, coordination and effective deployment of climate finance towards a just and inclusive low-carbon transition.

The social dialogue framework serves as both a consultative and analytical tool to guide stakeholder engagement across sectors such as energy, water, agriculture, transport,

biodiversity, human settlements, and waste management and a unified framework explaining who participates, when they participate, what decisions they influence, and how accountability is maintained. The National Business Initiative further argues that business participation in structured social dialogue is essential because firms are simultaneously investors, employers, technology providers and implementers of the transition (NBI, 2023). Through consultations based on participatory approaches such as Steering Committee review processes, validation workshop, roundtables and interviews, stakeholders can contribute to identifying climate finance barriers, investment opportunities, governance challenges, institutional gaps, and just energy transition priorities, thereby enhancing the credibility, inclusiveness, coordination, and policy relevance of the study findings and recommendations. Early stakeholder engagement also improves investment confidence, facilitates identification of implementation barriers and strengthens alignment between climate policy and investment decisions (NBI, 2022a).

2.4 Data Analysis and Quality Control Process

The evidence was synthesised using a narrative and thematic analysis approach. The development of themes was guided by a pre-defined analytical framework based on the theory of change described earlier as the conceptual framework. A structured quality-assessment process was followed throughout the scoping review. Two researchers independently conducted study identification, screening, data coding, extraction, and analysis using separate Excel files to identify inconsistencies. Discrepancies were resolved through consensus discussions to harmonise the datasets. The compiled data and draft manuscript were subsequently reviewed internally by a third reviewer and later subjected to external peer review by the Steering Committee, with reviewer comments incorporated into the final data matrix and manuscript at each stage. All selected journal articles and scientific reports went through a rigorous quality assessment process, which involved evaluating the robustness of their methodologies, the validity and reliability of their findings, and the credibility of the journals, publishers, and organizations responsible for their publication.

The analysis mapped existing financing flows and identified gaps relative to the implementation needs of sectoral policies. This included a review of international climate finance trends, regional financing mechanisms, and domestic fiscal space. The findings were organised around key dimensions of climate finance, i.e., scale, composition, accessibility, and alignment with sectoral priorities, allowing the study to identify systemic constraints such as limited concessional finance, high cost of capital, and institutional fragmentation. The study ultimately delivers practical insights to enhance knowledge and capacity for advancing inclusive green economies in South Africa, while positioning the country to access and mobilise climate finance at the scale required aligned with the broader socio-economic objectives of a just energy transition.

2.5 Limitations and Delimitations of the Study

Tracking climate finance sources remains challenging due to gaps in data availability, inconsistencies in reporting standards, and limited transparency, particularly in relation to private sector investments. Consequently, this study relied primarily on publicly available reports and secondary data sources to construct an overview of the current climate finance ecosystem in South Africa, acknowledging that actual financial flows may be underreported

or partially captured. Although this report draws on evidence from published journal articles and studies adapted specifically to the South African context that applied a robust climate finance accounting methodology developed by the Climate Policy Initiative (CPI) to characterise the climate finance ecosystem, it does not undertake original climate finance tracking. Consequently, all discussion of climate finance flows should be interpreted as evidence synthesised from existing national and international climate finance tracking exercises rather than new estimates produced by this study.

The study did not include primary data collection through interviews or surveys with stakeholders directly involved in the case studies or with practitioners actively engaged in climate finance within the respective countries. The report was, however, reviewed by the Steering Committee, who identified additional relevant case studies for inclusion. Consequently, the case studies presented in this report are informed not only by the systematic literature review but also by practitioner knowledge and expert recommendations, thereby broadening the evidence base beyond the studies initially identified through the literature search.

Finally, just energy transition-related funding is often embedded within mitigation, adaptation, or dual-benefit flows without separate reporting. To develop a complete picture of South Africa's climate finance landscape, it is necessary to identify and classify just energy transition finance explicitly in future tracking efforts (Meattle et al., 2023). Consequently, the reports reviewed for this study do not track just energy transition finance as a distinct category. A detailed evaluation of the relative merits of these financing options falls outside the scope of this report. It is acknowledged that the degree of alignment of the various instruments and interventions with the principles proposed for 'climate finance' (or SA's JT Framework) is outside the scope of the study.

3 EXISTING FINANCIAL INSTRUMENTS TO ACCELERATE JUST TRANSITIONS

3.1 Introduction

According to the International Labour Conference Resolution of the 111th Session, “a just transition involves maximising the social and economic opportunities of climate and environmental action, including an enabling environment for sustainable enterprises, while minimising and carefully managing challenges” (International Labour Conference, 2023). This transition should be based on effective social dialogue, highlighting the importance of stakeholder engagement (International Labour Conference, 2023). From this perspective, a just transition finance is not only about financing low-carbon development, but it goes beyond conventional climate finance to explicitly considering an inclusive approach to supporting regions, communities, workers and sectors affected by energy transition (Winkler et al. 2023, International Labour Conference, 2023). A project may reduce emissions but still fail to support workers, communities, access, affordability, or local development. Therefore, just transition finance should promote inclusive, sustainable and decent work for all, advance social justice by fostering sustainable enterprises, and manage the process (International Labor Organisation, 2015). This section therefore presents the existing landscape of climate finance instruments highlighting how they are or can be utilised to accelerate a just energy transition in South Africa.

3.2 Just Transition, Just Energy Transition and Climate Finance

Just transition finance, just energy transition finance and climate finance are related but distinct concepts that differ in scope and institutional focus. This report adopts the definition of a Just Transition advanced by the Presidential Climate Commission (PCC), which defines a just transition as “a vision-led, unifying and place-based set of principles, processes and practices that seek to ensure that no one is left behind in the transition to a low-carbon, climate-resilient and ecologically sustainable society.” The concept extends beyond climate mitigation and encompasses broader social, economic, environmental, and governance objectives, including reducing inequality, addressing historical injustices, promoting decent work, strengthening social protection, enhancing community resilience, and supporting sustainable development pathways. In contrast, a Just Energy Transition refers more specifically to the transformation of the energy system from fossil fuel dependence towards cleaner, low-carbon energy sources while ensuring that the social and economic impacts of this transformation are managed fairly. The focus is primarily on energy-related sectors, workers, communities, industries, and consumers affected by changes in energy production, distribution, and consumption. While the just energy transition forms a critical component of the broader just transition agenda, the two concepts are not synonymous. A just transition encompasses economy-wide changes across sectors such as transport, industry, agriculture, water, land use, and waste management, whereas a just energy transition focuses specifically on the energy sector and its associated value chains. Accordingly, this report distinguishes between these concepts and uses them carefully and consistently to avoid ambiguity, recognising that not all discussions of a just transition relate exclusively to energy systems.

In this report, a distinction is also made between climate finance and development finance. Climate finance broadly refers to all financial flows aimed at mitigation and adaptation

actions addressing climate change such as renewable energy deployment, climate-resilient infrastructure, ecosystem restoration, and emissions reduction initiatives. In contrast, development finance encompasses a broader range of investments aimed at promoting economic growth, poverty reduction, infrastructure development, social services, and overall socio-economic development. While climate finance can contribute to development objectives and many projects generate both climate and development benefits, not all development finance qualifies as climate finance. Maintaining this distinction is important for ensuring consistent measurement frameworks, avoiding double counting, transparency, strengthening accountability, clarifying institutional roles and ownership across financing mechanisms demonstrating additionality, and avoiding unrealistic expectations regarding the scale of funding available through climate-specific financial instruments. Additionality is a foundational concept in climate finance, carbon markets, blended finance, and grant evaluation since it ensures that financial resources deliver genuine environmental, social, or developmental benefits beyond what would have occurred under business-as-usual conditions (Michaelowa et al., 2019). It provides a basis for assessing the effectiveness, efficiency, and credibility of interventions and helps prevent the allocation of resources to activities that would have proceeded without external support.

Consistent with the UNFCCC and the Paris Agreement, developing countries seek to mobilise and leverage climate finance from public and private, domestic and international markets to enable the implementation of mitigation and adaptation actions (African Development Bank et al., 2024). These financial inflows are either aligned with low greenhouse gas emission or climate-resilient development pathways enabling adaptation to climate risks. Within the South African context, climate finance is concentrated across five priority sectors: clean energy, low-carbon transport, smart water management (across both supply and demand systems), the circular economy, and sustainable agriculture, all of which are critical for achieving national climate and development objectives. South Africa's National climate finance landscape assessments consistently demonstrate that public finance continues to play a catalytic role in mobilising climate investment, while private finance remains concentrated in commercially viable mitigation sectors such as renewable energy, highlighting the need for innovative financing mechanisms to leverage greater private sector participation (Lowitt, 2021; Meattle et al., 2025). Similar conclusions are reached by the National Business Initiative, which notes that public finance alone will be insufficient to meet South Africa's climate investment needs and should therefore be strategically deployed to de-risk investment and crowd in substantially larger volumes of commercial capital (NBI, 2022c).

Figure 6 shows an illustrative model of the financial flows for mitigation and adaptation finance in developing countries according to the UNFCCC. Climate finance flows through national governments, development banks, UN agencies, or directly to implementing entities including NGOs, city governments, or private sector to help countries transition to low-carbon economies and adapt to climate impacts. Although climate finance flows to South Africa have increased substantially in recent years, less than 10% of tracked climate finance reaches local governments directly despite municipalities playing a central role in implementing energy transition, infrastructure, and climate resilience projects (IISD, 2026). These observations are consistent with the findings of the Presidential Climate Commission's Climate Finance Landscape reports, which provide South Africa's principal evidence base for monitoring climate finance trends, sources, sectoral allocation and

financing gaps (Cassim et al., 2021; Meattle et al., 2023; 2025). This highlights a significant gap between national climate finance mobilisation and local-level access to funding.

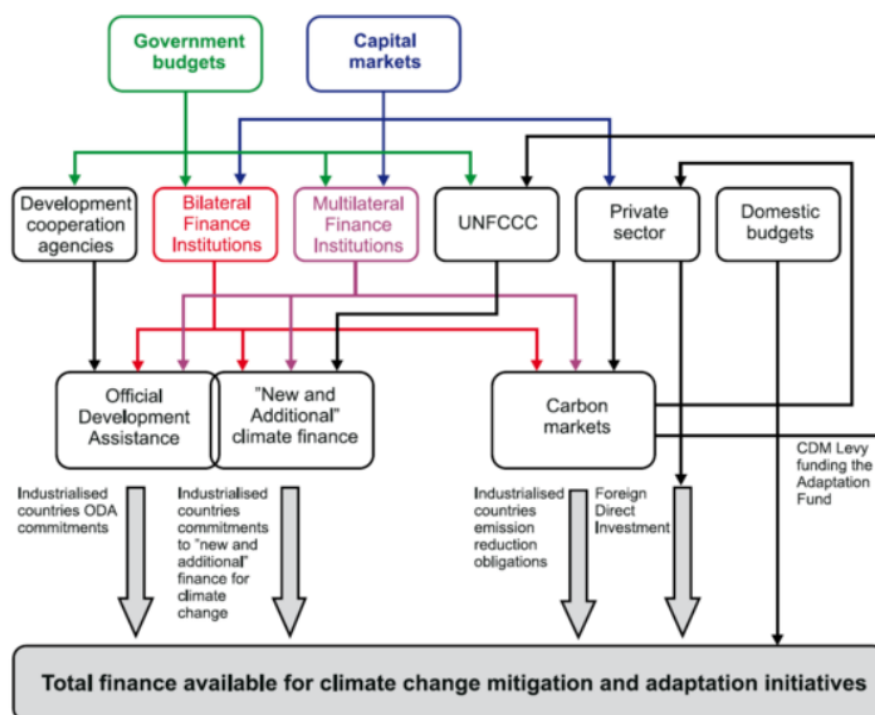


Figure 6: Illustrative Financial flows for climate mitigation and adaptation in developing countries

Source: Atteridge et al. (2009)

Another important objective of climate finance is to assist countries, especially from developing regions in the Global South, to meet international commitments, under the Paris Agreement. Many developing countries lack the financial capacity to implement climate actions needed (Neufeldt et al., 2025). Climate finance also supports a just energy transition, helping communities shift to sustainable livelihoods without bearing unfair costs. Public sources of climate finance include government funding, multilateral institutions such as Green Climate Fund and the World Bank. Private sector institutions such as banks, investors, and corporations can also contribute to climate finance through financial instruments such as green or climate bonds and ESG investments. Other important climate finance instruments include grants, concessional loans, guarantees, equity investments, carbon markets or credits and user fees. The final source is through Bilateral and Multilateral Climate funds or programmes between countries or through institutions. Each of these financial instruments is described in the following sections, with social dialogue guiding questions.

The framework also recognises that climate finance is not a homogeneous category and distinguishes between three interrelated financing objectives: (i) mitigation finance (reducing emissions); (ii) adaptation finance (building resilience to physical climate impacts); and (iii) transition risk finance (managing the economic disruption of decarbonisation, including worker support and community development). These categories require different instruments, attract different investor profiles, and respond to different policy incentives. This taxonomy is well-established in the literature (IPCC, 2022; Meattle et al., 2023) and its absence weakens the report's analytical precision, particularly in the barrier analysis where

the public adaptation finance and private mitigation finance face structurally different constraints.

The PCC's South African Climate Finance Landscape reports provide progressively broader coverage of climate finance instruments over time which are included in the analysis (Cassim et al., 2021; Meattle et al., 2023; 2025). While the 2021 Climate Finance Landscape primarily focuses on documenting climate finance flows and traditional financing mechanisms such as grants, concessional loans, commercial debt, equity finance, and green bonds, the 2023 and 2025 reports expand the analysis to include a wider range of innovative instruments, including blended finance, guarantees, carbon markets, results-based finance, public-private partnerships, climate risk insurance, and fiscal incentives.

The guiding questions presented throughout this section build directly on the principles of the Presidential Climate Commission's social dialogue framework, which advocates structured engagement across all phases of the Just Transition (PCC, 2022). Rather than viewing social dialogue as a once-off consultation exercise, the framework encourages continuous engagement that informs investment decisions, identifies distributional impacts, strengthens institutional accountability and promotes consensus among affected stakeholders. Applying these principles to each financing instrument helps identify governance requirements alongside financial considerations.

3.3 Green Bonds

Green or climate bonds function like traditional bonds where investors lend money to the issuer, who repays it with interest, but the key difference is that the proceeds are earmarked for green projects, such as renewable energy, sustainable transport, energy efficiency, or climate adaptation infrastructure (World Bank and United Nations, 2025). Green bonds provide a way for governments, development banks, and private companies to access private capital markets to support climate goals, while also offering investors a chance to align their portfolios with sustainability objectives (OECD, 2025a). Transparency and accountability are crucial, so issuers typically report on how the funds are used and the environmental impact achieved. Just energy transition bonds are debt financing instruments designed to raise capital for projects that support the transition to a low-carbon economy while addressing social and economic impacts on affected workers and communities (Makgetla, 2021b). These bonds can finance renewable energy, green infrastructure, worker reskilling, and community development initiatives in regions dependent on fossil fuels. In South Africa, just energy transition bonds can help mobilise long-term sustainable finance to support an inclusive and equitable energy transition.

In South Africa, the green bond market has grown driven by both public and private sectors such as government entities, municipalities leveraging the fund to finance projects aligned with the country's sustainability goals and commitments under the Paris Agreement and the Sustainable development goals (Tolliver et al 2020). The green bond market has attracted diverse investors ranging from institutional investors and pension funds to socially responsible firms and individual investors (Ngwenya et al., 2020). Table 1 illustrates the trends of green bonds issued for clean energy and local governments infrastructures (National Treasury, 2020). South Africa's green bond market has grown steadily since the first issuances in 2012 (NBI, 2022a), with cumulative issuances exceeding R10 billion, driven by municipalities, development finance institutions, commercial banks, and private sector

companies financing renewable energy, sustainable infrastructure, and other climate-related investments (Ngwenya and Simatele, 2020).

Table 1: Trends in green bonds in South Africa

Year	Institution issuing bond	Initiatives to finance	Bond amount	Comment
2012	Industrial Development Corporation	Clean energy infrastructure	ZAR 5 billion	
2014	City of Johannesburg	Biogas to energy and Solar Geyser Initiative	ZAR 1.46 billion	
	City of Cape Town	Projects aligned with the City's Climate Finance Strategy	ZAR 1 billion	
2017	Johannesburg Stock Exchange (JSE) segment, first issuance by Growthpoint		ZAR 1.1 billion for 5, 7 or 10 years	
2019	Nedbank	Renewable energy		First bank to list on JSE. attracted ZAR 5.5 billion in bids and increased issue size from ZAR 1 billion to 1.7 billion
2020	Standard Bank		USD 200	A 10-year bond to International Finance Corporation via London Stock

Source: National Treasury (2020)

Green bonds are typically financed through capital raised from institutional investors such as pension funds, asset managers, commercial banks, insurance companies, development finance institutions, and international climate finance providers, with the proceeds earmarked for eligible green projects, while the financing structure generally involves bond issuance by government entities, municipalities, state-owned enterprises, or private firms under a framework that aligns project selection, fund allocation, monitoring, and reporting with recognized green bond standards.

Despite the growth, there is still lack of awareness and education among investors, issuers and the general public regarding the benefits of the green bonds and its harmonisation to various sectors or projects (Okafor et al., 2024). NBI (2022b) further notes that expanding the domestic green bond market requires standardised taxonomies, improved disclosure, stronger project pipelines and greater participation from institutional investors. Hence, key social dialogue guiding questions on green bonds in South Africa include:

- Which eligible projects (and exclusions) will social partners agree to so bond proceeds support a just energy transition in affected regions?

- What social metrics will be reported (e.g., jobs, reskilling, local procurement, affordability impacts) and who will verify them?

3.4 Grants

In the context of climate action, grants are often used to fund activities such as capacity building, policy development, technology transfer, and pilot projects, especially in low-income or vulnerable countries (Meattle et al., 2025). Unlike loans, grants do not require repayment, making them particularly valuable for enabling early-stage or high-risk interventions that may not attract private investment (OECD, 2025b). They play a critical role in supporting climate adaptation and ensuring equitable access to finance for communities most affected by climate change (OECD, 2025c). Grants for climate action are primarily sourced from public finance allocations (including national budgetary transfers and provincial or municipal support), international climate finance mechanisms (such as multilateral climate funds and bilateral donor programmes), and development finance institutions, with the financing structure typically involving non-repayable funding disbursed through government departments, implementing agencies, or accredited entities, and governed by eligibility criteria, project approval processes, and monitoring and reporting frameworks aligned with national climate priorities and donor requirements.

Grants remain an important component of South Africa's climate finance landscape, particularly for early-stage investments, feasibility studies, infrastructure development, and industrial decarbonisation projects. Several grant instruments administered by the Department of Trade, Industry and Competition (DTIC) have direct relevance to the Just Energy Transition (JET) and green industrial development agenda¹. The Manufacturing Support Programme (MSP) provides reimbursable grants for green technology adoption, resource efficiency improvements, waste reduction, and energy-efficiency investments in manufacturing facilities, while also supporting the expansion of domestic green manufacturing value chains (DTIC, 2025). The Critical Infrastructure Programme (CIP) offers cost-sharing grants for infrastructure projects, including initiatives that reduce dependence on the national electricity grid and improve water and energy security, making it particularly relevant for renewable energy, green hydrogen, battery manufacturing, and industrial decarbonisation projects (DTIC, 2015). These instruments demonstrate how public grants can be strategically used to de-risk investments, crowd in private capital, and support the development of bankable projects aligned with South Africa's Just Energy Transition objectives. Key social dialogue guiding questions on grants in South Africa include:

- Which groups (affected municipalities, workers, communities, SMEs) should be prioritised for grant-funded capacity building and why?
- How will grant decisions and outcomes be disclosed, and how can communities raise concerns or appeal allocations?

3.5 Concessional Loans

Concessional loans are extended at below-market interest rates, often with longer repayment periods, grace periods, or partial risk guarantees (OECD, 2024a). The concessional element

¹ Incentives – The Department of Trade Industry and Competition

represents the financial “grant equivalent” embedded in the loan, meaning the degree to which the loan’s terms are softer than commercial borrowing conditions. These loans are typically provided by multilateral development banks (MDBs), bilateral development agencies, or climate funds such as the Green Climate Fund (GCF), Climate Investment Funds (CIFs), or the Adaptation Fund, or domestic financial institutions. Their purpose is to make otherwise unviable climate projects financially feasible by lowering the cost of capital, de-risking private investment, or supporting public sector initiatives that generate significant social or environmental benefits but limited financial returns. In this way, concessional loans play a catalytic role in mobilising blended finance, combining concessional and commercial resources, to accelerate low-carbon and climate-resilient development in countries with constrained fiscal space. Although concessional loans reduce financing costs through favourable terms, they still add to public debt stock and repayment obligations, meaning that even at reduced rates they can accumulate fiscal pressure over time and affect debt sustainability if not carefully managed within fiscal frameworks.

Concessional loans have become one of the most significant climate finance instruments in South Africa since the mid-2010s, with their use accelerating after the announcement of the Just Energy Transition Partnership (JETP) in 2021 (Bradlow and Swamidurai, 2026). They currently account for a substantial share of international climate finance flowing into the country, particularly through financing from multilateral development banks and bilateral partners. Concessional loans are being used primarily in the energy, transport, water, and industrial sectors to support renewable energy generation, electricity transmission and distribution infrastructure, energy efficiency, green hydrogen development, electric mobility, and climate-resilient water systems (O’Connell and Schot, 2024). Their attractiveness lies in offering below-market interest rates, longer repayment periods, and reduced financing risks for large-scale infrastructure projects that are critical to South Africa’s low-carbon and climate-resilient development pathway.

Concessional loans for climate-related investments are primarily sourced from multilateral development banks, bilateral development finance institutions, international climate funds, and selected domestic development finance institutions, and are structured as below-market-rate debt instruments with favourable repayment terms, often deployed through sovereign or project-level financing arrangements that combine concessional capital with commercial finance in blended structures to reduce risk, lower the cost of capital, and enhance the bankability of low-carbon and climate-resilient projects. Key social dialogue guiding questions on concessional loans in South Africa include:

- What just-transition conditions will be attached to the loan (reskilling, worker support, local enterprise development, affordability safeguards)?
- Who ultimately bears repayment risk (state/SOE/municipality/users), and how will tariff/price impacts be managed transparently?

3.6 Guarantees

A guarantee is a financial commitment by a donor, development bank, or public institution to partially or fully cover losses incurred by lenders or investors if a borrower defaults or a project underperforms (OECD-G20, 2025). By mitigating perceived or real investment risks, such as political, credit, or performance risks, guarantees help reduce financing costs and

improve access to capital for climate projects that might otherwise be considered too risky. Guarantees are commonly issued by MDBs, bilateral agencies, or climate funds (e.g., the GCF, Global Environment Facility (GEF), or CIF). In climate finance, they are particularly useful for mobilising private sector participation in renewable energy, green infrastructure, and adaptation investments (OECD-DAC, 2025). For example, a guarantee may backstop payments to investors in a solar power project or ensure repayment of a loan for climate-resilient agriculture. By lowering perceived risk, guarantees leverage limited public resources to crowd in larger volumes of private finance, making them a key blended finance instrument in achieving global climate goals. However, guarantees create contingent liabilities for the public sector, which may not appear immediately on the balance sheet but can materialise as direct fiscal costs if projects default or underperform, thereby increasing long-term fiscal exposure and potentially constraining future borrowing space.

Climate-related guarantees are primarily provided by multilateral development banks, bilateral development finance institutions, international climate funds, and domestic public financial institutions such as development finance institutions, and are structured as contingent financial instruments that partially or fully cover credit, political, or performance risks in underlying loans or investments, thereby enabling blended finance arrangements that mobilise private capital into climate projects by reducing perceived risk, improving creditworthiness, and lowering the overall cost of financing.

Guarantees have been used in South Africa's climate finance landscape since the early renewable energy procurement programmes of the 2010s, with their role expanding significantly through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and, more recently, the Just Energy Transition (JET) financing framework (Eberhard and Naude, 2016). Although guarantees represent a smaller share of climate finance than grants or concessional loans, they are increasingly used to de-risk private investments in renewable energy, transmission infrastructure, energy storage, green hydrogen, and climate-resilient infrastructure projects (Bellesi et al., 2025). By reducing perceived political, regulatory, credit, and project risks, guarantees have helped mobilise substantial private sector capital and improve the bankability of large-scale low-carbon investments. Key social dialogue guiding questions on guarantees in South Africa include:

- What specific risks are being guaranteed, and what public-interest benefits (jobs, service delivery, local content) justify this risk transfer?
- If the guarantee is called, what governance process decides the response and how are social impacts mitigated?

3.7 Equity Investments

Unlike loans, which must be repaid with interest, equity investors assume a share of both the risks and returns of the investment benefiting when the project or company performs well and potentially losing capital if it underperforms (OECD-Climate Club, 2025; OECD, 2025d). In the context of climate finance, equity is used to support low-carbon and climate-resilient businesses, infrastructure, and technologies, especially in early-stage or high-risk markets where private investment is limited (OECD, 2025b). Equity investments can be direct, where a development finance institution or climate fund takes a stake in a specific company or project (e.g., a solar power developer or green transport firm), or indirect, through

investments in climate-focused private equity or venture capital funds (World Bank. 2024). Institutions such as the GCF, International Finance Corporation (IFC), and CIFs often use equity to catalyse private sector participation by absorbing part of the risk or offering patient capital that extends the investment horizon. The goal is to enhance the financial viability of climate solutions, demonstrate new business models, and ultimately crowd in additional private and institutional investors toward sustainable, low-carbon growth.

Equity financing for climate-related investments is sourced from development finance institutions, multilateral institutions, international climate funds, impact investors, private equity and venture capital funds, and increasingly domestic institutional investors, and is structured as direct or indirect ownership stakes in companies or projects—often through project equity, corporate equity, or fund-of-funds arrangements—where investors share in both risks and returns, provide patient and catalytic capital, and help crowd in additional private investment into low-carbon and climate-resilient sectors.

Equity investments have been used to support climate-related initiatives in South Africa since the emergence of large-scale renewable energy investments in the early 2010s, particularly through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) (Eberhard and Naude, 2016). Their use has expanded significantly in recent years through development finance institutions such as the Development Bank of Southern Africa (DBSA), the Industrial Development Corporation (IDC), and international climate investors that provide risk capital for green projects (Carmen et al., 2025). Equity finance is primarily deployed in renewable energy generation, battery storage, green hydrogen, electric mobility, energy efficiency, circular economy enterprises, and climate-smart industrial development, where it helps mobilise private sector participation and supports the growth of innovative low-carbon businesses. Key social dialogue guiding questions on equity investments in South Africa include:

- What commitments will equity investors make regarding labour standards, skills development, and local supplier development?
- How will ownership and returns be structured to enable fair local/community benefit-sharing (where feasible) without worsening inequality?

3.8 Carbon Tax

A carbon tax is a market-based fiscal instrument that places a price on greenhouse gas (GHG) emissions, thereby creating an economic incentive for companies to reduce their carbon footprint, improve energy efficiency, and invest in cleaner technologies (Winkler and Marquard, 2011; Timilsina, 2022). Therefore, the carbon tax complements South Africa's commitments under the Paris Agreement and supports the country's transition to a low-carbon economy. By increasing the cost of carbon-intensive activities, a carbon tax encourages businesses and consumers to shift towards lower-emission alternatives while generating government revenue that can be used to support climate action, green industrial development, and just transition initiatives.

In South Africa, the carbon tax was introduced through the Carbon Tax Act, 2019 (Act No. 15 of 2019) and came into effect on 1 June 2019 as a key instrument for supporting the transition to a low-carbon economy and as part of the country's broader climate change

mitigation strategy (Nemavhidi and Jegede, 2023). While carbon tax revenues are not fully earmarked for climate finance, the instrument plays an increasingly important role in incentivising emissions reductions and generating public revenues that can support climate-related programmes. The tax is primarily applied to emissions-intensive sectors such as electricity generation, mining, manufacturing, petroleum, transport, and industrial processes, encouraging investments in renewable energy, energy efficiency, cleaner technologies, and industrial decarbonisation. As South Africa progresses with the Just Energy Transition, the carbon tax is expected to become an increasingly important market-based mechanism for mobilising resources and driving low-carbon investment decisions across the economy.

The discussion of South Africa's Carbon Tax as a market-based instrument for emissions reduction and as a potential revenue source is incomplete without context. The tax is being implemented in phases, with the initial phase designed to provide a gradual transition through tax-free allowances and sector-specific exemptions to limit economic impacts on emissions-intensive industries. As a result, the nominal tax rate is substantially reduced by legislated allowances: basic carbon budget allowances (up to 80% of liability), carbon offset allowances (up to 10%), and sector-specific trade exposure allowances. The effective average carbon price paid by firms is a fraction of the headline rate – well below the levels needed to drive meaningful fuel switching or technology change according to the IPCC and OECD.

In South Africa, carbon tax revenues are generated through the national fiscal system by imposing a levy on greenhouse gas emissions from regulated sectors, and are structured as government-administered public finance flows collected by the South African Revenue Service and allocated through the National Treasury, where the proceeds are partially recycled into tax incentives, rebates, and climate-related public spending to support mitigation activities, green industrial development, and just transition initiatives.

While implementation has progressed, challenges remain regarding the carbon price level, policy certainty, administrative capacity, and balancing emissions reduction objectives with economic competitiveness and employment concerns. Despite potential short-term adverse effects on low-income households and the informal sector, as well as possible political resistance, a carbon tax is generally less susceptible to tax evasion, thereby broadening the tax base. In the long run, these short-term costs are outweighed by the broader economic and environmental benefits. As a result, the carbon tax represents an important domestic financing instrument that can help mobilise resources for climate mitigation and support South Africa's Just Energy Transition objectives if the proceeds are reinvested in productive green sectors. Key social dialogue guiding questions on carbon tax in South Africa include:

- How should South Africa determine an appropriate carbon price that balances climate objectives, industrial competitiveness, employment, and social equity considerations?
- How can the carbon tax be implemented in a manner that balances emissions reduction objectives with economic competitiveness, employment protection, and affordability for vulnerable households and industries?

3.9 Carbon Markets

Carbon markets are based on the principle that greenhouse gas emissions carry a monetary value, creating financial incentives for countries, firms, and investors to trade or reduce emissions where it is most cost-effective (World Bank, 2025a). Each carbon credit generally represents one metric ton of carbon dioxide equivalent (tCO₂e) that has been avoided, reduced, or removed. These markets are broadly divided into compliance (regulated) markets and voluntary carbon markets (VCMs) (Wetterberg et al., 2024). Compliance markets operate under formal legal and policy frameworks, such as the European Union Emissions Trading System and the Paris Agreement's Article 6 mechanisms, where regulated entities must meet emissions caps or offset excess emissions (IETA, 2025). In South Africa, carbon market finance is generated through the trading of carbon credits by firms, project developers, and landowners participating in voluntary carbon markets and emerging compliance-linked mechanisms, with funding sources including private sector buyers, international carbon offset purchasers, and domestic regulated entities, and is structured through project-based or market-based systems where emissions reductions are verified, certified, and monetised as tradable carbon credits under recognised standards or emerging Article 6-aligned frameworks, enabling revenue flows to climate mitigation and sequestration projects.

Carbon markets have been used in South Africa since the mid-2000s through participation in the Kyoto Protocol's Clean Development Mechanism (CDM), with renewed momentum emerging after the introduction of the Carbon Tax Act in 2019 and the growing development of voluntary and Article 6 carbon markets (Schneider, 2009). Although still relatively small compared to grants and concessional finance, carbon markets are increasingly being used to mobilise private climate finance in sectors such as renewable energy, forestry, agriculture, waste management, transport, and industrial emissions reduction (Bumpus and Liverman, 2008). Carbon credits generated from activities such as reforestation, regenerative agriculture, methane capture, ecosystem restoration, and energy-efficiency projects are creating new revenue streams that improve project bankability and support South Africa's Just Energy Transition and broader climate mitigation objectives.

While Article 6 of the Paris Agreement establishes a framework for internationally transferred mitigation outcomes, its full operationalisation – including registry systems, corresponding adjustment rules, and supervisory guidance – remains in progress (Müller and Michaelowa, 2019). Revenue projections from Article 6 mechanisms should be treated as indicative rather than confirmed finance sources at this stage. Voluntary carbon markets, by contrast, function outside mandatory regimes and allow companies, institutions, and individuals to purchase credits voluntarily to offset emissions or support wider climate objectives (West et al., 2020). Collectively, carbon markets generate economic incentives for mitigation, mobilise climate finance toward low-carbon investments, and support both regulatory compliance and voluntary climate action. By putting a price on carbon, they help channel capital to mitigation projects, including renewable energy, afforestation, and energy-efficiency initiatives, particularly in developing countries, often through results-based payment structures that complement concessional finance and grants (World Bank, 2025a). When supported by robust governance and transparency, carbon markets can stimulate technological innovation and contribute meaningfully to the global transition toward net-zero emissions (World Bank, 2025b).

Carbon markets, particularly land-based carbon projects, require careful consideration of key integrity and governance issues that determine their environmental and social effectiveness. These include additionality, ensuring that emissions reductions would not have occurred without the project; permanence, which relates to the long-term durability of carbon sequestration; and leakage, where emissions reductions in one area may lead to increases elsewhere (Michaelowa et al., 2019). Clear definitions of carbon rights and robust benefit-sharing arrangements are also essential to ensure fair distribution of revenues among landowners, communities, and project developers. In addition, land-based carbon projects carry specific risks related to land tenure, governance, and ecological uncertainty, which must be carefully managed to ensure credible and equitable outcomes.

Although VCMs present a potential mechanism for mobilising private finance for climate mitigation, ecosystem restoration, and sustainable land-use activities, recent assessments have highlighted important concerns regarding environmental integrity, including the risk of over-crediting, baseline inflation, permanence, leakage, and the verification of additionality in some project types (West et al., 2020; 2023). While certification standards such as the Verified Carbon Standard (VCS) and emerging initiatives such as the Integrity Council for the Voluntary Carbon Market (ICVCM) and the Voluntary Carbon Markets Integrity Initiative (VCMI) are strengthening quality assurance and governance frameworks, participation in carbon markets should be accompanied by robust monitoring, reporting and verification systems, transparent benefit-sharing arrangements, and careful assessment of environmental and social outcomes. Consequently, carbon markets should be viewed as a complementary source of climate finance rather than a substitute for direct emissions reductions, public investment, or regulatory action. Key social dialogue guiding questions on carbon markets in South Africa include:

- Who holds carbon rights and how will benefit-sharing with communities/land users be agreed and enforced?
- What safeguards ensure meaningful consultation, grievance mechanisms, and environmental integrity (additionality, leakage, permanence)?

3.10 Blended Finance

By definition, blended finance is not an instrument on the same level as a grant or loan; it is a structuring approach that can combine grants, concessional debt, guarantees, equity and commercial finance. Blended finance is sourced from a combination of public and concessional capital provided by multilateral development banks, bilateral development finance institutions, domestic DFIs, and international climate funds (such as the Green Climate Fund), together with commercial private sector investment from banks, institutional investors, and project developers, and is structured through integrated financing arrangements that layer grants, concessional debt, guarantees, and equity with market-rate capital to de-risk investments, improve project viability, and crowd in private finance for climate-related and development-oriented projects.

The underlying idea behind blended finance is to use limited public funds to de-risk or enhance the attractiveness of investments in sectors or regions that are otherwise perceived as too risky or insufficiently profitable by private investors (World Bank, 2025a; IFC, 2025). This is achieved through financial instruments such as concessional loans, guarantees, first-

loss capital, or equity co-investments, which improve the risk-return profile of climate projects and crowd in commercial capital (OECD-DAC, 2025). Blended finance is a cornerstone of efforts to scale up climate action in developing countries, where financial, institutional, and market barriers often limit private sector participation (OECD, 2025b). By combining concessional resources from public institutions, such as MDBs, bilateral agencies, or dedicated climate funds (e.g., the Green Climate Fund), with private capital, blended finance facilitates investments in renewable energy, sustainable agriculture, resilient infrastructure, and ecosystem restoration (OECD, 2023). Beyond leveraging additional resources, it also helps build local financial markets, demonstrate viable green business models, and catalyse long-term investment flows toward low-carbon, climate-resilient development pathways (OECD-DAC, 2025). While blended finance has the potential to mobilise private capital by reducing investment risks, evidence from Sub-Saharan Africa suggests that actual leverage ratios have generally been lower than in other regions, often ranging from 0.6:1 to 1.5:1 rather than the optimistic 3:1 to 5:1 ratios cited in global averages (Convergence, 2025). This highlights the importance of maintaining realistic expectations regarding the scale of private capital mobilisation and addressing underlying market, institutional, and project-preparation constraints that limit investment flows.

Blended finance has been used in South Africa since the late 2000s and gained significant momentum during the 2010s through renewable energy procurement programmes and climate investment facilities that combined public, concessional, and private capital (Eberhard et al., 2016). Its use has expanded considerably under the Just Energy Transition Partnership (JETP), where grants, concessional loans, guarantees, and private investment are strategically combined to de-risk projects and mobilise large-scale climate finance. According to the NBI (2022b; 2023), blended finance represents one of the most promising approaches for addressing South Africa's financing gap because concessional public capital can absorb early-stage risks, enabling commercial investors to participate in projects that would otherwise remain financially unattractive. Blended finance is primarily being applied in renewable energy, electricity transmission, battery storage, green hydrogen, electric mobility, climate-resilient water infrastructure, and sustainable industrial development, making it one of the most important mechanisms for leveraging private sector participation in South Africa's low-carbon transition (Davies et al., 2018). Key social dialogue guiding questions on blended finance in South Africa include:

- What is the rationale for the public/concessional component, and what just-transition outcomes are required in exchange?
- Who governs the blended facility (representation and decision rights), and what will be published on beneficiaries and social outcomes?
- What minimum conditionality framework should social partners require before public or concessional capital is deployed to de-risk private investment, including commitments on employment, local economic development, affordability, transparency, and equitable distribution of benefits?
- To what extent do blended finance commitments impact on the national fiscal space (for more state-directed opportunities/investments)?

3.11 Sustainability Linked Loans

Sustainability-linked loans (SLLs) are financing instruments in which the loan terms, particularly interest rates, are linked to a borrower's achievement of predefined sustainability or climate-related performance targets, such as reducing greenhouse gas emissions, increasing renewable energy use, or improving social and governance outcomes (Winkler et al., 2023). Unlike traditional green loans, SLLs do not require funds to be allocated to a specific green project; instead, they incentivise broader corporate sustainability performance. In the context of South Africa's Just Energy Transition (JET), SLLs can help mobilise private-sector capital toward decarbonisation, renewable energy expansion, green industrialisation, and social protection measures for affected workers and communities. They can also encourage companies such as utilities, mining firms, and industrial sectors to align their operations with national climate goals and commitments under the Paris Agreement. SLLs are primarily sourced from commercial banks, development finance institutions, and increasingly international financial institutions and institutional investors, and are structured as general-purpose corporate loans whose interest rates, margins, or repayment terms are adjusted based on the borrower's achievement of pre-agreed sustainability or climate performance targets, thereby incentivising economy-wide decarbonisation and alignment with Just Energy Transition and Paris Agreement commitments rather than financing specific green projects. Studies on transition finance in South Africa highlight the importance of innovative financial instruments in accelerating coal phase-out and supporting socially inclusive development pathways.

Sustainability-Linked Loans (SLLs) began gaining traction in South Africa during the late 2010s in line with global trends and have expanded rapidly since 2020 as financial institutions and corporates increasingly aligned financing with environmental, social, and governance (ESG) objectives (Woolworths, 2021; Pohl et al., 2023). Although still a relatively small component of the climate finance landscape compared to concessional loans and blended finance, SLLs are increasingly being used in sectors such as renewable energy, mining, manufacturing, agriculture, property, transport, and water infrastructure, where loan terms are linked to measurable sustainability performance targets such as greenhouse gas reductions, energy efficiency improvements, renewable energy uptake, and water conservation (Merana et al., 2026). As South Africa advances its Just Energy Transition agenda, SLLs are emerging as an important mechanism for incentivising corporate decarbonisation and mobilising private capital towards low-carbon and climate-resilient investments. Key social dialogue guiding questions on sustainability-linked loans in South Africa include:

- How can Sustainability-Linked Loans be aligned with South Africa's Just Energy Transition priorities and national development goals?
- How can the government ensure that SLLs contribute to both climate mitigation and socio-economic development objectives?

3.12 Climate Insurance

Climate insurance is a financial risk-transfer mechanism designed to protect governments, businesses, communities, and households against losses arising from climate-related hazards such as droughts, floods, storms, and extreme heat events (Lopera et al., 2024). These instruments cover crop insurance, disaster risk insurance, parametric insurance, and

resilience-based insurance schemes that provide financial compensation after climate shocks. In the context of South Africa's Just Energy Transition (JET), climate insurance can play an important role in reducing the financial risks associated with transitioning to a low-carbon economy, particularly for vulnerable workers, coal-dependent communities, farmers, and small businesses affected by climate change and economic restructuring (Republic of South Africa, 2023). By enhancing resilience and providing financial security against climate-related disruptions, climate insurance can encourage investment in renewable energy, climate-resilient infrastructure, and sustainable livelihoods, thereby supporting a socially inclusive transition. Research on South Africa's energy transition highlights the importance of integrating social protection and innovative climate finance instruments to address transition risks and strengthen resilience among affected communities. Climate insurance is financed through a combination of risk premiums paid by households, farmers, businesses, and public entities, alongside risk-sharing support from insurers, reinsurers, development finance institutions, and international climate risk facilities, and is structured as risk-transfer mechanisms such as crop insurance, disaster risk insurance, and parametric insurance products, where payouts are triggered by predefined climate events or losses, often supported by public subsidies or blended finance arrangements to enhance affordability and expand coverage for vulnerable groups under climate and Just Energy Transition-related risks.

Climate insurance has been used in South Africa since the early 2000s, initially through agricultural and disaster-risk insurance products, with its role expanding in the 2010s as climate-related risks such as droughts, floods, wildfires, and extreme weather events intensified (Born et al., 2019; Mathithibane and Chummun, 2022). While climate insurance remains less developed than grants, concessional loans, and blended finance mechanisms, it is increasingly being applied in agriculture, water resources, infrastructure, biodiversity conservation, and disaster risk management to enhance resilience and reduce the financial impacts of climate shocks (Mathithibane and Chummun, 2022). Emerging applications include index-based agricultural insurance, catastrophe risk coverage, parametric insurance products, and public-private insurance partnerships that help protect vulnerable communities, businesses, and public assets while supporting climate adaptation objectives (Born et al., 2019). Key social dialogue guiding questions on climate insurance in South Africa include:

- Which groups and sectors should be prioritised for climate insurance coverage, particularly among vulnerable workers, coal-dependent communities, small businesses, and farmers?
- What types of climate insurance instruments (e.g., parametric insurance, crop insurance, disaster risk insurance, resilience insurance) are most suitable for the South African context?

3.13 Tax Incentives and Accelerated Depreciation

Tax incentives and accelerated depreciation are fiscal policy instruments used by governments to encourage investment in targeted sectors and technologies by reducing the tax burden on firms and investors. Tax incentives may include tax credits, exemptions, rebates, or reduced corporate tax rates for renewable energy, energy efficiency, and low-carbon technologies, while accelerated depreciation allows businesses to deduct the cost of

qualifying assets more quickly over a shorter period, thereby improving cash flow and reducing upfront investment costs. In the context of South Africa's Just Energy Transition (JET), these instruments can help attract private investment into renewable energy infrastructure, green manufacturing, electric mobility, and energy-efficient technologies, while also supporting industrial transformation and job creation in affected regions. By lowering investment risks and improving the financial viability of low-carbon projects, tax incentives and accelerated depreciation can accelerate the transition away from coal dependence and stimulate inclusive green economic development. Research on climate finance and energy transitions highlights that fiscal incentives are important policy tools for mobilising private capital and enabling low-carbon transitions in developing economies, including South Africa's energy sector transformation.

Tax incentives have been used in South Africa to support climate-related investments since the late 2000s, with their application expanding through measures such as the former Section 12L Energy Efficiency Tax Incentive, accelerated depreciation allowances under Section 12B for renewable energy assets, and more recently the Renewable Energy Tax Incentive introduced in 2023 (Campbell et al., 2017). Although tax incentives do not directly provide climate finance, they play an important role in mobilising private investment by reducing the cost of low-carbon technologies and improving project returns. These incentives have been widely applied in renewable energy generation, energy efficiency, green manufacturing, electric mobility, sustainable buildings, and industrial decarbonisation, making them an important fiscal instrument for advancing South Africa's Just Energy Transition and climate mitigation objectives (Hamer et al., 2020). Key social dialogue guiding questions on Tax incentives and accelerated depreciation in South Africa include:

- How can tax incentives and accelerated depreciation policies be designed to effectively support South Africa's Just Energy Transition (JET)?
- Which sectors and technologies should be prioritised for tax incentives, particularly in renewable energy, green manufacturing, electric mobility, and energy efficiency?

3.14 Ranking of Financial Instruments

Overall, while most of the financial instruments discussed in Section 3 are applicable within the South African context, their effectiveness depends on strengthening governance, policy certainty, institutional capacity, and project pipelines capable of attracting both domestic and international climate finance.

For a South African climate finance and just transition assessment, a useful way to rank financial instruments is according to the following five criteria using the information available: i) Current level of implementation in South Africa (existing policy and market maturity); ii) Scalability (ability to mobilise large volumes of finance); iii) Institutional feasibility (ease of implementation within current institutional and regulatory frameworks); iv) Contribution to a Just Transition (ability to support social inclusion, affordability, worker protection, community development, community ownership and grievance mechanisms); and v) Private capital mobilisation potential (ability to leverage additional private investment).

Using these criteria, the instruments can be ranked as shown in Figure 7. South Africa's most practical climate finance instruments are concessional loans, tax incentives, green bonds, and sustainability-linked loans, largely because they already operate within established

regulatory and financial systems and have demonstrated capacity to mobilise significant investment (Republic of South Africa, 2023; Winkler et al., 2023). Blended finance remains important but should be viewed as a supporting mechanism whose effectiveness depends on project quality, institutional capacity, and risk-sharing arrangements. Carbon taxes and carbon markets play an important role in creating incentives for decarbonisation, but their direct contribution to mobilising large-scale climate finance remains comparatively limited, particularly in the short term (Qu et al., 2023; Peacock et al., 2023). The analysis suggests that South Africa's climate finance strategy should prioritise concessional finance, green finance instruments, sustainability-linked lending, and targeted fiscal incentives, while utilising blended finance, carbon taxation, and carbon markets as complementary mechanisms within a broader financing framework for a just transition.

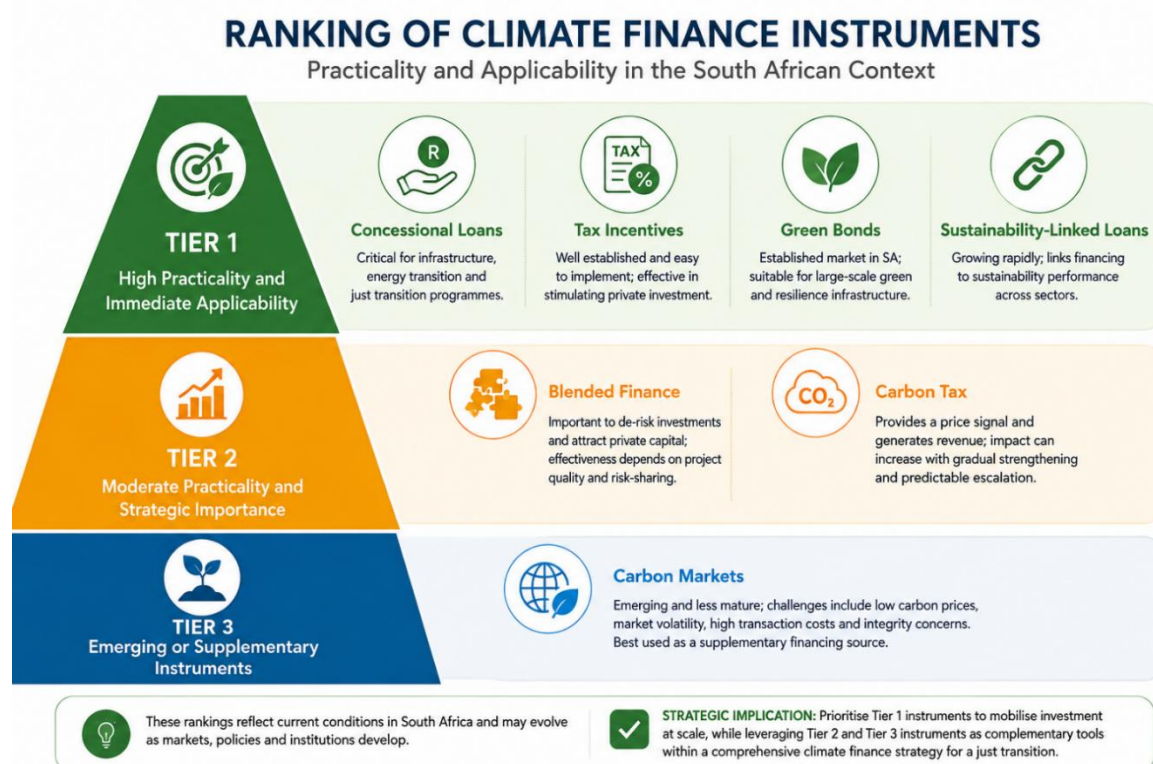


Figure 7: Ranking of financial instruments

3.15 Implications for Social Dialogue

The South African Climate Finance Landscape reports suggest an evolution in South Africa's climate finance architecture, identifying diversified financing instruments and mechanisms capable of mobilizing greater private sector investment and addressing financing gaps for the country's climate transition. While the financial instruments discussed in this section are broadly applicable to South Africa's just transition objectives, their effectiveness depends on greater contextualisation to the country's fiscal constraints, municipal financing challenges, and the financial realities of state-owned enterprises such as Eskom, Transnet, and water utilities. Explicit consideration of public debt pressures, SOE balance sheet constraints, municipal absorptive capacity, and the role of development finance institutions would strengthen the analysis and improve the practical relevance of these instruments within South Africa's climate finance landscape.

South Africa has already adopted several climate finance instruments, although their level of maturity and scale of deployment vary considerably. Established and actively used instruments include grants, concessional loans, green bonds, equity investments, and public-private arrangements (Dave and Akongwale, 2024; Meattle et al., 2025; Cordonnier et al., 2025; Gomes, 2026). These instruments have been applied through programmes such as the Just Energy Transition Partnership (JETP), renewable energy procurement initiatives, development finance institution lending, and municipal and corporate green bond issuances (Republic of South Africa, 2023). Emerging and expanding instruments include guarantees, de-risking mechanisms, and blended finance structures, which are increasingly being developed to crowd in private capital for renewable energy, climate-resilient infrastructure, and adaptation projects but remain underdeveloped relative to international best practice (Winkler et al., 2023). Nascent but high-potential instruments include carbon credit markets, which are supported by South Africa's Carbon Tax framework and growing interest in voluntary carbon markets, particularly in the forestry, agriculture, and land-use sectors (Qu et al., 2023). It is important to highlight that the list of potential instruments discussed in this section is not exhaustive. Additional instruments were identified in other sections including sustainability-linked bonds, transition bonds, results-based finance, other innovative risk-transfer products, project preparation facilities, municipal finance instruments, and tariff- or contract-based mechanisms such as PPAs.

Consistent with the PCC's social dialogue framework, meaningful participation throughout the project cycle, i.e., from policy design and investment prioritisation to implementation, monitoring and evaluation, is essential for enhancing transparency, improving policy legitimacy and increasing investor confidence (PCC, 2021; 2022). Integrating social dialogue into climate finance governance also contributes to identifying locally appropriate financing solutions and reducing implementation risks associated with major transition investments.

Existing climate finance instruments can accelerate South Africa's just energy transition when deployed as a coherent package that lowers the cost of capital, strengthens implementation capacity, and mobilises private investment at scale. Green bonds, concessional loans, guarantees, equity, grants, carbon markets, and blended finance each offer distinct advantages, but their legitimacy and effectiveness depend on robust governance, clear eligibility rules, transparent disclosure of beneficiaries and results, and credible safeguards for environmental integrity and social outcomes. Embedding these instruments in ongoing social dialogue in an inclusive manner so that worker protection, reskilling, local economic development, and affordability are treated as core performance metrics helps ensure that climate action delivers both emissions reductions and socio-economic wellbeing of affected communities and regions. Key considerations for strengthening ongoing social dialogue include issues of affordability, debt sustainability, procurement, local content, labour standards, community ownership, and grievance mechanisms to ensure that climate finance interventions are equitable, inclusive, and responsive to stakeholder needs.

4 BARRIERS AND OPPORTUNITIES FOR FINANCING JUST ENERGY TRANSITIONS

Access to climate finance remains one of the most persistent challenges facing developing countries, particularly, in the Global South. Despite the growing pool of global climate funds, many LMICs struggle to translate international commitments into accessible and affordable finance. This section discusses the main barriers to accessing climate finance in developing countries focusing on South Africa as a case study. It concludes with key opportunities available to South Africa for mobilising and accessing climate finance to support its transition towards a low-carbon, climate-resilient economy, with an emphasis on innovative financing instruments and sector-specific financing.

4.1 Barriers

The scoping review identified several key barriers to effective climate finance mobilisation that are interrelated, such as institutional and governance constraints, policy and regulatory challenges, financial and economic limitations, technical and data-related gaps, as well as access and equity barriers. Accordingly, these factors should not be considered in isolation but analysed as interconnected elements within a broader context to understand the global picture and shed light on the problem. These barriers are examined in detail, with South Africa used as a case study to illustrate their implications.

4.1.1 Institutional Capacity, Governance, and Political Barriers

South Africa's climate finance landscape assessments jointly commissioned by the PCC and CPI consistently identify fragmented institutional responsibilities, overlapping mandates and limited coordination among government departments, development finance institutions and the private sector as significant barriers to scaling climate finance (Cassim et al., 2021; Meattle et al., 2023; 2025). Although climate policy frameworks have strengthened considerably, coordination across planning, budgeting and implementation processes remains uneven, reducing the effectiveness of climate finance mobilisation and deployment (Meattle et al., 2025). Weak coordination across government departments, development finance institutions, municipalities, labour organisations and affected communities may delay investment decisions, reduce policy certainty and increase transaction costs for climate finance. Strengthening institutionalised social dialogue therefore represents not only a governance objective but also an enabling condition and opportunity for improving climate finance mobilisation and implementation (PCC, 2022).

A key constraint lies in institutional and governance weaknesses, including limited capacity to design and manage bankable projects, fragmented coordination across ministries, and insufficient fiduciary standards (Adenle et al., 2017; Browne, 2022). Weak institutional arrangements often delay or prevent accreditation to major global climate funds such as the Green Climate Fund or Adaptation Fund. Limited institutional capacity in many developing countries such as South Africa is a key barrier to accessing climate finance (Pillay et al., 2025). Government agencies and climate units often lack sufficient resources, technical expertise, and coordination mechanisms to design and manage projects that meet the stringent requirements of international funds such as the GCF or GEF (Sibiya et al., 2023). Lack of action on municipal finance reform is a significant barrier, allied with inadequate local government capacity (Manuel and Erasmus, 2024). High staff turnover further undermines project continuity (Ochieng et al., 2016). Consequently, even when funding opportunities

exist, implementation capacity constraints have, in some cases, limited the pace of disbursement and project delivery.

Municipalities face significant barriers to accessing and effectively using climate finance, including limited technical and fiduciary capacity, weak project preparation capabilities, concerns about creditworthiness, reliance on intergovernmental transfers, and complex donor compliance requirements (IISD, 2026). These constraints reduce municipal absorptive capacity and undermine the development of credible, bankable climate project pipelines (Van Heerden and van Vuuren, 2022; Adom et al., 2024). Limited institutional capacity also affects the ability of municipalities to manage, implement, and monitor climate-financed projects once funding has been secured. This can delay fund disbursement, weaken project delivery, reduce the utilisation of available resources, and ultimately constrain the scale of climate investment and the achievement of intended environmental, social, and development outcomes. The underutilisation of innovative financing instruments remains a key challenge at municipal level. Despite the availability of mechanisms such as green bonds, public-private partnerships, concessional finance, and credit enhancement facilities, many municipalities lack the technical expertise and financial readiness required to access and deploy these instruments effectively.

In South Africa, fragmented coordination among government ministries responsible for environment, finance, energy, agriculture, and infrastructure, limits effective access to and deployment of climate finance (Pillay et al., 2025). Overlapping mandates and weak communication lead to duplication, policy incoherence, and missed opportunities for co-financing, reducing alignment between national climate strategies, sectoral plans, and budget priorities (Jensen et al., 2020). This fragmentation undermines national ownership and the ability to present a unified investment pipeline to international funders (Adenle et al., 2017). Strengthening inter-ministerial coordination through mechanisms like climate finance committees or national green investment frameworks is essential to improve policy coherence, avoid duplication, and ensure that climate finance effectively supports national development and resilience objectives (Montmasson-Clair, 2021). The study recognises that the limited implementation of Integrated Energy Planning remains a significant barrier to inter-departmental and inter-sectoral coordination, undermining policy coherence and the alignment of energy, climate, and development objectives.

Institutional and governance challenges in South Africa, including lengthy approval processes, limited coordination across government departments, weak project preparation capacity, and concerns regarding financial oversight and accountability, continue to constrain the country's ability to access, manage, and effectively deploy climate finance (Pillay et al., 2025). Many institutions in the country lack robust financial management, internal controls, audit mechanisms, and transparent reporting frameworks required by funds such as the Green Climate Fund or Adaptation Fund (Sibiya et al., 2023). Consequently, ministries, development agencies, and local authorities often depend on international intermediaries to manage funding, delaying disbursements and limiting local ownership (Sibiya et al., 2023). Governance gaps in financial management and accountability reduce access to international climate finance (Chamma, 2025). Strengthening fiduciary systems, enhancing accountability, and improving governance are therefore critical to attract finance, build institutional credibility, and ensure efficient, equitable use of climate funds for national mitigation and adaptation objectives in South Africa (Pillay et al., 2025).

Political instability and policy discontinuity pose significant challenges to attracting and sustaining climate finance in many developing countries by undermining investor confidence (Adenle et al., 2017). Frequent changes in government, shifting priorities, and weak institutional safeguards can lead to abrupt policy reversals or abandonment of long-term climate commitments, creating uncertainty around regulations, incentives, and investment frameworks (Wang et al., 2024). While political instability is not considered a major constraint in the South African context, policy uncertainty could be resolved by addressing governance challenges, policy contestation, and shifts in the political landscape that affect the predictability of long-term policy direction (Parsons and Krugell, 2022). Governance risks, including fiduciary governance gaps, and opaque decision-making, further heighten perceived risk for both private and international investors, discouraging long-term engagement (Chamma, 2025). Politicisation of climate policies can delay or disrupt project implementation, undermining consistent climate finance pipelines (Prakash, 2026). Strengthening political and institutional stability, embedding climate commitments into legally binding frameworks, and upholding governance standards are therefore critical for de-risking investments and ensuring steady inflows of climate finance.

4.1.2 Policy and Regulatory Barriers

A related challenge linked to governance, institutional, and political constraints is the absence of clear and stable policy and regulatory frameworks needed to attract climate investment, in particular, delays in policy implementation, uncertainty regarding carbon pricing and renewable energy procurement, inconsistent approval processes across sectors and spheres of government, and limited regulatory guidance for private sector participation continue to discourage long-term climate finance investment (Mungai et al., 2022). The effectiveness of climate finance depends heavily on regulatory clarity (Bhandary et al., 2021). Like many developing countries in Africa, South Africa demonstrates that when climate finance strategies and fiscal incentives are underdeveloped, investors face uncertainty regarding priorities, rules, and long-term objectives (Pillay et al., 2025). This often leads to short-term interventions and limits the competitiveness of green projects compared to traditional carbon-intensive investments (Mungai et al., 2022; Wang et al., 2024).

The Climate Finance Landscape reports further highlight that policy uncertainty, including evolving carbon market regulations, inconsistent investment signals and lengthy project approval processes, continues to discourage long-term private investment, particularly in adaptation, nature-based solutions and emerging low-carbon technologies (Cassim et al., 2021; Meattle et al., 2023; 2025). National Business Initiative assessments similarly identify policy uncertainty, inconsistent regulatory signals, lengthy approval processes, limited project preparation capacity and fragmented institutional mandates as major constraints to scaling private climate investment (NBI, 2023). South Africa's transition requires governance arrangements capable of coordinating multiple institutions while ensuring accountability and inclusive decision-making (Makgetla, 2021a).

Many countries lack tax incentives, or clear investment guidelines, resulting in uncertainty for both domestic and international investors. Regulatory uncertainty – arising from unclear, inconsistently applied, or frequently revised rules – increases perceived risk for investors (Ameli et al., 2020). South Africa and regional experience highlight how weak enforcement of

environmental standards, land tenure, and property rights can undermine project predictability and delay approvals for initiatives requiring permits, secure land titles, or compliance with environmental regulations (Shiba et al., 2025; Chigbu and Babalola, 2025). Frequent changes to regulatory frameworks, without clear transition measures, further disrupt ongoing projects and deter new investments in sectors such as renewable energy, climate-smart agriculture, and resilient infrastructure (Wang et al., 2024). Ensuring clarity, consistency, and enforceability of regulations, alongside well-communicated compliance guidelines, is therefore critical to reduce perceived risk, strengthen investor confidence, and facilitate sustained finance flows for both mitigation and adaptation projects (Mungai et al., 2022).

Another recurring policy challenge identified by the Climate Finance Landscape assessments is the limited pipeline of bankable climate projects (Cassim et al., 2021; Meattle et al., 2025). While substantial financing opportunities exist, inadequate project preparation capacity, weak technical support and insufficient feasibility studies constrain the ability of both public institutions and private developers to access available climate finance (Meattle et al., 2025). Integrating climate priorities into budgeting and national development planning, alongside clear investment pipelines and governance frameworks, is therefore crucial to attract both private and blended finance and to ensure the long-term sustainability of climate action initiatives (Bhandary et al., 2021).

Effective climate finance mobilisation is hindered when climate objectives are not fully integrated into national budgets (Pindiriri and Kwaramba, 2024). In South Africa, insufficiently climate-responsive budgeting results in underfunded adaptation and mitigation projects and reduces the ability to coordinate domestic spending with international finance flows (Adom et al., 2025a). According to Adom et al. (2025a), this gap also complicates long-term planning, monitoring, and reporting, which are critical for demonstrating impact to international donors. Implementing dedicated climate funds, multi-year expenditure frameworks, and budget tagging can align domestic fiscal resources with global climate finance, enabling coherent investment strategies and supporting the country's pursuit of sustainable, low-carbon development goals (Pindiriri and Kwaramba, 2024).

4.1.3 Financial, Economic, Market and Private Sector Barriers

The institutional and policy challenges highlighted earlier are compounded by financial and economic constraints, including fiscal constraints, sovereign risks, municipal creditworthiness, high borrowing costs, currency volatility, exchange risks, and the predominance of market-rate debt from development finance institutions and multilateral development banks, i.e., terms that are often unsuitable for non-revenue-generating adaptation projects (Adom et al., 2025a). Market-rate debt has the most direct and immediate impact on public balance sheets by increasing debt service costs and repayment burdens, thereby heightening fiscal risk and potentially limiting fiscal space for other development and climate-related expenditures. South Africa lost investment-grade status with all three major rating agencies (Moody's, S&P, Fitch) by 2020 (BLSA, 2025). This sub-investment grade rating has direct consequences for the report's core proposals: (i) it significantly raises the cost of sovereign and quasi-sovereign green bond issuance; (ii) it restricts the domestic institutional investor base, as many pension funds and insurance mandates prohibit holding sub-investment grade instruments; and (iii) it limits the terms on

which multilateral credit enhancements are available. The cost of capital discussion is analytically incomplete without this context (Ntsalaze et al., 2017).

According to KEPSA (2022), limited risk-sharing or blended finance mechanisms such as grants, concessional loans, guarantees, first-loss capital, or equity co-investments hinder private capital mobilisation. At the same time, market-related barriers including market failures, behavioural, investor risk perceptions and awareness limit SME financing opportunities and private-sector participation. The result is a persistent imbalance, where most climate finance flows toward easily investable mitigation projects in middle-income countries, while adaptation initiatives and least-developed regions remain underfunded (Pillay et al., 2025).

Perceived high risk and low financial returns continue to limit private sector participation in South Africa's climate finance, especially for adaptation projects and energy sector (Ameli et al., 2021). For instance, Eskom holds approximately R400 billion in government-guaranteed debt and is the dominant entity in South Africa's electricity sector. Its financial restructuring is inseparable from the energy transition financing discussion. The JET-IP, REIPPPP, and any renewable energy blended finance mechanism must be understood in the context of Eskom's debt load, its credit risk, and the government's fiscal exposure as guarantor. Initiatives such as flood protection, water management, and climate-resilient agriculture often lack predictable revenue streams, while even mitigation projects like renewable energy face risks from regulatory uncertainty, currency volatility, or long payback periods (Whittaker et al., 2026). Without risk mitigation tools, guarantees, or blended finance structures, private investors remain hesitant, restricting funding for critical resilience and adaptation interventions (Pillay et al., 2025). Expanding de-risking mechanisms, blended finance models, and targeted guarantees is therefore essential to mobilise private capital, enhance project bankability, and accelerate South Africa's transition to a low-carbon, climate-resilient economy (Meattle et al., 2023).

The high cost of capital remains a major constraint for financing climate projects in South Africa (Ameli et al., 2021). Market-rate borrowing, driven by macroeconomic and political risk factors, limits the ability to implement adaptation and mitigation projects, particularly those without predictable revenue streams. This elevates financial risks for both public and private investors and reduces the country's capacity to leverage international climate finance (Adenle et al., 2017). Targeted interventions, including concessional finance, blended funding structures, and risk-mitigation instruments, are critical to improving project bankability and enabling the scaling of low-carbon and climate-resilient investments (Granata and Di Nunno 2025).

The reliance on market-rate debt poses a significant constraint to climate finance in South Africa, particularly for adaptation-focused projects (Meattle et al., 2023). Funding from Development Finance Institutions (DFIs) and Multilateral Development Banks (MDBs) is largely offered as near-commercial loans, which are suitable for revenue-generating mitigation projects but often impractical for adaptation initiatives such as climate-resilient infrastructure, water management, or ecosystem restoration that lack predictable cash flows (Whittaker et al., 2026). This financing mismatch reduces the feasibility of projects essential for vulnerable populations and national adaptation goals, while increasing fiscal pressure on governments and limiting resources for other development priorities (Ameli et al., 2021).

Expanding access to concessional loans, grants, and blended finance mechanisms is therefore critical to lower costs, share risk, and enable the implementation of transformative adaptation and resilience projects (Granata and Di Nunno 2025).

The limited availability of concessional and grant funding in South Africa constrains the country's ability to implement transformative, long-term climate projects (Meattle et al., 2023). Most climate finance comes as market- or near-market-rate loans, which are unsuitable for adaptation and resilience initiatives, such as water infrastructure, ecosystem restoration, and community-based programmes, which lack direct revenue streams (Whittaker et al., 2026). This scarcity of low-cost, patient capital forces reliance on short-term, commercially viable mitigation projects, while smaller municipalities and local institutions struggle to access finance (Adhikari et al., 2023). Expanding concessional and grant-based instruments is therefore essential to unlock adaptation investments, promote inclusive climate action, and support a sustainable transition to a low-carbon, climate-resilient economy (Meattle et al., 2023; 2024).

Limitations within South Africa's domestic financial markets, including limited availability of long-term concessional finance, high perceived investment risks, insufficient green financial instruments, and constrained access to finance for municipalities and small-scale project developers, continue to hinder the mobilisation of private sector investment for low-carbon and climate adaptation projects (Pillay et al., 2025). While the country's financial system is relatively advanced in the African context, climate-focused instruments such as green bonds, climate funds, and blended finance mechanisms remain limited in scale, restricting private sector participation, especially in higher-risk sectors like adaptation, water management, and sustainable agriculture (Dave and Akongwale, 2024). Smaller municipalities and local enterprises face additional barriers due to insufficient financial instruments or risk-sharing mechanisms (Manuel and Erasmus, 2024). Strengthening domestic financial infrastructure through expanded green bond markets, dedicated climate investment funds, and risk mitigation tools is therefore essential to unlock private capital, diversify funding sources, and support long-term transformative climate action (Adhikari et al., 2023).

The limited availability of de-risking instruments in South Africa, constrains private sector investment in climate projects. Tools such as guarantees, insurance products, and first-loss mechanisms are essential for reducing perceived financial and operational risks, particularly for long-term adaptation and resilience initiatives like water infrastructure, ecosystem restoration, and climate-resilient urban development (OECD-G20, 2025). Without these mechanisms, private investors and smaller local institutions remain hesitant, increasing reliance on concessional or public finance and limiting the scaling of critical projects (Whittaker et al., 2026). Expanding structured de-risking instruments is therefore crucial to attract private capital, support ambitious long-term initiatives, and advance national mitigation and adaptation objectives (Ali and Kamraju, 2025).

Limited awareness and capacity among domestic financial institutions and SMEs in South Africa restricts access to climate finance. Many local banks, investment firms, and businesses lack knowledge of available instruments, funding criteria, and concessional or blended finance options, and often do not have the expertise to assess climate-related risks (IFC, 2025). This gap limits their ability to develop or invest in viable climate projects,

particularly in adaptation sectors, leaving smaller enterprises excluded and domestic private capital underutilized (Granata and Di Nunno, 2025). Strengthening technical capacity, raising awareness of finance instruments, and providing decision-support tools are therefore essential to enable broader participation in climate investments and advance national low-carbon and resilience objectives (OECD-G20, 2025).

4.1.4 Technical and Data Barriers

The progressive development of South Africa's Climate Finance Landscape reports demonstrates significant improvements in climate finance tracking and transparency (Cassim et al., 2021; Meattle et al., 2023; 2025). Nevertheless, the reports recognise persistent challenges related to data availability, harmonised reporting methodologies and consistent monitoring of climate finance flows across institutions, limiting evidence-based policy evaluation and investment planning.

Technical and informational barriers further impede access to climate finance by limiting the ability of project developers, local governments or municipalities and smaller enterprises to navigate complex application processes, prepare bankable project proposals, meet stringent reporting and monitoring requirements, and access knowledge about available funding sources or eligibility criteria (Owens et al., 2025). These barriers often result in delays, missed opportunities, or underutilization of available funds, particularly for stakeholders in developing countries or regions with limited institutional capacity, thereby constraining the scale and effectiveness of climate mitigation and adaptation interventions (Adom et al., 2024). Furthermore, many potential municipal recipients lack the technical capacity and climate data needed to prepare robust, evidence-based proposals (Van Heerden and van Vuuren, 2022). A weak Monitoring, Reporting and Verification (MRV) system makes it difficult to demonstrate impact and accountability, discouraging further investment (Ochieng et al., 2016).

In South Africa, limited project preparation capacity remains a major barrier to accessing climate finance, particularly for municipalities, local authorities, and smaller institutions (Van Heerden and van Vuuren, 2022). Many potential municipal recipients for climate finance lack technical expertise to design, structure, and implement bankable projects that meet the stringent requirements of international funds such as the GCF or Adaptation Fund (Adom et al., 2024). This results in promising adaptation and mitigation initiatives, such as urban resilience programmes, community-based renewable energy, or climate-smart agriculture, stagnating at the concept stage or relying heavily on external consultants, which increases costs and delays implementation (Owens et al., 2025). Enhancing technical assistance, capacity-building, and project preparation facilities is therefore essential to improve access to finance, strengthen local ownership, and ensure that investments deliver tangible, long-term climate impacts (Ricci and Mangenot, 2023).

Limited climate data and risk assessments in South Africa hinder effective mobilisation of climate finance (Sibiya et al., 2023). Gaps in high-resolution information on climate impacts, emissions baselines, sectoral vulnerabilities, and cost-benefit analyses make it difficult to develop credible, bankable projects, particularly for adaptation and resilience initiatives like coastal protection, water management, and climate-resilient agriculture (OECD, 2023). The lack of standardised, accessible data also undermines the MRV system, reducing transparency and funder confidence (Körner et al., 2025). Strengthening climate data

infrastructure, building technical capacity, and integrating risk information into national and municipal planning are therefore critical to support informed decision-making, enhance project viability, and improve access to international climate finance (Sibiya et al., 2023).

Weak MRV systems in South Africa significantly constrain access to and effective use of climate finance (Sibiya et al., 2023). Many institutions lack standardised frameworks, technical capacity, and digital tools to track and report project outcomes, including emissions reductions, adaptation impacts, and socio-economic co-benefits (Körner et al., 2025). This undermines transparency and accountability, reduces investor confidence, delays funding approvals, and limits the scaling of successful interventions (Van Heerden and van Vuuren, 2022). Strengthening MRV through standardised methodologies, integrated data systems, and capacity-building at national and local levels is therefore critical to enhance credibility, improve access to finance, and ensure measurable, long-term climate impacts (Körner et al., 2025).

4.1.5 Access and Equity Barriers

Access requirements for climate finance vary greatly across financing providers (international or bilateral agencies, MDBs, and climate funds) but overlap across some critical policy areas (Belianska, et al., 2022). Common areas of focus involve the quality of a country's data, laws and regulations, governance, debt, and public financial management (PFM) practices including procurement systems, budget credibility and execution, fiscal transparency, internal controls, audit and oversight mechanisms, and the capacity of institutions to plan, implement, and monitor public investments effectively (Gonguet et al., 2021; Lubinga and Mazenda, 2024). When evaluating a proposed project, providers of climate finance seek the project's link with the country's climate or development strategy, where high impact projects are often preferred (Belianska, et al., 2022).

Access to climate finance is also shaped by inclusivity, equity concerns and limited gender responsiveness often exclude vulnerable communities from funding opportunities (Makgetla, 2021b; Grown and Martínez, 2025). Both geographical and sectoral imbalances in climate finance limit equitable access and effective climate action in South Africa. Most funding flows to middle-income regions and commercially viable mitigation projects, while adaptation initiatives in vulnerable rural areas, informal settlements, and water-stressed regions remain underfunded (Barrett, 2014). This disparity restricts the ability of poorer communities and under-resourced municipalities to implement climate-resilient infrastructure, ecosystem restoration, or community-based adaptation measures (Tandukar et al., 2025). Targeted allocation of finance to underserved regions and sectors, combined with supportive policies, is therefore essential to promote inclusive resilience and advance nationwide low-carbon and climate adaptation goals (Maina and Parádi-Dolgos, 2024).

Complex application and accreditation procedures limit access to climate finance for smaller or local entities in South Africa, including municipalities, community organizations, and Small and Medium-sized Enterprises (SMEs) (Manuel and Erasmus, 2024). Funds such as the Green Climate Fund and Adaptation Fund require highly technical proposals with detailed financial, environmental, and social reporting, which many local institutions lack the capacity to prepare (Kergozou, 2025). This exclusion forces reliance on intermediaries or external consultants, increasing costs and delaying implementation (Tandukar et al., 2025).

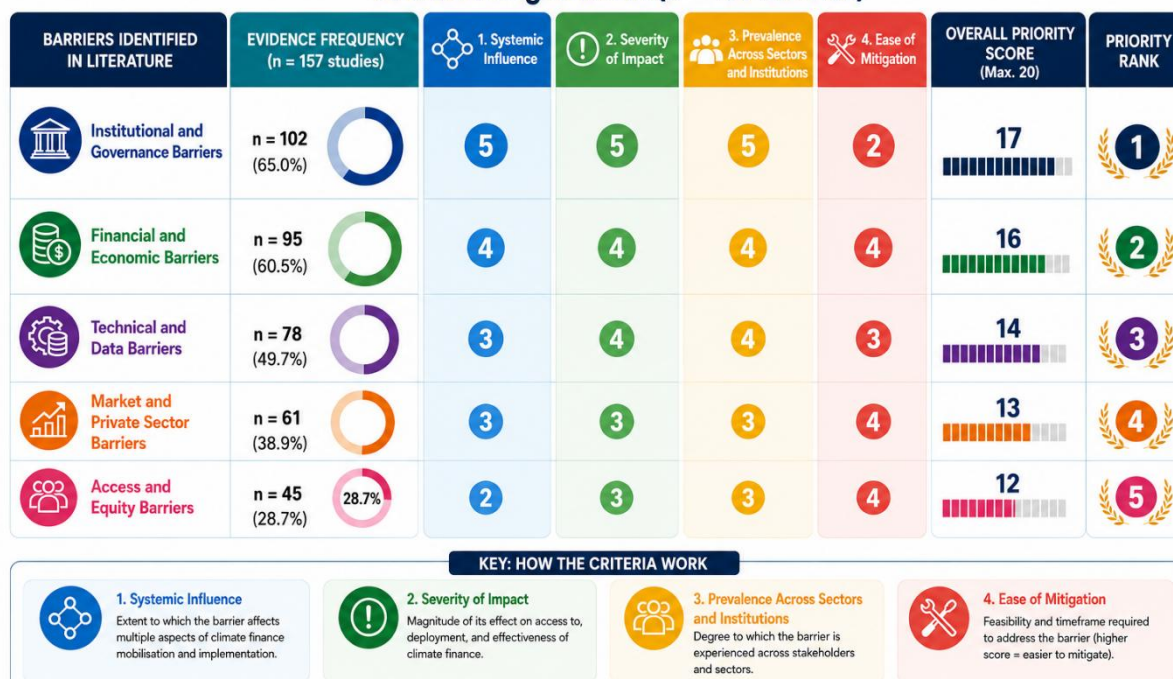
Simplifying procedures, building local capacity, and streamlining accreditation would enhance inclusivity, empower domestic actors, and improve the effective use of climate finance for mitigation and adaptation projects (Belianska, et al., 2022). The report also recognises limited access to electricity as a key access and equity barrier. Lack of reliable energy services constrains climate resilience efforts and reduces the capacity of communities to access and benefit from climate finance. At the same time, inadequate climate finance limits investment in electrification and renewable energy infrastructure, reinforcing existing inequalities.

Gender and social exclusion limit the equitable distribution and effectiveness of climate finance in South Africa (Sibiya et al., 2023). Many funding mechanisms prioritise large-scale or technical projects, often overlooking the needs of marginalised groups such as women, youth, and low-income communities in rural areas or informal settlements (Grown and Martínez, 2025). This results in projects that lack gender-responsive planning, inclusive decision-making, or community-driven approaches, reducing both social equity and climate resilience (Barrett, 2014). Integrating gender and social considerations into project design, funding criteria, and monitoring frameworks is therefore essential to ensure climate finance supports inclusive, participatory, and locally impactful climate action (Grown and Martínez, 2025).

4.1.6 Ranking of Barriers

Figure 8 illustrate a crude ranking of these barriers according to four criteria: (i) systemic influence, or the extent to which a barrier affects multiple aspects of climate finance mobilisation; (ii) severity of impact, reflecting its effect on access to, deployment, and effectiveness of climate finance; (iii) prevalence across sectors and institutions, indicating how widely the barrier is experienced; and (iv) ease of mitigation, tractability and relevance to PCC or social planner influence, which considers the feasibility and timeframe required to address the constraint. Barriers that are highly systemic, have significant impacts, affect multiple stakeholders, and constrain the effectiveness of other interventions were prioritised as the most binding. Based on the specified criteria, the review suggests that institutional and governance barriers constitute the most binding constraint to climate finance mobilisation in South Africa, as they directly affect the country's ability to coordinate, access, allocate, and effectively utilise available financial resources. Weak intergovernmental coordination, fragmented planning processes, policy uncertainty, and limited integration of climate objectives into sectoral and fiscal planning undermine investor confidence and reduce the effectiveness of both domestic and international finance flows.

Prioritisation of Climate Finance Barriers Based on Evidence Frequency and Ranking Criteria (n = 157 studies)



* Scores (1–5) reflect the contribution of each dimension to making the barrier a binding constraint on climate finance mobilisation.

Source: Scoping review of 157 studies.

Figure 8: Ranking of barriers

The second most significant constraint is financial and economic barriers, including the high cost of capital, limited availability of concessional finance, and the predominance of market-rate debt, which collectively constrain investment in adaptation and other non-revenue-generating projects. Third are technical and data barriers, particularly limited project preparation capacity, weak monitoring, reporting and verification systems, and inadequate climate data, which reduce the pipeline of bankable projects and hinder access to international climate finance. Fourth are market and private sector barriers, such as perceived investment risks and insufficient risk-sharing mechanisms, which limit private capital mobilisation. Finally, access and equity barriers, including unequal access to electricity, finance, information, and decision-making processes, remain important cross-cutting concerns that influence the distributional outcomes of climate finance. This prioritisation suggests that the PCC and social partners should focus first on strengthening governance and institutional arrangements, while simultaneously addressing financing and capacity constraints. Social dialogue processes should therefore move beyond identifying barriers towards establishing practical implementation arrangements, including stakeholder participation mechanisms, transparency and disclosure requirements, accountability structures, and monitoring frameworks to ensure that climate finance contributes effectively to a just and inclusive transition (Makgetla, 2021a).

4.2 Opportunities: innovative financing instruments

South Africa's climate finance architecture has evolved considerably over recent years, progressing from an emphasis on tracking climate finance flows towards developing an integrated financing ecosystem that combines public finance, development finance,

commercial investment and innovative financial instruments. This evolution is reflected in successive Climate Finance Landscape reports, which document increasing institutional coordination and a growing emphasis on leveraging private capital to achieve national climate objectives (Cassim et al., 2021; Meattle et al., 2023; 2025). NBI (2023) further argues that an effective climate finance architecture should function as an integrated ecosystem in which government establishes enabling policies, development finance institutions absorb risk, commercial financiers provide investment capital, and the private sector delivers implementation through commercially viable projects.

Building on the country's strong policy and regulatory foundations, such as the Climate Change Act, the Carbon Tax Act, and the Just Energy Transition Investment Plan (JET-IP), the sub-section highlights the potential to leverage both international and domestic financial mechanisms. It examines avenues such as access to multilateral and bilateral climate funds, the growth of green and blended finance instruments, and the role of public-private partnerships and de-risking tools in crowding in private capital. Furthermore, it identifies emerging opportunities in developing domestic green financial markets, strengthening institutional capacity for direct access to global funds, and aligning finance with socially inclusive, community-driven initiatives. Collectively, these opportunities provide a framework for scaling up investment, improving financial flows, and ensuring that climate finance advances South Africa's sustainable development and just energy transition objectives. Near-term opportunities should prioritise practical implementation mechanisms such as project preparation facilities, concessional and grant windows for adaptation and social components, credit enhancement tools including guarantees, green municipal finance, and the development of sector-specific investment pipelines to accelerate bankable climate investments.

4.2.1 Growing Policy and Regulatory Frameworks

South Africa has made significant strides in establishing a policy and regulatory environment conducive to climate finance, providing strong entry points for both domestic and international investment (Cordonnier et al., 2025). Key instruments include the National Climate Change Response Policy (NCCRP), which outlines the country's overarching climate strategy (Kergozou, 2025), and the Carbon Tax Act, promulgated in 2019 as a market-based tool to incentivise emissions reductions (Meattle et al., 2023). The Climate Change Act (Act No. 22 of 2024) provides a robust legal backbone for implementing South Africa's climate commitments and enhancing regulatory certainty. (Republic of South Africa, 2024), provides a robust legal backbone for implementing climate commitments and enhancing regulatory certainty, which is critical for attracting investors.

Beyond these overarching frameworks, climate objectives are increasingly embedded within sectoral plans, including energy, transport, water, and agriculture, enabling targeted and coordinated investments. For example, the energy sector's transition toward renewable sources aligns with mitigation-focused funding, while water and agricultural policies create avenues for adaptation and resilience projects in water-stressed and rural areas (Republic of South Africa, 2023). These sectoral alignments provide opportunities to develop a pipeline of bankable, fundable projects that directly support South Africa's Nationally Determined Contribution (NDC) under the Paris Agreement.

The combination of national strategies, sectoral integration, and emerging legal frameworks enhances South Africa's attractiveness to multilateral development banks, bilateral donors, and private investors. By leveraging these policies, the country can design climate finance interventions that are coherent, scalable, and aligned with international climate goals (Cordonnier et al., 2025). Moreover, strong regulatory frameworks improve predictability and investor confidence, which is particularly important for long-term adaptation projects that require patient capital and risk mitigation instruments. As a result, South Africa's policy and regulatory landscape as well as JET IP represents a critical opportunity to channel climate finance into transformative low-carbon and climate-resilient development pathways.

4.2.2 Access to Multilateral and Bilateral Climate Funds

The Climate Finance Landscape reports consistently show that public finance remains the cornerstone of South Africa's climate finance architecture by providing catalytic investments, reducing investment risks and creating enabling conditions for private sector participation (Cassim et al., 2021; Meattle et al., 2023; 2025). National government, state-owned entities and development finance institutions therefore play a central role in mobilising additional domestic and international climate finance. South Africa is well-positioned to access a wide array of international climate finance resources, including the Green Climate Fund (GCF), Adaptation Fund, Global Environment Facility (GEF), and financing from regional and multilateral development banks such as the African Development Bank (AfDB) and the World Bank (Adom et al., 2024). South Africa can leverage opportunities from global climate frameworks, including the Paris Agreement Article 6 mechanisms which speaks to carbon markets, trading, and credits (Michaelowa et al., 2020; IETA, 2025) and Sustainable Development Goals (SDGs) linkages, which appeal to multi-lateral investors seeking co-benefits (Meattle et al., 2023). Accessing climate finance through internationally recognised frameworks enhances credibility and signals alignment with global low-carbon and resilience priorities (Kergozou, 2025). These funds provide both mitigation and adaptation financing, offering concessional loans, grants, equity, and risk-sharing instruments that are critical for addressing South Africa's climate priorities across energy, water, agriculture, and urban resilience sectors (Adom et al., 2024).

A key opportunity for South Africa lies in leveraging blended finance structures, which combine concessional funding from these multilateral and bilateral sources with domestic public resources or private capital (Adom et al., 2025a). By strategically layering grants, concessional loans, and commercial financing, the country can de-risk projects that would otherwise be too costly or perceived as high-risk, particularly in adaptation sectors such as water resource management, climate-resilient infrastructure, and ecosystem restoration (OECD Climate Club, 2025). This approach not only mobilises additional capital but also enables longer-term, transformative investments aligned with national climate and development objectives.

South Africa's growing capacity to engage in direct access modalities, for example, through accredited national implementing entities with the GCF or Adaptation Fund, enhances national ownership of climate finance and reduces reliance on external intermediaries (Sibiya et al., 2023). Direct access allows local institutions, including government departments, municipalities, and state-owned enterprises, to submit and manage projects themselves, improving alignment with domestic priorities and enabling faster, context-specific decision-

making (Manuel and Erasmus, 2024). Strengthening institutional capacity for project preparation, fiduciary management, and MRV further increases South Africa's competitiveness in securing these funds (Körner et al., 2025).

Overall, access to multilateral and bilateral climate finance presents a significant opportunity for South Africa to scale mitigation and adaptation initiatives, attract private sector co-financing, and implement nationally coordinated, bankable climate projects that contribute to its NDC and broader sustainable development goals (Adom et al., 2025a).

4.2.3 Emerging Domestic Financial Instruments

South Africa has seen significant growth in domestic financial instruments tailored to mobilise climate finance, creating opportunities to leverage private sector capital for both mitigation and adaptation initiatives (Kergozou, 2025). Despite increasing private sector investment in commercially attractive mitigation activities, particularly renewable energy, private finance remains relatively limited in adaptation, biodiversity conservation and resilience investments (Cassim et al., 2021; Meattle et al., 2023; 2025). Consequently, the Presidential Climate Commission recommends expanding blended finance mechanisms, guarantees and other risk-sharing instruments to crowd in private investment for sectors that generate substantial public benefits but limited commercial returns (Meattle et al., 2025). The issuance of green bonds by government entities, state-owned enterprises, and private companies provides a mechanism to finance projects with measurable environmental benefits, such as renewable energy, energy efficiency, and sustainable transport (Ngwenya and Simatele, 2020). Similarly, climate-focused investment funds and blended finance vehicles are emerging, allowing public and concessional capital to be combined with private investment to de-risk projects that may otherwise be considered too risky or long-term (OECD-G20, 2025).

Domestic financial institutions are increasingly incorporating climate-related risk into ESG mandates, reflecting a growing awareness of the financial implications of climate change (OECD-DAC, 2025). Banks, asset managers, and insurers are beginning to integrate climate risk assessments into lending and investment decisions, opening avenues for financing projects in both mitigation sectors, like solar, wind, and energy efficiency, and adaptation sectors, such as water infrastructure, ecosystem restoration, and climate-resilient urban development (Lefevre and Tourin, 2023). This trend enhances the ability of South Africa to mobilise private capital, reduce reliance on international concessional finance, and foster locally driven climate investment.

Furthermore, the development of domestic instruments enables smaller municipalities, local enterprises, and community-based organizations to access finance through intermediated or structured mechanisms, broadening participation and promoting more inclusive climate action (Ngwenya and Simatele, 2020). Expanding the green bond market, creating dedicated climate investment funds, and developing risk-sharing and blended finance frameworks will be critical for scaling transformative projects (Ngwenya and Simatele, 2020). By strengthening these domestic financial instruments, South Africa can enhance its capacity to implement nationally aligned climate strategies, crowd in private investment, and accelerate progress toward its NDC and long-term sustainable development objectives (Chalabi-Jabado and Ziane, 2024).

4.2.4 Public-Private Partnerships and De-risking Mechanisms

South Africa has significant opportunities to leverage public-private partnerships (PPPs) and de-risking instruments to mobilise private sector finance for climate projects, particularly in adaptation and resilience sectors. Many critical climate interventions, such as water infrastructure upgrades, ecosystem restoration, climate-resilient urban development, and community-based adaptation projects, are capital-intensive and generate limited direct revenue, making them less attractive to private investors (Meattle et al., 2025). By employing instruments like guarantees, insurance products, and first-loss mechanisms, the government and development partners can reduce perceived financial and operational risks, improving the bankability of such projects (Whittaker et al., 2026).

Blended finance structures, which combine concessional public capital with private investment, provide a mechanism to share risks and enhance returns for private actors (Sharma et al., 2023). In South Africa, such approaches can unlock funding for long-term projects that are crucial for climate resilience but would otherwise struggle to attract commercial finance (Meattle et al., 2025). Partnerships with DFIs, MDBs, and international donors can create enabling environments for private investment, including support for project preparation, technical assistance, and risk mitigation frameworks (Sheikh et al., 2025). For instance, the African Development Bank's Private Sector Facility and World Bank guarantees can complement domestic resources, crowding in private capital for both mitigation and adaptation interventions (Avellán et al., 2024).

These mechanisms not only increase the flow of finance into high-impact climate projects but also foster sustainable investment pipelines and build local capacity in project design, financial structuring, and monitoring (Sharma et al., 2023). Expanding the availability of de-risking instruments and promoting strategic PPPs will be critical for scaling climate solutions in South Africa, enabling the country to implement its NDC, enhance climate resilience, and achieve inclusive low-carbon development.

4.2.5 Capacity-Building, Technical Assistance, Gender and Social Inclusive

Opportunities exist to strengthen project preparation capacity for municipalities, local authorities, and Micro, Small and Medium Enterprises (MSMEs) through capacity building and technical assistance programmes. Support for bankable project development, climate risk assessments, and MRV systems can unlock access to both domestic and international climate finance (Körner et al., 2025). Building awareness of available climate finance instruments among local financial institutions and enterprises can broaden participation. Integrating gender-responsive and socially inclusive approaches provides opportunities to access specialised funding windows emphasising equity and social co-benefits enhances national climate objectives while increasing social resilience and community engagement .

4.3 The Role of Coal in a Transitioning Energy System

4.3.1 South African Coal Roadmap

The South African Coal Roadmap provides a strategic framework for managing the country's long-term coal transition while balancing energy security, economic development, and

decarbonisation objectives (Meridian Economics, 2025; Gomes, 2026). It recognises coal as a continuing component of the national energy mix in the medium term, while outlining pathways for gradual diversification towards lower-carbon alternatives. The roadmap typically emphasises the importance of improving efficiency in existing coal-fired power plants, supporting cleaner coal technologies such as high-efficiency low-emission systems, and facilitating structural adjustment in coal-dependent regions. It also highlights the need for coordinated planning across government, state-owned enterprises, and industry to manage the socio-economic impacts of coal decline, particularly in employment-intensive regions such as Mpumalanga. However, critiques of the roadmap often point to the need for stronger integration with project-level investment planning and clearer alignment with emerging financing mechanisms under the Just Energy Transition framework.

The SAUCGA Underground Coal Gasification (UCG) Roadmap (SANEDI and Promethium Carbon, undated) specifically focuses on advancing UCG as a strategic indigenous energy resource that can convert deep or unmineable coal reserves into usable synthetic gas. Developed through industry and technical collaboration, the roadmap outlines the technical feasibility, phased development approach, and potential deployment sites, building on earlier pilot experiences such as Eskom's Majuba UCG trial. It positions UCG as a transitional technology that could enhance energy security, support industrial feedstock supply, and reduce dependence on imported fuels, particularly in regions with significant coal reserves such as Limpopo. The roadmap also highlights the need for enabling regulatory frameworks, environmental safeguards, and structured risk-sharing mechanisms to support commercialisation. However, successful implementation would depend on securing concessional finance, addressing water and environmental permitting challenges, and ensuring alignment with South Africa's broader decarbonisation commitments under the Just Energy Transition Investment Plan.

4.3.2 Opportunities in the coal sector

As a coal-dominated economy, understanding value chains of fossil fuels such as coal and identifying opportunities for hybridisation with renewable energy technologies is another crucial financial opportunity. Hybridisation involves coupling renewable energy with existing fossil fuel technology to deliver the same energy service. According to Promethium Carbon and SANEDI (2017) categorise fossil fuels value chains in two areas. First is the transformation technologies, which are energy-generating plants with potential for boosting these plants with renewable energy. An example is the repowering and repurposing of Eskom's Komati Power Station with a solar power facility. The second area is demand sectors and technologies, where energy-consuming plants have potential for fossil fuel augmentation with renewable energies.

Significant opportunities remain within South Africa's coal sector to support a balanced, inclusive and just energy transition through the adoption of innovative financing mechanisms, clean coal technologies, hybrid energy systems, mine rehabilitation initiatives, and value-added coal applications that promote energy security, industrial development, and employment retention. Rather than viewing coal primarily as an environmental liability and major source of emissions, this report acknowledges its broader strategic, economic, and energy security significance within the South African context. Accordingly, this perspective positions coal not solely as a resource to be phased out, but as a strategic asset that can be

responsibly managed and progressively integrated into South Africa's broader just energy transition pathway. Coal continues to provide several advantages, including abundant domestic reserves, relatively low-cost large-scale energy generation, reduced foreign exchange risk due to local availability, and the benefit of extensive existing infrastructure that has already been capitalised. It provides dispatchable power that variable renewables cannot match without storage. In addition, coal remains strategically important to national energy security through coal-to-liquids production, with Sasol supplying approximately 20–25% of South Africa's liquid fuel demand.

These are structural realities that this assessment explicitly recognises. Without quantifying the “coal cost hurdle,” the analysis implicitly assumes that substituting coal with renewable energy is cost-neutral, which is not the case in practice. This omission risks underestimating the system-wide transition costs and, consequently, misrepresenting the true economic implications of different energy pathways. In fact, an over-reliance on renewable-only scenarios without accounting for transitional system costs may contribute to upward pressure on electricity prices in the long term, particularly where grid stability, backup capacity, and integration costs are not fully internalised.

Beyond conventional combustion, coal also presents opportunities for higher-value applications such as coal-to-chemicals, carbon-based products including graphite and activated carbon for battery technologies, and the recovery of rare earth elements from coal ash. The report also acknowledges the potential contribution of emerging and cleaner coal-related technologies, including High-Efficiency Low-Emission (HELE) systems, Carbon Capture Utilisation and Storage (CCUS), ammonia co-firing, underground coal gasification (UCG), and hybrid energy systems.

4.3.3 Near-term, high-impact opportunities in the coal sector

The report identifies several immediate, low-cost interventions that could be implemented with limited capital investment but significant system-wide benefits. One key opportunity lies in enhancing the operational flexibility of existing coal-fired power plants. This includes lowering minimum load thresholds, improving ramping capability, and enabling planned seasonal or partial shutdowns where appropriate. Evidence suggests that such operational optimisation is cost-effective across transition scenarios, potentially delivering 50–90% of achievable cost savings while avoiding up to approximately one gigatonne of CO₂ emissions by 2050 (Meridian Economics, 2025). Importantly, these gains can be realised primarily through improved system planning, dispatch optimisation, and operational scheduling rather than requiring major capital-intensive retrofits.

In addition, South Africa holds substantial opportunities in mine land rehabilitation and repurposing, particularly given the presence of nearly 6,000 abandoned mines, including more than 300 coal-related sites (Cornelissen et al., 2019). These degraded landscapes can be transformed into productive land uses such as biofuel cultivation, industrial hemp production, renewable energy installations, and climate-smart agriculture supported by treated mine water. Evidence from field trials at Kleinkopje Colliery in Witbank demonstrates the agricultural potential of rehabilitated land, with sugar beans and wheat yields comparable to yields registered in the area (Annandale et al., 2001). These interventions present a compelling opportunity for near-term, partially self-financing development pathways that

combine environmental restoration, job creation, and local economic revitalisation, while contributing to broader Just Energy Transition objectives.

4.3.4 Technology pathways available for consideration

Several critical technology pathways are available for consideration within South Africa's energy transition portfolio (NBI, 2022c). Underground Coal Gasification (UCG), which is referenced in the National Development Plan (NDP) and was previously demonstrated at Eskom's Majuba pilot facility between 2007 and 2013, represents a potential indigenous gas resource opportunity, with estimates suggesting that Limpopo alone may contain over 400 trillion cubic feet of natural gas equivalent (Gomes, 2026). Advancing this pathway would require progression from pilot-scale experimentation to commercial-scale deployment, supported by appropriate concessional finance, risk-sharing mechanisms, and sovereign or development finance guarantees.

Solar-Assisted Power Generation (SAPG) has also been successfully demonstrated internationally, notably through projects such as Liddell and Kogan Creek in Australia, and earlier case studies such as AREVA's Matimba initiative, which demonstrated a 100 MWe configuration with cost performance below R1.50/kWh (Mokheimer et al., 2013). Evidence from comparative analyses further suggests that SAPG systems can be significantly more cost-effective than standalone concentrated solar power, with potential efficiency gains of up to 1.8 times.

In addition, circulating fluidised bed (CFB) technology for discard coal utilisation is reflected in the Khanyisa Independent Power Producer (IPP) project (450 MW), which is structured as a bankable project under a capacity charge model and has been supported through validation by development finance institutions such as the Industrial Development Corporation (IDC) and the Development Bank of Southern Africa (DBSA). Furthermore, ammonia co-firing represents an emerging transitional technology actively being explored through bilateral engagement between Japan and South Africa, including discussions on yen-denominated concessional financing. This technology offers a pathway for emissions reduction in existing coal-fired power stations without premature asset retirement, thereby supporting both decarbonisation objectives and employment and asset preservation within the power sector.

4.3.5 Lessons and recommendations on applicable financing instruments for the sector

Finally, it is important to recognise that financial instruments are not universally applicable across all project types, and effective financing requires careful alignment between technology risk profiles and appropriate funding mechanisms. For example, a first-of-a-kind Underground Coal Gasification (UCG) facility would typically require concessional finance, sovereign support, and risk guarantees, rather than exposure to commercial green bond markets due to its high technological and regulatory uncertainty. In contrast, Solar-Assisted Power Generation (SAPG) projects are better suited to more mature financing structures such as green bonds or energy service company (ESCO) models, particularly those supported by institutions such as the Industrial Development Corporation (IDC), given their relatively lower risk and proven operational performance. Similarly, circulating fluidised bed (CFB) plants utilising discard coal are most appropriately financed through capacity charge arrangements that provide long-term revenue certainty and enable bankability for utility-

scale deployment. The development of a systematic framework that aligns specific technologies with appropriate financial instruments represents a valuable opportunity to strengthen and enhance the practicality and implementability of the proposed investment pipeline. More specifically, the recommendations explicitly call for:

- A project pipeline that includes clean coal and hybrid technologies, not only renewables.
- Financing mechanisms specifically matched to the risk profiles of UCG, SAPG, CFB, and ammonia co-firing.
- Regulatory reform to address barriers for these technologies (e.g., Water Use Licenses for UCG, small-scale embedded generation rules for SAPG).
- Quantification of the "coal cost hurdle" and system costs of different transition pathways.
- Inclusion of low-hanging opportunities (flexible operations, mine rehabilitation) in the JET-IP pipeline.

4.4 Opportunities: Sector-specific Financing

This sub-section examines the sectoral opportunities for mobilising and directing climate finance to priority areas that are critical for achieving South Africa's mitigation and adaptation goals. Building on the national policy context and financing landscape, the analysis highlights how tailored financial instruments and partnerships can unlock investment in key sectors such as Energy, Agriculture, Forestry and Other Land Use (AFOLU). It explores innovative mechanisms including blended finance, green bonds, concessional lending, and public-private partnerships that can accelerate renewable energy deployment, enhance water security, and promote climate-smart agriculture and ecosystem restoration. Each sectoral analysis identifies both existing initiatives and emerging opportunities for scaling finance, demonstrating how well-structured investments can deliver environmental, economic, and social co-benefits. Collectively, these sectoral insights provide a roadmap for aligning financial flows with South Africa's NDC and advancing a just, inclusive, and sustainable transition. Focusing on underserved sectors and communities, climate finance can be targeted toward adaptation in rural areas, informal settlements, water-stressed regions, and socially marginalised communities (IPCC, 2022).

4.4.1 Energy Sector

South Africa's renewable energy sector presents substantial financial opportunities driven by innovative financing mechanisms and strong institutional support (Cordonnier et al., 2025). A cornerstone of this progress is the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has successfully attracted large-scale private investment through long-term Power Purchase Agreements (PPAs) backed by the government (Republic of South Africa, 2023). These PPAs offer predictable revenue streams to independent power producers, reducing investor risk and increasing bankability. As a result, South Africa has become one of the most attractive destinations for renewable energy investment in Africa, particularly in solar and wind technologies (Cordonnier et al., 2025). According to Cordonnier et al. (2025), the success of REIPPPP demonstrates the effectiveness of structured procurement mechanisms in leveraging private capital for public energy goals.

Financial innovation is further strengthened through blended finance models that combine concessional funding from institutions such as the Development Bank of Southern Africa (DBSA), Industrial Development Corporation (IDC), and GCF with commercial financing (OECD-DAC, 2025). This approach reduces the cost of capital and mitigates risks associated with early-stage renewable projects, making them more viable and attractive to investors (Adom et al., 2025b). Blended finance plays a critical role in unlocking capital for large-scale infrastructure developments, supporting grid expansion, and accelerating the deployment of renewable technologies (OECD, 2023). These financing mechanisms are especially important in a country with fiscal constraints and the need for rapid energy transformation.

At the macroeconomic level, the JET-IP has emerged as a key instrument for mobilising international climate finance to support South Africa's transition away from coal (Republic of South Africa, 2024; Cordonnier et al., 2025). The JET-IP secured an initial pledge of USD8.5 billion from the International Partners Group, which includes France, Germany, the United States, the United Kingdom, and the European Union (Republic of South Africa, 2023). Mobilisation progress and revised financing projections should be assessed against the most current JET-IP implementation reports. According to the government, this funding is designed not only to support decarbonisation and the expansion of renewable energy projects but also to ensure a socially inclusive transition that addresses the livelihoods of both communities and workers in coal-dependent regions. The financial flows under this plan emphasise a balanced approach that integrates environmental sustainability with social justice, demonstrating South Africa's leadership in structuring climate finance to drive both economic development and energy security (Republic of South Africa, 2023).

The Just Energy Transition Project Management Unit (JET PMU) plays a central coordinating role in the implementation of South Africa's Just Energy Transition Investment Plan (JET IP), serving as the primary interface between government, international partners, and financiers, and facilitating the mobilisation, coordination, monitoring, and deployment of concessional climate finance to support priority transition projects and programmes (Republic of South Africa, 2023). While utility-scale renewable energy projects are increasingly cost-competitive and capable of attracting commercial investment, concessional climate finance remains particularly important for supporting decentralized renewable energy solutions targeted at low-income households, rural communities, and energy access programmes. At the same time, expectations regarding the scale of climate finance, including revenues from carbon markets and carbon crediting mechanisms, should remain realistic given transaction costs, market uncertainties, and governance requirements. Achieving South Africa's climate and development objectives will require a balanced policy mix that combines financial incentives with regulatory measures such as carbon pricing, emissions standards, and disclosure requirements to mobilise investment and accelerate the transition to a low-carbon and climate-resilient economy.

Energy efficiency represents a crucial financial opportunity in South Africa's transition to a more sustainable and resilient energy system, with targeted programmes and incentives designed to attract both public and private investment. The Energy Efficiency and Demand Side Management (EEDSM) programme provides municipalities with dedicated allocations from the National Treasury to implement energy-saving interventions such as street lighting retrofits, building energy upgrades, and water infrastructure efficiency improvements (World Bank and United Nations, 2025). These investments not only reduce electricity consumption and municipal operating costs but also free up grid capacity without the need for new power

generation infrastructure (Mazzucato and Semieniuk, 2018). As local governments face increasing financial pressure due to rising energy costs and service delivery demands, EEDSM offers a strategic pathway to enhance financial sustainability while promoting environmental stewardship (Lubinga and Mazenda, 2024; World Bank and United Nations, 2025). Municipal energy efficiency retrofits, including street lighting upgrades, building energy efficiency improvements, and optimisation of water pumping systems, represent high-impact interventions that can generate rapid, self-financing returns through reduced operational expenditure and energy cost savings. These projects are already well-proven, technically mature, and highly scalable at municipal level, making them suitable for immediate implementation under existing EEDSM-type programmes. Importantly, their predictable cash flows and measurable savings profiles make them strong candidates for green bond financing and other forms of municipal climate finance, thereby enabling municipalities to mobilise capital while simultaneously improving service delivery and fiscal sustainability.

In addition to public sector initiatives, significant financial incentives exist for private sector participation in energy efficiency improvements (Adhikari and Safaee-Chalkasra, 2023). Section 12 of the Income Tax Act of 1962 (as amended) provides tax deductions for companies that implement certified energy efficiency projects (Hamer et al., 2020). This incentive effectively reduces the cost of capital by allowing businesses to claim deductions based on verified energy savings, making investments in technologies such as industrial process optimisation, efficient motors, heating and cooling systems, and building energy management systems more financially attractive. By lowering operational costs and improving competitiveness, Section 12 has driven increased private-sector engagement in energy efficiency measures across manufacturing, commercial property, and mining sectors (SARS, 2024). Combined with rising electricity tariffs and load shedding pressures, these financial mechanisms position energy efficiency as one of the most cost-effective ways to support economic growth, reduce emissions, and strengthen South Africa's energy security (Winkler, 2023).

In summary, South Africa's energy sector can benefit from increased linkages to concrete climate finance pipelines through the Just Energy Transition Investment Plan (JET-IP), blended finance platforms, and renewable energy procurement programmes that support bankable low-carbon infrastructure projects. The report recommends developing a project pipeline that incorporates clean coal and hybrid technologies, rather than focusing exclusively on renewable energy. Institutional ownership is shared across the Presidential Climate Commission (PCC), the Department of Electricity and Energy (DEE), the Development Bank of Southern Africa (DBSA), the Industrial Development Corporation (IDC), Eskom, relevant government departments responsible for energy and finance, municipalities, and private Independent Power Producers (IPPs). These institutions play a central role in structuring concessional finance, guarantees, and public-private partnerships to crowd in private investment for renewable energy and grid modernisation initiatives. Examples of bankable projects include utility-scale solar and wind farms under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), battery storage systems, transmission grid expansion and infrastructure upgrades, emerging green hydrogen developments in provinces such as the Northern Cape and Eastern Cape, municipal embedded generation, energy-efficiency retrofits in public buildings, mine rehabilitation and repurposing, electric vehicle charging networks, and hybrid energy systems that combine

renewable and conventional generation. Suitable financing instruments include concessional loans, green and sustainability-linked bonds, blended finance facilities, public-private partnerships, guarantees, carbon market revenues, and climate grants for project preparation. The growing use of green bonds, blended finance, and multilateral climate funds within the sector further strengthens investment readiness and improves project bankability within South Africa's energy transition agenda. Key financing risks include policy uncertainty, grid connection constraints, currency and interest-rate volatility, technology performance risks for emerging technologies, and limited municipal implementation capacity. Beyond emissions reductions, these investments can generate substantial social co-benefits through job creation, worker reskilling, local enterprise development, improved energy access and affordability, enhanced energy security, reduced air pollution, and the revitalisation of coal-dependent communities through economic diversification.

4.4.2 Water Sector

Water infrastructure financing in South Africa presents significant sector-specific financial opportunities driven by innovative funding mechanisms that address both water security and climate resilience (DBSA, National Treasury, NPC, and PCC, 2023). The Water Partnership Office (WPO), housed within the Development Bank of Southern Africa (DBSA), plays a pivotal role in mobilising blended finance and facilitating PPPs for strategic water projects (Department of Water and Sanitation, 2024). Through this platform, funding from government, development finance institutions, and private investors is pooled to support critical initiatives such as bulk water infrastructure development, non-revenue water reduction, and improved water service delivery (OECD-DAC, 2025). These financial arrangements help mitigate risks for private investors while enabling municipalities and water utilities to access capital for long-term infrastructure upgrades, thus improving efficiency, expanding supply, and enhancing resilience to drought (Department of Water and Sanitation, 2024).

In parallel, South African metropolitan municipalities are increasingly turning to green bonds and climate resilience bonds as innovative financing instruments to fund water-related infrastructure (Kuchtyak et al., 2017). Cities such as Cape Town have issued green bonds to mobilise investment for water reuse projects, desalination plants, aquifer recharge, and the rehabilitation of water distribution systems (DFE, 2022). These bonds attract both domestic and international investors seeking sustainable investment opportunities, while enabling municipalities to diversify their funding sources beyond traditional fiscal channels (Kuchtyak et al., 2017). By linking financial returns to environmental performance and resilience outcomes, these instruments play a critical role in closing the infrastructure financing gap in the water sector (Dave and Akongwale, 2024). Collectively, the WPO's blended finance model and the growing use of green bonds offer scalable pathways to modernise South Africa's water infrastructure while supporting long-term climate adaptation and economic growth (Department of Water and Sanitation, 2024).

Financing for catchment and ecosystem restoration in South Africa presents growing opportunities that align environmental protection with water security and climate resilience objectives (OECD, 2023). The Natural Capital Financing Facility (NCFF) and the Biodiversity Finance Initiative (BIOFIN) provide effective models for mobilising capital toward nature-based solutions that protect river systems, wetlands, and upstream catchment areas

(European Commission, 2017; UNDP, 2016). These mechanisms leverage a mix of public funds, private investment, and international climate finance to support ecological infrastructure that delivers critical water-related benefits, such as enhanced water flow regulation, reduced sedimentation in dams, and improved water quality (Granata and Di Nunno, 2025). By integrating environmental restoration into financial planning, these initiatives demonstrate how ecosystem health can be treated as a productive asset rather than a cost burden (Sheikh et al., 2025).

The Restoring Landscapes in South Africa (ReLiSA) project exemplifies the potential of ecosystem restoration as a financially viable and socially inclusive strategy, as restoration investments in South Africa have been shown to generate net positive economic returns, while ReLiSA explicitly seeks to mobilise investment and support a just energy transition in the land-use sector. (Peacock et al., 2023). Implemented through a multi-stakeholder platform, ReLiSA focuses on rehabilitating degraded ecosystems in key biomes such as grasslands, savannas, and thickets using nature-based solutions (IKI South Africa, 2024). These interventions generate multiple co-benefits, including improving water infiltration, reducing biodiversity loss, sequestering carbon, and supporting rural livelihoods through job creation and sustainable resource use (ReLiSA, 2022; Kotze, D. 2021). The project has also positioned ecosystem restoration as a climate finance opportunity for carbon credits, demonstrating how investments in ecological infrastructure can yield measurable returns in water security and community resilience (IKI South Africa, 2024).

The water sector represents a critical climate adaptation and resilience investment opportunity in South Africa, given increasing water scarcity, aging infrastructure, and growing climate-related risks such as droughts and floods. South Africa's water sector is increasingly connected to climate finance pipelines through investments in water security, wastewater treatment, climate-resilient infrastructure, and integrated catchment management programmes aligned with national adaptation priorities. Institutional ownership is largely coordinated through the Department of Water and Sanitation (DWS), the Development Bank of Southern Africa (DBSA), National Treasury, Trans-Caledon Tunnel Authority (TCTA), municipal water entities, water boards, municipalities, catchment management agencies, private-sector partners, which collectively support financing mobilisation and infrastructure delivery. Financing mechanisms include blended finance, infrastructure grants, green bonds, public-private partnerships, payment for ecosystem services schemes, and biodiversity-related finance mechanisms, climate adaptation funds and concessional climate finance from multilateral institutions supporting adaptation-oriented water projects. Bankable project examples include water infrastructure rehabilitation and expansion, wastewater treatment upgrades, bulk water supply augmentation schemes, non-revenue water reduction programmes, wastewater recycling and reuse facilities, smart metering systems, desalination initiatives where applicable, catchment and wetland restoration using nature-based solutions that improve water security and ecosystem resilience, acid mine drainage treatment projects, and climate-resilient dam and pipeline upgrades in water-stressed municipalities. These investments increasingly emphasise resilience, service delivery efficiency, and long-term sustainability while improving the investment readiness of South Africa's water sector within broader green transition and climate adaptation frameworks. Key financing risks include weak municipal finances, revenue collection challenges, high infrastructure maintenance backlogs, regulatory uncertainty, climate variability, and limited technical capacity for project

preparation and implementation. In addition to strengthening climate resilience and water security, investments in the water sector can deliver significant social co-benefits through improved public health, reduced water losses, enhanced agricultural productivity, job creation in infrastructure development and ecosystem restoration, protection of vulnerable communities from water-related climate risks, and improved access to reliable and affordable water services.

Scaling these efforts is further supported by payment for ecosystem services (PES) schemes, which create market-based incentives for landowners and communities to engage in conservation and restoration activities (Peacock et al., 2023). Under PES models, downstream water users such as municipalities, agribusinesses, and utilities financially compensate upstream land managers for maintaining healthy catchments and restoring natural vegetation that enhances water yield and reduces treatment costs (Benn, et al., 2023; Turpie et al., 2008). This approach not only attracts private sector participation but also promotes long-term sustainability by linking financial returns to ecological outcomes (Blignaut et al., 2010). Collectively, these financing mechanisms offer South Africa a transformative pathway to secure water resources, build climate resilience, and drive inclusive green development (Benn, et al., 2023).

4.4.3 Agriculture, Forestry, and Land Use (AFOLU)

Climate-smart agriculture financing offers a critical opportunity to align South Africa's agricultural sector with national goals for food security, climate resilience, and sustainable land management (Lipper et al., 2014). Concessional finance provided through institutions such as the Land Bank's Green Finance Facility and the Agricultural Development Agency (AGDA) enables smallholder farmers to adopt sustainable practices, including precision irrigation, conservation tillage, and climate-resilient crop varieties (OECD, 2024a). These financial products are specifically tailored to reduce borrowing costs and provide flexible repayment terms, recognising the long-term nature of returns associated with climate-smart investments (Adom et al., 2025a). By empowering emerging farmers and promoting inclusive participation in the green economy, these mechanisms support both agricultural productivity and rural livelihoods (Lipper et al., 2014).

In addition to concessional lending, results-based financing and participation in carbon credit markets present expanding revenue streams for farmers implementing regenerative agricultural practices (Wetterberg et al., 2024). Through internationally recognised certification frameworks such as the Verified Carbon Standard (VCS) VERRA and the Gold Standard, farmers can generate carbon credits through integrating agroforestry and restoring degraded land to increasing above-ground carbon and soil organic carbon (World Bank, 2025a). These credits can then be sold to voluntary or compliance carbon markets, creating financial incentives for sustainable land use while contributing to global climate mitigation (Sheikh et al., 2025). This approach not only monetises environmental benefits but also drives investment into low-emission agricultural practices, enhancing resilience to climate variability (ReLISA, 2022). Together, these financing mechanisms provide powerful tools for transforming South Africa's AFOLU sector into a climate-resilient and net carbon sink contributing to national economic growth (IKI South Africa, 2024).

Financing remains crucial to accelerate the adoption of circular water management technologies among both smallholders and commercial farmers (Lipper et al., 2014). These

technologies, which include water recycling, precision irrigation, and on-farm water reuse systems, can significantly improve water efficiency and resilience to climate variability (DWS, 2024). However, the high upfront capital costs and limited access to affordable credit present major barriers to widespread implementation (Ameli et al., 2021). Increased financial support, through concessional loans, grants, and blended finance mechanisms, is therefore essential to scale these solutions and ensure sustainable water use in the agricultural sector (Flammer and de Mariz, 2025).

Forestry and restoration financing within South Africa's Agriculture, Forestry, and Land Use (AFOLU) sector presents growing opportunities that align environmental conservation with economic development (Benn, et al., 2023). The government-led Working for Water and Working on Fire programmes already provide substantial public investment in invasive species management, watershed protection, and fire prevention (Turpie et al., 2008). These initiatives can be further leveraged through blended finance models that combine government funding with donor contributions and international climate finance to expand landscape restoration efforts (IFC, 2025). By integrating these programmes into broader ecosystem restoration strategies, South Africa can unlock financial flows that support biodiversity conservation, improve water security, and generate employment in rural areas, particularly for vulnerable communities (IKI South Africa, 2024).

In addition to public finance, the private sector has a significant role to play in scaling sustainable forestry and restoration initiatives. There is increasing investor interest in sustainable timber value chains, which include responsibly managed plantations, agroforestry systems, and community forestry enterprises that supply high-value timber, biomass, and fibre products (OECD, 2023). Furthermore, the growth of the bioeconomy presents new investment opportunities in green industries such as bio-based packaging, bioenergy, and phytochemical extraction (IKI South Africa, 2024). These ventures not only generate commercial returns but also contribute to carbon sequestration and climate resilience (Benn, et al., 2023). By enabling regulatory certainty, access to concessional finance, and market incentives such as carbon credits, South Africa can catalyse private sector investment in forestry and restoration activities that deliver both environmental and socio-economic benefits (Sibiya et al., 2023).

In conclusion, South Africa's Agriculture, Forestry, and Land Use (AFOLU) sector presents significant opportunities for mobilising climate finance by simultaneously supporting climate mitigation, adaptation, biodiversity conservation, and rural development objectives. AFOLU is increasingly integrated into climate finance pipelines through investments in climate-smart agriculture, sustainable land management, ecosystem restoration, and carbon sequestration initiatives linked to adaptation and mitigation goals. Priority projects include climate-smart agriculture, conservation agriculture, sustainable irrigation systems, agroforestry, reforestation and afforestation programmes, restoration of degraded lands, sustainable livestock management, climate-resilient crop production, soil carbon enhancement initiatives, wildfire management, and community-based natural resource management projects. Institutional ownership is coordinated through the Department of Agriculture, Land Reform and Rural Development (DALRRD), the Department of Forestry, Fisheries and the Environment (DFFE), the Land Bank, development finance institutions such as the Development Bank of Southern Africa (DBSA), provincial governments, agricultural development agencies, research institutions, commodity organisations, community trusts, and private-sector agribusinesses. These institutions support financing mobilisation

through blended finance facilities, green climate funds, climate adaptation funds, agricultural grants, carbon markets, payment for ecosystem services schemes, biodiversity credits, green bonds and private-sector partnerships aimed at improving resilience and sustainable rural development. Bankable project examples include regenerative agriculture programmes, reforestation and afforestation initiatives, invasive species clearing projects, climate-resilient irrigation systems, biodiversity conservation schemes, and landscape restoration projects under initiatives such as LandCare and carbon credit programmes. Key financing risks include climate variability and extreme weather events, uncertain carbon and biodiversity market revenues, land tenure challenges, limited access to finance for smallholder farmers, long project payback periods, and capacity constraints in project development and monitoring. Beyond reducing greenhouse gas emissions and enhancing climate resilience, AFOLU investments can generate substantial social co-benefits through improved food security, rural job creation, enhanced livelihoods for smallholder farmers and local communities, ecosystem restoration, improved water retention and soil health, strengthened biodiversity conservation, and increased resilience of vulnerable rural populations to climate and economic shocks. These financing pipelines increasingly position the AFOLU sector as a critical component of South Africa's just transition and climate-resilient development agenda.

4.4.4 Biodiversity and Ecosystem Services

Nature-based solutions (NbS) and conservation finance in South Africa present substantial opportunities to align biodiversity protection with economic development and climate mitigation goals (IKI South Africa, 2024). One key avenue is the expansion of biodiversity stewardship programs and carbon offset projects, which generate biodiversity credits that can be traded in voluntary carbon markets (Sheikh et al., 2025). These mechanisms provide financial incentives for private landowners, communities, and conservation organizations to protect and restore ecosystems, while delivering measurable environmental benefits such as carbon sequestration, habitat restoration, and watershed protection (Kotze, 2021). By linking ecological outcomes with market-based instruments, South Africa can attract private investment into conservation initiatives that support both climate and biodiversity objectives (World Bank, 2025a).

Tourism-linked conservation finance also offers significant potential to mobilise resources for protected area management and community development. Instruments such as conservation trust funds and eco-concessions enable revenue from eco-tourism, entrance fees, and private sector partnerships to be reinvested into maintaining biodiversity, improving park infrastructure, and supporting local livelihoods (Müller et al., 2023). These approaches create a sustainable financing model where economic benefits from tourism are directly tied to ecosystem preservation, incentivizing both public and private stakeholders to engage in long-term conservation efforts (Ijatuyi et al., 2025).

The Biodiversity Economy Strategy further enhances investment opportunities by providing a structured framework for private sector engagement in biotrade, bioprospecting, and eco-tourism ventures (Müller et al., 2023). By formalizing regulatory guidance, market access, and benefit-sharing arrangements, the strategy encourages innovative business models that generate income from sustainable use of biodiversity (Sibiya et al., 2023). Together with carbon and biodiversity credits and tourism-linked financing, these mechanisms

demonstrate how conservation finance and nature-based solutions can drive economic growth, create jobs, and strengthen ecological resilience, while supporting South Africa's broader environmental and climate objectives (Meattle et al., 2025).

In conclusion, South Africa's biodiversity and ecosystem services sector presents growing opportunities for climate and conservation finance through nature-based solutions linked to restoration, water security, sustainable livelihoods, long-term economic development and carbon markets. Financing pipelines are increasingly supported by institutional actors such as the South African National Biodiversity Institute (SANBI), Department of Forestry, Fisheries and the Environment (DFFE), the Development Bank of Southern Africa (DBSA), South African National Parks (SANParks), provincial conservation agencies, municipalities, community conservation organisations, private conservation and tourism stakeholders and international partners through initiatives such as BIOFIN and the Natural Capital Financing Facility. These institutions are facilitating conservation trust funds, climate adaptation finance, blended finance facilities, grants, green bonds, biodiversity funds, biodiversity and carbon credits, and payment for ecosystem services schemes to scale restoration investments. Bankable project examples include wetland and catchment restoration in strategic water source areas, invasive alien plant clearing programmes, biodiversity stewardship initiatives, ecological infrastructure rehabilitation, coastal and marine ecosystem conservation, ecosystem-based adaptation initiatives, wildlife economy development, carbon-credit linked landscape restoration projects under the ReLiSA programme and nature-based solutions that enhance carbon sequestration, water security, and disaster risk reduction. Key financing risks include uncertain and fragmented revenue streams, difficulties in valuing ecosystem services, land-use conflicts, weak long-term funding commitments, governance challenges, and the complexity of monitoring and verifying ecological outcomes. Such projects generate measurable environmental and socio-economic returns through improved water quality and security, job creation in ecosystem restoration and conservation activities, strengthened rural livelihoods, reduced disaster risks, protection of cultural and natural heritage, enhanced tourism opportunities, biodiversity conservation, and increased resilience of vulnerable communities that depend directly on ecosystem goods and services, thereby increasing their attractiveness to both public and private investors. Collectively, these financing pipelines demonstrate how biodiversity conservation can be integrated into South Africa's broader just transition and sustainable development agenda.

4.4.5 Oceans and Coastal Economy

South Africa's oceans and coastal economy constitute a critical component of the country's sustainable development and climate resilience agenda (Loureiro et al., 2022; Struwig et al., 2024; Knight, 2024). The sector encompasses maritime transport, ports, fisheries, aquaculture, coastal tourism, marine conservation, offshore renewable energy, and coastal infrastructure, all of which contribute significantly to economic growth, employment creation, food security, and trade (Loureiro et al., 2022). At the same time, coastal systems are highly vulnerable to climate change impacts, including sea-level rise, coastal erosion, ocean warming, ocean acidification, extreme weather events, and biodiversity loss (Struwig et al., 2024). Given these dual economic and climate dimensions, the oceans and coastal economy should be recognised as a distinct sector within the climate finance framework rather than being subsumed under water, biodiversity, or agriculture-related sectors.

Significant climate finance opportunities exist to support a climate-resilient and low-carbon coastal economy (Loureiro et al., 2022). Priority investment areas include the decarbonisation of ports and maritime transport through green fuels, shore-to-ship electricity systems, energy-efficient port infrastructure, and sustainable logistics (Fadiga et al., 2024). Additional opportunities include climate-smart fisheries and aquaculture, restoration of coastal ecosystems such as mangroves, estuaries, dunes, and wetlands, marine protected area management, coastal adaptation infrastructure, early warning systems, and nature-based solutions for disaster risk reduction (Knight, 2024). Emerging sectors such as offshore wind energy, green hydrogen production linked to port infrastructure, and blue carbon projects also present opportunities to attract both public and private climate finance while supporting economic diversification and job creation.

Potential financing instruments for the sector include grants, concessional loans, blended finance mechanisms, blue bonds, sustainability-linked loans, carbon markets, climate insurance products, public-private partnerships, and dedicated adaptation finance (Shiiba et al., 2022; Bosmans and de Mariz, 2023). Institutional ownership may involve the Department of Forestry, Fisheries and the Environment, the Department of Transport, the South African Maritime Safety Authority, Transnet National Ports Authority, SANParks, provincial coastal authorities, municipalities, development finance institutions, and private sector investors. Strengthening investment pipelines within the oceans and coastal economy would contribute to achieving South Africa's Just Energy Transition objectives while enhancing climate resilience, protecting marine ecosystems, and unlocking sustainable blue economy growth opportunities.

4.4.6 Transport Sector

Low-carbon mobility financing in South Africa offers substantial potential to accelerate the transition toward a sustainable and modern transport system while unlocking economic opportunities (Adom et al., 2025b; EfD, 2023). Green financing mechanisms are under consideration to support electric vehicle (EV) adoption through incentives within the Automotive Production and Development Programme (APDP) (Pillay and Dall-Orsoletta, 2024). This programme is complemented by partnerships with the IDC, which provides concessional loans and equity financing to support the development of electric mobility infrastructure, battery manufacturing, and EV fleet deployment (DTIC, 2023). In addition to rolling out the infrastructure network in South Africa, incentives in the form of subsidies are also required to encourage private transportation operators to adopt EVs, given their higher upfront costs compared to conventional fossil fuel-powered vehicles (DTIC, 2023). By aligning industrial policy with climate goals, these financing initiatives not only reduce transport emissions but also position South Africa as a competitive player in the global green automotive market (EfD, 2023).

At the municipal level, cities have access to innovative financial instruments to promote low-carbon transport solutions (DFFE, 2022). Green Municipal Bonds enable municipalities to raise capital for projects such as low-emission bus rapid transit (BRT) systems, non-motorized transport infrastructure, such as bicycle lanes and pedestrian pathways, and transit-oriented developments that reduce reliance on private vehicles (Dave and Akongwale, 2024). These investments enhance urban mobility, improve air quality, and support inclusive access to transport services, particularly for low-income households (DFFE, 2022). By utilizing green bonds and leveraging public-private partnerships, South African

municipalities can advance sustainable transport infrastructure while contributing to the country's broader climate commitments and socio-economic development objectives (Sebitlo et al., 2022).

Rail and freight transportation in South Africa presents a significant opportunity to enhance transport efficiency, reduce emissions, and stimulate economic growth through private sector engagement (DFFE, 2022). Modernizing the rail network, including upgrading tracks, signaling systems, and freight terminals, requires substantial capital investment that often exceeds public sector capacity (Rajput and Preston, 2026). PPPs offer a mechanism to mobilise private finance for these infrastructure upgrades while sharing risk and ensuring long-term operational efficiency (Sebitlo et al., 2022). By leveraging private sector expertise and funding, South Africa can accelerate the modernization of its rail system, reduce bottlenecks, and improve reliability for both passenger and freight transport (DFFE, 2022). Investing in rail freight also provides environmental and economic benefits by shifting cargo from road to rail, thereby reducing greenhouse gas emissions, traffic congestion, and road maintenance costs (Rajput and Preston, 2026). PPP arrangements can incentivize private operators to participate in freight corridors, intermodal facilities, and logistics hubs, creating new revenue streams while enhancing national competitiveness (Sebitlo et al., 2022). These financing opportunities not only support South Africa's low-carbon transport objectives but also contribute to regional trade integration by improving connectivity between ports, industrial zones, and inland markets (Adom et al., 2025b). By combining public funding with private investment, the country can develop a more resilient, sustainable, and economically efficient freight transport system (DFFE, 2022).

In conclusion, South Africa's transport sector presents significant climate finance opportunities that support both decarbonisation and inclusive economic development through investments in low-carbon mobility, public transport modernization, and electric vehicle infrastructure. Financing pipelines are increasingly supported by institutional actors such as the Department of Transport, the Development Bank of Southern Africa (DBSA), the Passenger Rail Agency of South Africa (PRASA), metropolitan municipalities, the Industrial Development Corporation (IDC), and private-sector transport operators and manufacturers and international climate finance partners including the Green Climate Fund and multilateral development banks. Existing financing mechanisms include green bonds, blended finance, concessional loans, public-private partnerships, sustainability-linked loans, carbon finance mechanisms, climate-focused infrastructure funds and public-private partnerships that support sustainable urban mobility projects. Bankable project examples include Bus Rapid Transit (BRT) system expansions in cities such as Cape Town, Durban, Johannesburg and Pretoria, electrification of municipal bus fleets, rail infrastructure rehabilitation, modernization and expansion, non-motorised transport corridors, sustainable logistics systems, green ports, and the adoption of low-carbon fuels such as green hydrogen and sustainable biofuels, and electric vehicle charging infrastructure linked to the Automotive Production and Development Programme (APDP2). Key financing risks include high upfront capital costs, long investment payback periods, regulatory and policy uncertainty, infrastructure maintenance backlogs, technological adoption risks, and affordability concerns for low-income users. These projects offer measurable climate mitigation, reduced urban congestion, improved air quality, and socio-economic co-benefits, thereby enhancing their attractiveness to both domestic and international investors. Collectively, the transport

financing pipeline demonstrates how sustainable mobility investments can support South Africa's just transition, industrial development, and long-term climate resilience objectives.

4.4.7 Industrial and Manufacturing Sector

Green industrial development financing in South Africa offers substantial opportunities to promote sustainable economic growth while reducing industrial emissions (Meattle et al., 2025). The Industrial Energy Efficiency (IEE) programme, co-funded by the United Nations Industrial Development Organization (UNIDO) and GEF, exemplifies how technical assistance combined with concessional finance can catalyse private sector investment (OECD, 2025e). Through this programme, industrial firms receive support for energy audits, technology upgrades, and process optimisation, while access to low-interest loans or blended finance reduces investment risk (Lowitt, 2021). This approach not only improves industrial energy efficiency but also enhances competitiveness, lowers operating costs, and accelerates the adoption of clean technologies across manufacturing sectors.

Complementing energy efficiency initiatives, South Africa's Just Transition Framework provides targeted financial support to diversify coal-dependent economies through green industrial development (OECD, 2025e). Funding is directed toward emerging sectors such as battery manufacturing, green hydrogen production, and recycling industries, enabling a shift from high-carbon to low-carbon industrial activities (Meattle et al., 2025). By financing new green industrial ventures and facilitating retraining programmes for workers, the framework fosters both environmental sustainability and socio-economic resilience (EfD, 2023). Together, these mechanisms demonstrate how strategic financial interventions can mobilise investment, stimulate innovation, and support a sustainable industrial transformation that aligns with South Africa's climate goals and inclusive economic development objectives (Meattle et al., 2025).

Carbon pricing in South Africa's industrial and manufacturing sector offers a powerful avenue to generate financial resources that can support industrial decarbonisation and innovation (IPCC, 2022). The country's Carbon Tax, implemented to internalize the social and environmental costs of greenhouse gas emissions, creates a predictable revenue stream that can be strategically reinvested into the economy (Meattle et al., 2024). Options for aligning carbon pricing revenues with climate transition objectives may warrant further examination by relevant authorities (UNEP, 2020).

Such a fund can also provide concessional finance, grants, or guarantees to reduce investment risk for private companies seeking transition to low-emission operations (OECD, 2025e). Additionally, directing carbon tax revenues toward research, development, and deployment of innovative industrial technologies, such as green hydrogen, electrification of processes, and circular production methods, can stimulate domestic industrial innovation while creating high-value jobs (EfD, 2023). By linking carbon pricing instruments with targeted industrial financing, South Africa can simultaneously achieve emissions reductions, enhance competitiveness, and foster a sustainable and resilient manufacturing sector (UNEP, 2020).

In conclusion, South Africa's industrial and manufacturing sector presents important opportunities for climate finance through investments in industrial decarbonisation, energy efficiency, green hydrogen, waste-to-value projects and cleaner production technologies.

Financing pipelines are increasingly supported by institutional actors such as the Industrial Development Corporation (IDC), Development Bank of Southern Africa (DBSA), the Department of Trade, Industry and Competition (DTIC), the Department of Science, Technology and Innovation, sector industry associations, state-owned enterprises, commercial banks, private manufacturing firms and international climate finance institutions including the Green Climate Fund and World Bank. Existing financing mechanisms include blended finance, concessional loans, green industrial funds, tax incentives, equity investments, carbon market revenues, public-private partnerships, industrial transition funds and sustainability-linked financing aligned with ESG objectives. Bankable project examples include industrial energy efficiency retrofits, green hydrogen production hubs, low-carbon steel and cement manufacturing, circular economy initiatives, industrial carbon capture, utilisation and storage (CCUS), battery manufacturing, and cleaner production technologies in mining and heavy industries. Programmes linked to Special Economic Zones and the Automotive Production and Development Programme (APDP2) also create opportunities for scaling green manufacturing investments. Key financing risks include high capital requirements, technology and market uncertainties, exposure to international carbon border adjustment mechanisms, energy supply constraints, policy uncertainty, and limited access to affordable finance for small and medium-sized enterprises. These projects provide measurable emissions reductions, enhanced industrial competitiveness, job creation, and export opportunities, thereby increasing their attractiveness to both domestic and international investors. Collectively, the sector demonstrates how industrial finance can support South Africa's just transition, economic diversification, and long-term low-carbon development objectives.

4.4.8 Waste Management and Circular Economy

Circular economy investment in South Africa presents substantial financial opportunities by transforming waste streams into economic and environmental value that are still underutilized (OECD, 2025e). The Waste Management Bureau, together with the National Waste Management Strategy, provides a policy and institutional framework that encourages investment in recycling, composting, and waste-to-energy projects (DWS, 2023). These initiatives not only reduce landfill use and greenhouse gas emissions but also create employment opportunities and stimulate local enterprise development (Kotze, 2021). By establishing clear regulations, technical guidance, and market incentives, the strategy enhances investor confidence and enables scalable circular economy projects across urban and industrial contexts (Sibiya et al., 2023).

Financial innovation plays a key role in mobilising private sector capital for circular economy initiatives (Meattle et al., 2025). Blended finance mechanisms, combining concessional funding from development institutions with commercial investment, can reduce risk and attract private investors to projects in packaging, plastics, and electronic waste (e-waste) value chains (OECD-DAC, 2025). Extended Producer Responsibility (EPR) schemes further create market-based incentives by requiring producers to manage the end-of-life of their products, thereby channeling funds into recycling infrastructure, collection systems, and innovative waste processing technologies (DFFE, 2022). Together, these financial instruments and regulatory frameworks offer a pathway to accelerate the transition to a circular economy, fostering sustainable resource management while generating economic returns and supporting environmental objectives (Meattle et al., 2025).

Green entrepreneurship in South Africa's waste management sector offers promising financial opportunities by fostering small and medium-sized enterprises (MSMEs) and cooperatives that contribute to a sustainable and circular economy (Meattle et al., 2025). Support mechanisms such as the Small Enterprise Development and Finance Agency (SEDFA) provide concessional loans, guarantees, and technical assistance to green businesses, enabling them to develop innovative products and services in recycling, renewable energy, sustainable packaging, and waste management (Meattle et al., 2025). By lowering the cost of capital and providing tailored financial support, SEDFA helps emerging enterprises overcome barriers to entry, scale operations, and compete in both local and regional markets (Ameli et al., 2021).

In addition, the Green Outcomes Fund offers performance-based financing that rewards measurable environmental and social impacts (Kotze, 2021). This approach incentivises green entrepreneurs to implement solutions that reduce carbon emissions, improve resource efficiency, or promote sustainable livelihoods, while ensuring financial sustainability (DWS, 2023). By combining these financial instruments, South Africa can nurture a vibrant ecosystem of green enterprises that generate economic value, create jobs, and advance circular economy objectives (Meattle et al., 2025). Supporting MSMEs and cooperatives in this way not only strengthens local economies but also contributes to broader national goals of climate resilience and sustainable development (Meattle et al., 2024).

In conclusion, South Africa's waste management and circular economy sector presents significant opportunities for climate finance through investments in recycling, waste-to-energy, resource recovery, and sustainable waste infrastructure. Financing pipelines are increasingly supported by institutional actors such as the Department of Forestry, Fisheries and the Environment (DFFE), Development Bank of Southern Africa (DBSA), the Industrial Development Corporation (IDC), metropolitan municipalities, private-sector recycling initiatives, and producer responsibility organisations under Extended Producer Responsibility (EPR) regulations. Existing financing mechanisms include green bonds, blended finance, concessional loans, grants, carbon finance, and public-private partnerships aimed at scaling circular economy initiatives. Bankable project examples include landfill gas-to-energy projects, municipal recycling infrastructure, plastics and e-waste recycling facilities, organic waste composting plants, industrial material recovery systems, and waste beneficiation enterprises linked to the circular economy. Key financing risks include fluctuating commodity prices for recycled materials, weak waste collection and segregation systems, regulatory uncertainty, limited market demand for secondary materials, technology performance risks, and constrained municipal implementation capacity. These projects generate measurable environmental and socio-economic benefits through reduced landfill emissions, improved resource efficiency, job creation, and enhanced urban sustainability, support for small and medium enterprises, improved public health and sanitation, reduced environmental pollution, enhanced resource security, local economic development, and the creation of more resilient and inclusive circular value chains that contribute to a just and sustainable transition. thereby increasing their attractiveness to domestic and international investors. Climate finance also supports informal waste sector integration, SME development, and innovation in secondary material markets. Collectively, the sector demonstrates how circular economy investments can contribute to South Africa's just transition, low-carbon industrial development, and long-term climate resilience objectives.

4.4.9 Human Settlements and Urban Development

Green building and urban infrastructure in South Africa offer significant sectoral-specific financial opportunities by linking sustainable construction practices with innovative financing mechanisms (Flammer, 2021; Gianfrate and Peri, 2019; Dave and Akongwale, 2024; Meattle et al., 2024; Meattle et al., 2025). The Green Building Council of South Africa (GBCSA) promotes certification standards for energy-efficient and environmentally sustainable buildings, which can enhance property values and attract preferential financing such as green mortgages (Borman, 2020). These certifications signal lower operational costs and reduced environmental impact, making both residential and commercial developments more attractive to investors and homeowners while encouraging widespread adoption of sustainable building practices (GBSA, 2022).

At the municipal level, programmes such as the Cities Support Programme (CSP) and the Infrastructure Fund provide platforms to integrate climate-resilient and sustainable design principles into housing, transport, and public infrastructure projects (DFFE, 2022; Avellán et al., 2024). These initiatives enable municipalities to access funding for energy-efficient social housing, water-sensitive urban design, and resilient public facilities, helping to reduce long-term operating costs and vulnerability to climate risks (Meattle et al., 2024; 2025). Furthermore, by combining public funding with technical support, these programmes create scalable opportunities for sustainable urban development that benefit communities while improving infrastructure resilience (OECD, 2023).

Private sector participation further expands the financial landscape for green urban development (Avellán et al., 2024). Developers and institutional investors, including pension funds, can leverage blended finance mechanisms that combine concessional loans, grants, and commercial investment to support energy-efficient housing projects and urban infrastructure (OECD, 2023). These arrangements reduce financial risk and enhance the bankability of sustainable developments, encouraging investment in low-carbon building technologies, efficient water management systems, and integrated urban planning (OECD-DAC, 2025). Collectively, these financing opportunities enable South Africa to advance climate-resilient cities, promote sustainable human settlements, and mobilise private and public capital toward long-term urban sustainability goals (Meattle et al., 2025).

In conclusion, South Africa's human settlements and urban development sector presents major opportunities for climate finance through investments in resilient infrastructure, green buildings, sustainable housing, and climate-smart urban planning. Financing pipelines are increasingly supported by institutional actors such as the Department of Human Settlements, Development Bank of Southern Africa (DBSA), metropolitan municipalities, the Cities Support Programme (CSP), and international climate finance institutions. Existing financing mechanisms include green bonds, blended finance, concessional loans, climate resilience funds, and public-private partnerships designed to support low-carbon urban development. Bankable project examples include energy-efficient social housing, green building retrofits, climate-resilient informal settlement upgrading, urban stormwater management systems, district energy projects, and transit-oriented development linked to Bus Rapid Transit (BRT) systems. Municipal green bond programmes in cities such as Cape Town and Johannesburg further demonstrate the growing role of sustainable urban finance. Key financing risks include municipal fiscal constraints, high infrastructure costs, limited project preparation capacity, land availability and tenure challenges, policy and regulatory

uncertainty, and affordability concerns for low-income households. These projects generate measurable environmental and socio-economic benefits through reduced emissions, improved housing quality, improved service delivery, reduced disaster risks, lower household energy and water costs, improved public health outcomes, increased urban liveability, enhanced resilience, and job creation in construction and infrastructure development, and greater social inclusion for vulnerable and historically underserved communities, thereby increasing their attractiveness to both domestic and international investors. Collectively, the sector demonstrates how urban climate finance can support South Africa's just transition, inclusive development, and long-term climate resilience objectives.

4.4.10 Cross-Cutting Financial Instruments, Gender, Labour and Social Dimensions

The Climate Finance Landscape reports demonstrate that closing South Africa's climate investment gap will require strengthening the overall finance architecture through improved policy coherence, enhanced project preparation capacity, greater mobilisation of institutional investors, and more effective deployment of public finance to leverage substantially larger volumes of private capital (Cassim et al., 2021; Meattle et al., 2023; 2025). The evolution of South Africa's finance architecture reflects a gradual shift from reliance on grants and concessional finance towards a more diversified financing portfolio incorporating green bonds, blended finance, guarantees, carbon markets, sustainability-linked finance and results-based financing. This diversification is intended to improve capital mobilisation while reducing investment risks associated with climate projects (Meattle et al., 2025). Cross-cutting financial instruments in South Africa provide critical avenues to mobilise capital for climate action and sustainable development across multiple sectors (Dave and Akongwale, 2024). South Africa's climate finance landscape comprises a mix of established instruments currently supporting investment and emerging mechanisms whose future effectiveness depends on enabling policies, institutional capacity, and market development.

Green and sustainability-linked bonds are increasingly being used to finance projects that deliver measurable environmental and social benefits, such as renewable energy, low-carbon transport, and climate-resilient infrastructure (Flammer, 2021). These bonds attract both domestic and international investors seeking environmentally responsible investment opportunities, while providing municipalities, corporations, and development finance institutions with access to long-term, low-cost capital for sustainable projects (Gianfrate and Peri, 2019). Moreover, by directly linking financial returns to environmental performance, these instruments encourage accountability and the adoption of best practices across sectors (Flammer, 2021). Ameli et al. (2020) highlights the importance of climate finance disclosure and transparency, noting that financial instruments tied to environmental outcomes promote accountability, while DFFE (2022) emphasises reporting, monitoring, and verification requirements for sustainable bonds, reinforcing accountability and best practices.

While instruments such as green bonds, blended finance, concessional loans, and carbon markets offer important opportunities to mobilise resources for a just transition, their limitations and associated risks must also be recognised. In particular, carbon crediting mechanisms have attracted significant debate regarding environmental integrity, additionality, benefit-sharing, and social justice outcomes. The evidence base also highlights cases where inadequate governance, limited stakeholder participation, and

unequal benefit-sharing have led to suboptimal outcomes that were inconsistent with just transition principles. International experience demonstrates that while carbon markets can generate supplementary finance, their contribution to transformational development outcomes is often constrained by transaction costs, market volatility, governance challenges, and the uneven distribution of benefits. As a result, carbon finance should be regarded as one component of a broader financing portfolio rather than a standalone solution for financing a just transition. The potential for regulation or enforcement of standards to drive investment towards cleaner production has received limited attention. Beyond financial incentives, regulatory instruments, including carbon pricing, emissions standards, disclosure requirements, procurement policies, and environmental compliance mechanisms, can play a critical role in directing investment towards cleaner production pathways and low-carbon technologies. Furthermore, the government should not be viewed solely as an enabler of private-sector investment, but also a major player. Drawing on mission-oriented approaches to innovation and development, the government can play a strategic role as an investor, coordinator, market creator, and development partner through targeted public investment programmes, industrial policy interventions, infrastructure development, and social protection measures that collectively support a just and inclusive transition.

Climate insurance and risk transfer mechanisms offer another layer of financial security, helping governments, businesses, and communities manage exposure to climate-related hazards such as floods, droughts, and storms (Lopera et al., 2024). These instruments reduce the economic impact of climate shocks and make investments in climate-resilient infrastructure and nature-based solutions more bankable, while incentivizing proactive risk management strategies (Maina and Parádi-Dolgos, 2024). By mitigating potential losses, climate insurance also attracts private sector participation in projects that might otherwise be considered too risky (Ameli et al., 2021).

Public-private partnerships (PPPs) and blended finance platforms, such as those facilitated by the Development Bank of Southern Africa (DBSA), Industrial Development Corporation (IDC), and National Empowerment Fund (NEF), play a pivotal role in crowding in private investment for large-scale climate and sustainability projects (IFC, 2025). By combining concessional finance, grants, and commercial capital, these platforms reduce investment risks and catalyse private sector engagement across sectors including energy, water, transport, and agriculture (Avellán et al., 2024). Similarly, international climate funds, including the Green Climate Fund (GCF), Global Environment Facility (GEF), and Adaptation Fund, provide concessional financing, technical support, and risk-sharing mechanisms to scale climate projects in line with South Africa's Nationally Determined Contribution (NDC) (African Development Bank et al., 2024).

At the national level, instruments such as the PCC's Just Transition Financing Facility and the National Climate Finance Strategy (NCFS) provide coordinated approaches to allocate resources for low-carbon development while addressing socio-economic inclusion (Meattle et al., 2025). These frameworks guide public and private investments, ensuring that funds are directed toward initiatives that advance decarbonisation, create employment, and build climate resilience. Together, these cross-cutting financial instruments form an integrated toolkit for unlocking climate finance, accelerating sectoral transitions, and fostering sustainable development in South Africa (IFC, 2025).

While financial instruments and institutional reforms are essential for scaling climate finance, their effectiveness ultimately depends on how well they address the social dimensions of the transition. Evidence from the literature suggests that climate finance is more likely to achieve sustainable outcomes when it incorporates principles of social equity, including meaningful stakeholder participation, worker protection, skills development, community benefit-sharing, and support for vulnerable groups affected by decarbonisation. In South Africa's just transition context, financing mechanisms should therefore be designed not only to mobilise capital and reduce investment risks, but also to promote decent work opportunities, reskilling and livelihood diversification, and equitable distribution of transition benefits across affected communities. Integrating these social considerations into project design, investment criteria, monitoring frameworks, and reporting systems can enhance public trust, strengthen social dialogue, and improve the long-term effectiveness and legitimacy of climate finance interventions.

This report frames gender, youth, informal workers, affordability, local ownership, and energy access as intrinsic components of just transition outcomes, rather than peripheral issues. Gender considerations are relevant across all dimensions of climate finance and therefore integrated in the analysis as a cross-cutting principle. The literature indicates that women and men often experience the impacts of climate change, energy transitions, and access to finance differently due to existing socio-economic inequalities. Consequently, the design and implementation of climate finance mechanisms should incorporate gender-responsive criteria throughout project identification, investment decision-making, capacity-building initiatives, monitoring frameworks, and benefit-sharing arrangements. Embedding gender considerations across sectors can help ensure that climate finance interventions promote inclusive participation, equitable access to opportunities and resources, and more socially just transition outcomes, while also aligning with international best practices and PAGE objectives.

4.5 Implications for Social Dialogue

Social dialogue is an integral component of the governance architecture for climate finance, shaping how decisions are made, how risks and benefits are distributed, what evidence informs policy choices, and how implementation processes are monitored and evaluated. It provides a structured platform for engagement between government, labour, business, civil society, and affected communities, ensuring that climate finance decisions are transparent, inclusive, and responsive to diverse stakeholder interests. By embedding participatory decision-making into the climate finance system, social dialogue helps strengthen accountability, improve the legitimacy of interventions, and ensure that financial flows are aligned with both climate objectives and just transition outcomes. Thus, strengthening institutional mechanisms for social dialogue would improve policy coherence, enhance transparency in investment prioritisation, reduce implementation conflicts and increase confidence among domestic and international investors (PCC, 2022). These governance functions complement financial instruments by improving the enabling environment within which climate finance is mobilised and deployed.

For each climate finance barrier, social dialogue should focus on the stakeholders most directly affected and the governance actions required to address the constraint. Institutional barriers are primarily experienced by government entities, municipalities, and SOEs that

struggle with project preparation and implementation capacity; policy barriers affect investors and project developers seeking regulatory certainty; financial barriers constrain municipalities, SMEs, and infrastructure providers; technical barriers limit the ability of institutions to generate and use reliable data; while access and equity barriers disproportionately affect vulnerable communities, workers, women, youth, and under-resourced municipalities. Social dialogue can therefore serve as a practical mechanism for improving coordination, strengthening accountability, building capacity, resolving financing bottlenecks, enhancing transparency, and ensuring that climate finance delivers equitable and just transition outcomes. Table 2 explicitly identifies who is affected by each barrier and where social dialogue can intervene.

Table 2: Climate Finance Barriers and Entry Points for Social Dialogue in Support of a Just Transition

Barrier	Who primarily faces the barrier?	Where can social dialogue intervene?
4.1.1 Institutional Capacity, Governance and Political Barriers	National departments, municipalities, state-owned enterprises (Eskom, Transnet, water utilities), climate finance units, implementing agencies, and DFIs seeking accreditation and project approval.	Dialogue can strengthen coordination across institutions, clarify roles and responsibilities, identify capacity-building needs, improve accountability mechanisms, and agree on priorities for project preparation and municipal finance reform.
4.1.2 Policy and Regulatory Barriers	Private investors, project developers, municipalities, SOEs, financial institutions, and communities affected by regulatory uncertainty.	Dialogue can help build consensus on policy reforms, improve regulatory predictability, identify bottlenecks in permitting and approvals, and create shared understanding of transition pathways and investment priorities.
4.1.3 Financial and Economic Barriers	Municipalities, SMEs, community enterprises, SOEs, project developers, and investors facing high capital costs, debt constraints, or limited access to finance.	Dialogue can identify appropriate financing instruments, discuss risk-sharing arrangements, address affordability concerns, and improve alignment between public finance, concessional finance, and private investment.
4.1.4 Technical and Data-Related Barriers	Government departments, municipalities, project developers, DFIs, investors, researchers, and implementing agencies that lack reliable climate, financial, and project data.	Dialogue can facilitate information sharing, improve transparency, establish common reporting standards, strengthen monitoring systems, and support collaborative project preparation and knowledge exchange.
4.1.5 Access and Equity Barriers	Vulnerable communities, women, youth, informal workers, SMEs, rural areas, coal-dependent regions, and under-resourced municipalities.	Dialogue can ensure inclusive participation in decision-making, promote equitable benefit-sharing, identify social protection needs, address distributional impacts, and ensure that climate finance reaches disadvantaged groups and regions.

The proposed theory of change for the climate finance framework outlined in Section 2 links policy certainty, institutional capability, financial instruments, and implementation outcomes in a sequential and reinforcing pathway. Policy certainty provides the foundation by reducing regulatory uncertainty and signalling long-term commitment to climate and just transition objectives, which in turn strengthens investor confidence (NBI, 2022b). This enables

institutions with adequate technical and coordination capacity to design, structure, and deploy appropriate financial instruments such as grants, concessional loans, guarantees, and blended finance mechanisms. These instruments help to unlock and de-risk investment, leading to the development of robust and bankable project pipelines across key sectors. As investment flows increase, they translate into tangible implementation outcomes, including infrastructure development, job creation, and private capital mobilisation. Ultimately, these outcomes contribute to just transition impacts, such as improved equity, social inclusion, skills development, and reduced carbon emissions, thereby reinforcing the overall effectiveness and legitimacy of the transition process.

The sectoral opportunities outlined above highlight the need for social dialogue to move beyond consultation and function as an operational governance mechanism for climate finance mobilisation and implementation. Participants should include government departments, municipalities, state-owned enterprises, development finance institutions, private investors, organised labour, business associations, civil society organisations, academia, traditional authorities, community representatives, and affected workers and households. Social partners should negotiate key decisions relating to investment priorities, project selection criteria, financing instruments, benefit-sharing arrangements, local economic development commitments, employment impacts, skills development programmes, affordability safeguards, and measures to support vulnerable communities during the transition. To promote transparency and informed decision-making, stakeholders should have access to relevant data on project pipelines, financing sources and terms, investment allocations, environmental and social impacts, job creation outcomes, procurement processes, and progress against agreed targets. Accountability should be maintained through regular public reporting, independent monitoring and evaluation, social and environmental safeguards, grievance and dispute-resolution mechanisms, stakeholder review forums, and clearly defined institutional responsibilities. By embedding these elements within climate finance governance structures, social dialogue can strengthen trust, improve coordination, enhance transparency, and help ensure that climate investments deliver equitable, inclusive, and just transition outcomes across all sectors.

The scoping review indicates that barriers to climate finance mobilisation are systemic and interconnected. Institutional, governance and political constraints, policy and regulatory uncertainty and financial and economic barriers interact with technical and data limitations to influence access, project bankability and pace of disbursement, with distributional implications for vulnerable groups and affected regions. Despite these barriers, South Africa has a strong opportunity to scale climate finance through policy coherence, institutional strengthening, concessional finance expansion, and innovation in de-risking instruments. Building local capacity and ensuring equitable access will be essential to mobilising climate finance at the scale and speed required for an inclusive low-carbon and climate-resilient transition. Prioritising opportunities in sector specific finance can also help translate South Africa's just energy transition into scalable on-ground outcomes. The barriers and opportunities highlighted in section 4 imply that social dialogue on climate finance and the just energy transition in South Africa need to do more than just build consensus on goals. It needs to resolve coordination failures, strengthen accountability, and translate commitments into implementable sector specific fundable project pipelines (NBI, 2022a).

Effective social dialogue is essential to ensure that climate finance decisions are transparent, inclusive, and aligned with South Africa's just transition objectives. Dialogue platforms

should actively involve government departments, organised labour, private investors, development finance institutions, municipalities, project developers, civil society organisations, traditional authorities, women and youth groups, SMEs, and affected local communities. These stakeholders should collectively determine how climate finance priorities are selected, who makes decisions, the criteria used for project approval, and how environmental and socio-economic outcomes are monitored and reported. Social dialogue must also address the equitable sharing of transition costs, risks, and benefits, ensuring that vulnerable communities, workers, and municipalities are protected from disproportionate burdens. The government should prioritise climate finance pipelines that promote decent work, local industrial development, energy access, climate resilience, and community ownership (Makgetla, 2021b). At the same time, organised labour, organised business, and communities should commit to collaborative implementation, skills development, social protection, accountability, and long-term partnerships that strengthen trust and legitimacy in climate finance governance. Key social dialogue guiding questions on the barriers and opportunities for climate financing include the following:

- What concrete steps will build trust and accountability for climate finance decisions (who decides, on what basis, and how results are tracked)?
- Who should carry the costs and risks of the transition – and how do we ensure benefits reach vulnerable communities, SMEs and affected municipalities?
- What should the government prioritise in the climate finance project pipeline and what organised labour, organised business and community commitments are needed to ensure those projects deliver decent jobs, local benefits and a just energy transition?

5 INNOVATIVE FINANCING INSTRUMENTS FOR A JUST ENERGY TRANSITION

South Africa stands at a critical juncture in its transition toward a low-carbon, climate-resilient economy, and the ability to unlock climate finance is central to this transition. As countries across the Global South face similar development and environmental challenges, key lessons can be drawn from successful climate finance strategies implemented in Africa, Asia, and South America (Whittaker et al., 2026; KEPSA, 2022; OECD, 2023). These regions have pioneered a range of financial mechanisms, policy innovations, and community-driven approaches that have overcome resource constraints, attracted private investment, and supported just and inclusive climate action (Adom et al., 2025b). By examining what has worked, what has failed, and why, South Africa can identify practical pathways to scale up climate finance, strengthen institutional readiness, and enhance the implementation of sectoral climate policies. This section thus presents innovative insights based on the reviewed literature followed by case studies and best practices, from Global South showing how well-designed climate finance strategies use innovative instruments and supportive governance to mobilise large-scale investment offering practical lessons for achieving a just and inclusive transition. For each region, we examine: (i) what approaches or interventions have proven successful, (ii) the challenges and barriers encountered, and the reasons they arise, and (iii) potential solutions to overcome these obstacles. The report explores how successful interventions from other parts of the Global South can be adapted, replicated, or scaled up to support South Africa's climate finance and sectoral policy objectives, providing region-specific lessons and insights. By doing so, the review highlights opportunities for unlocking climate finance to implement sectoral policies in South Africa.

It is also important to distinguish between the focus of Sections 3 and 5. Section 3 provides an overview of the range of climate finance instruments currently available or emerging within the climate finance landscape, including grants, concessional loans, green bonds, blended finance, guarantees, and carbon markets. The purpose of this section is to describe their characteristics, functions, opportunities, and limitations. In contrast, Section 5 focuses on innovative applications, structures, and implementation models of these instruments, drawing on international case studies and emerging practices that demonstrate how they have been deployed to address specific financing challenges associated with just energy transitions. Consequently, some instruments appear in both sections; however, Section 3 examines the instruments themselves, whereas Section 5 examines innovative approaches to their design, combination, governance, and practical application.

5.1 Evidence from the Literature

The reviewed literature shows that climate finance instruments have evolved from relying primarily on traditional public finance tools, such as subsidies and concessional loans, towards a broader mix of market-based and blended finance mechanisms. These instruments were introduced to address key barriers including insufficient public resources, high capital costs, limited private-sector participation, and the significant financing gap associated with climate and energy transitions. Their effectiveness has depended on enabling conditions such as stable policy frameworks, credible institutions, transparent regulatory systems, well-prepared project pipelines, and access to concessional capital that can reduce investment risks. Blended finance structures, guarantees, political risk insurance, and subordinated capital have proven particularly effective in mobilising private investment

by mitigating policy, currency, credit, and demand risks that often discourage investors in emerging economies. At the same time, risks have emerged relating to overreliance on public de-risking, limited additionality, governance challenges, and uneven distribution of benefits. The rapid growth of green, social, and sustainability (GSS) bonds and sustainability-linked bonds (SLBs) further demonstrates the increasing role of capital markets in financing climate action when supported by credible reporting, monitoring, and performance frameworks. For South Africa, the literature suggests that the most transferable lessons are the importance of combining public and private finance, strengthening project preparation capacity, utilising targeted risk-sharing mechanisms, and embedding strong governance and social accountability measures to ensure that climate finance supports both climate objectives and just transition outcomes.

A key theme in the scholarly literature on financing a just energy transition, is the emergence of innovative financial instruments that redirect capital toward low-carbon energy systems while integrating social equity objectives. Traditional public finance tools such as subsidies and concessional loans have increasingly been complemented by market-based instruments, including green bonds and sustainability-linked bonds, which seek to align financial returns with environmental and social performance. Empirical evidence shows that green, social, and sustainability (GSS) bonds have expanded rapidly, enabling governments, development banks, and corporations to mobilise large volumes of capital for renewable energy and inclusive transition investments (Flammer, 2021; Gianfrate and Peri, 2019). In parallel, sustainability-linked bonds (SLBs) introduce performance-based incentives by tying borrowing costs to predefined sustainability targets, encouraging measurable improvements in emissions reduction and social outcomes rather than restricting proceeds to specific projects (Zerbib, 2019; Tang and Zhang, 2020).

Beyond debt markets, the literature highlights blended finance and risk-sharing mechanisms as critical innovations for closing the energy transition financing gap in emerging and developing economies. Blended finance structures strategically combine public or concessional capital with private investment to lower the cost of capital, improve risk-return profiles, and mobilise finance for renewable energy projects, for example, that might otherwise be considered unbankable (Bhandary et al., 2021). Academic studies demonstrate that instruments such as guarantees, political risk insurance, and subordinated capital play a catalytic role by mitigating policy, currency, and demand risks that deter private investors in low-income and transition contexts (Mazzucato and Semieniuk, 2018). Recent scholarship on Just Transition further shows how blended finance can be tailored to coal-dependent economies, embedding social protection, worker reskilling, and regional development objectives into energy transition finance models, with South Africa frequently cited as a leading case (Newell and Mulvaney, 2013; Winkler et al, 2023).

Finally, peer-reviewed research stresses that innovative financing instruments must be embedded within robust governance frameworks and equity-focused metrics to ensure that energy transitions are genuinely “just” rather than narrowly decarbonised. While green finance and carbon-related instruments can accelerate renewable energy deployment, studies caution that they often underperform in addressing distributional impacts, labour displacement, and community-level vulnerabilities unless justice considerations are explicitly integrated into design and monitoring frameworks (Heffron, 2022; Jenkins et al.,

2021). Scholars advocate for governance arrangements that link financial flows to social indicators, such as employment quality, skills development, and regional economic diversification, to align energy finance with distributive and procedural justice principles (Sovacool et al., 2023). The effective operationalisation of such frameworks remains a key research frontier, particularly in South Africa and other emerging economies where inequality, informality, and energy poverty intersect with decarbonisation imperatives (NBI, 2023).

5.2 Case Studies: Africa

There is a notable scarcity of African case studies on climate finance implementation, as many countries on the continent are still in the early stages of designing policies and programmes for climate mitigation and adaptation. Access to climate finance is often constrained by multiple factors, including limited funding flows, complex application procedures, and stringent accreditation requirements that demand demonstration of financial readiness, governance capacity, and project bankability (Ameli et al., 2021). These barriers make it challenging for many African nations to translate policy frameworks into actionable, well-funded interventions. South Africa's institutional foundations position it to strengthen its role in regional climate finance mobilisation (Adom et al., 2025a). Its experience demonstrates how clear policy alignment, robust governance, and strategic use of blended finance can enhance access to funding and accelerate the implementation of climate action initiatives (Cordonnier et al., 2025).

5.2.1 Gabon's Debt-for-Nature Swaps

Debt-for-nature swaps are financial mechanisms in which a portion of a developing country's external debt is forgiven or restructured in exchange for commitments to invest in environmental conservation and ecosystem restoration (Simeth, N., 2025). In the context of climate finance, these swaps provide an innovative way for resource-constrained countries to access funding for biodiversity protection, reforestation, and climate adaptation projects without increasing fiscal pressure (Steele and Patel, 2020). By linking debt relief to measurable environmental outcomes, debt-for-nature swaps mobilise both public and private capital, strengthen sustainable governance, and create co-benefits for climate mitigation, ecosystem resilience, and local livelihoods (Simeth, N., 2025).

Gabon pioneered Africa's first debt-for-nature swap of USD500 million in August 2023, marking a landmark achievement in leveraging innovative financial mechanisms to address environmental challenges (Simeth, 2025). Under this arrangement, a portion of Gabon's sovereign debt was restructured and forgiven in exchange for commitments to fund marine conservation initiatives, including the protection of coastal ecosystems, fisheries management, and the establishment of marine protected areas. The deal was structured in collaboration with international creditors, development banks, and conservation organizations, ensuring that freed-up resources were channeled directly into measurable environmental outcomes (Standing, 2023).

Gabon's Debt-for-Nature Swap was designed to address the dual challenge of high sovereign debt obligations and the need for long-term financing for marine conservation and sustainable development. The instrument enabled the refinancing of a portion of Gabon's external debt on more favourable terms, generating fiscal savings that were redirected

toward the protection and management of marine ecosystems. Its success was supported by strong government commitment, valuable natural assets, credible conservation targets, and the involvement of international financial institutions and conservation partners that provided guarantees and technical support. However, risks emerged around transaction complexity, high structuring costs, long-term monitoring requirements, and the need to ensure that conservation commitments translated into measurable environmental outcomes. For South Africa, the key transferable lessons include the potential to leverage natural capital to mobilise conservation finance, the importance of robust governance and monitoring systems, and the need to carefully assess debt sustainability, transaction costs, and the alignment of environmental objectives with broader development and just transition priorities.

The success of Gabon's debt-for-nature swap lies in its dual impact, i.e., it alleviated fiscal pressures on the government while simultaneously mobilising substantial funding for biodiversity conservation, demonstrating that financial markets can be aligned with environmental objectives (Fresnillo, 2024). This mechanism also provided a framework for accountability and monitoring, with clear indicators for the use of funds and the achievement of conservation targets (Standing, 2023). Beyond its financial and environmental benefits, the initiative enhanced Gabon's profile as a leader in sustainable finance in Africa, inspiring other countries on the continent to explore similar approaches (Simeth, 2025). By linking debt relief with tangible ecological outcomes, Gabon's experience illustrates how innovative finance can simultaneously address sovereign debt challenges, support climate and biodiversity objectives, and promote sustainable development in developing countries (Bosma et al., 2025). However, Gabon's credit rating and fiscal position differ significantly from South Africa's, which may affect direct transferability of this instrument.

The material contribution of debt-for-nature swaps and biodiversity credits to biodiversity financing remains uncertain. While debt-for-nature swaps and biodiversity credits have attracted growing interest as innovative conservation finance instruments, their scalability remains constrained by high transaction costs, complex monitoring, reporting and verification (MRV) requirements, and the need for robust environmental and social safeguards. As a result, these instruments are unlikely to provide financing at the scale required to address biodiversity loss on their own, but can play an important complementary role within a broader financing mix.

5.2.2 Climate Finance Facilities in Ghana

Ghana has strengthened its climate finance architecture through the establishment of institutional mechanisms aimed at mobilising, coordinating, and managing climate finance to support low-carbon and climate-resilient development (Benefoh and Ackom, 2016). One of the key institutional arrangements is the Climate Financing Division (CFD) within the Ministry of Finance, which was established to mobilise concessional climate finance, align investments with Ghana's Nationally Determined Contribution (NDC), and prepare bankable climate projects (Nakouwo and Zhang, 2024). The facility also seeks to mainstream climate finance into national planning and budgeting processes while improving coordination between government, development partners, and private investors.

5.2.3 Rwanda Green Fund (FONERWA)

Rwanda is widely recognised as one of Africa's leading examples of a national climate finance facility through the establishment of the Rwanda Green Fund, commonly known as FONERWA (FONERWA, 2023). Established in 2012, FONERWA serves as Rwanda's primary national mechanism for mobilising, coordinating, disbursing, and monitoring climate and environmental finance (Munyazikwiye and Michaelowa, 2022). The Fund was designed as a cross-sectoral financing mechanism to support Rwanda's green growth and climate resilience objectives while facilitating direct access to international climate finance (Bhandary, 2022). FONERWA provides financial and technical support to government institutions, districts, private companies, civil society organisations, and research institutions for projects focused on climate resilience, renewable energy, sustainable agriculture, ecosystem restoration, and green urban development (Munyazikwiye and Michaelowa, 2022). FONERWA has achieved notable success in mobilising climate finance and supporting green investments (FONERWA, 2023). According to FONERWA (2023), The Fund has mobilised over USD200 million and financed numerous projects that have contributed to green job creation, increased access to clean energy, watershed protection, forest restoration, and climate adaptation initiatives. Rwanda has also used the Fund to attract blended finance and private sector participation through initiatives such as the Rwanda Green Investment Facility (RGIF) and Ireme Invest, which provide concessional loans, credit guarantees, and project preparation support for green investments.

1.1.1 Climate Finance Facilities in Namibia

Namibia has increasingly strengthened its climate finance landscape through the development of national financing mechanisms and institutional arrangements aimed at improving access to international climate finance (Doku et al., 2021). One important initiative is the Environmental Investment Fund of Namibia (EIF), established by the government to mobilise and manage funding for environmental protection, climate change adaptation, and sustainable development projects (Angula et al., 2021). The EIF serves as Namibia's accredited national implementing entity to the Green Climate Fund (GCF) and the Adaptation Fund, allowing the country to access international climate finance directly. The Fund supports projects related to renewable energy, water security, climate-resilient agriculture, biodiversity conservation, and community-based adaptation initiatives. Namibia has also prioritised climate finance as part of its national development and green industrialisation strategies.

5.2.4 Challenges for African Countries

African countries face significant challenges in accessing adequate climate finance, which limits their ability to implement effective mitigation and adaptation strategies (Fresnillo, 2024). As already alluded, many nations struggle with complex application procedures, stringent accreditation requirements, and limited institutional capacity to develop bankable climate projects (Ameli et al., 2021). These barriers reduce the flow of both international and domestic funding, delaying critical interventions in sectors such as energy, water, agriculture, and biodiversity conservation (Tandukar et al., 2025). As a result, opportunities to build resilience to climate impacts and transition to low-carbon economies are often constrained,

despite the urgent need for action (Bhandary et al., 2021; Bosma et al., 2025). The high cost of capital further compounds these challenges (Ameli et al., 2021). Many African countries are burdened with debt distress and credit constraints, which make borrowing for climate-related investments expensive and risky (Simeth, 2025). High interest rates, combined with perceived investment risks in developing markets, discourage private sector participation and limit large-scale financing for sustainable infrastructure and green projects (Adenle et al., 2017). Consequently, even well-designed climate initiatives may struggle to attract sufficient funding, slowing progress toward achieving national climate targets and Sustainable Development Goals.

Climate finance facilities in Ghana, Namibia, and Rwanda's Green Fund (FONERWA) were established to address limited access to affordable finance for climate mitigation, adaptation, and sustainable development projects by coordinating and leveraging domestic and international funding sources. Their effectiveness was supported by strong national climate policies, dedicated institutional arrangements, government ownership, and partnerships with development finance institutions and donors. However, challenges included dependence on external funding, project preparation constraints, and the need for robust governance and monitoring systems. For South Africa, the key lesson is the value of dedicated climate finance platforms that can aggregate resources, strengthen investment pipelines, improve coordination across sectors, and mobilise finance for climate resilience, green industrialisation, and just transition objectives.

Despite efforts from various stakeholders, Ghana continues to face significant climate finance challenges. Limited fiscal space, high public debt levels, and dependence on external donor funding constrain the country's ability to finance large-scale climate interventions. In addition, project preparation capacity remains limited, particularly at local government level, reducing the pipeline of investment-ready projects capable of attracting international climate finance. Institutional fragmentation and overlapping mandates among government agencies also create coordination challenges in accessing and managing climate finance effectively. Furthermore, private sector participation in climate-related investments remains relatively low because of high perceived risks, limited availability of concessional finance, and insufficient de-risking instruments for green investments. Published studies further note that adaptation projects, particularly in agriculture and water sectors, remain underfunded relative to national needs.

Rwanda still faces several challenges in scaling climate finance. The country remains heavily dependent on international donor funding and concessional finance, raising concerns about long-term sustainability and domestic resource mobilisation. Limited domestic private sector capacity and relatively small capital markets also constrain large-scale private investment in climate projects. In addition, many climate projects still face difficulties in reaching financial close because of limited technical expertise, high preparation costs, and difficulties in demonstrating commercial viability for adaptation-focused projects. Rwanda's vulnerability to climate shocks, particularly in agriculture and hydropower sectors, also increases pressure on already limited climate finance resources.

Namibia faces significant climate finance challenges (Adom et al., 2024). The country is highly vulnerable to droughts, water scarcity, and climate variability, yet domestic financial resources remain limited (Nikodemus et al., 2000). Accessing international climate finance is

often slowed by lengthy accreditation processes, complex application requirements, and limited technical capacity for developing large-scale bankable projects. In addition, Namibia's relatively small domestic market and limited private sector participation reduce opportunities for leveraging private finance for climate investments. Similar to many African countries, adaptation projects in rural and vulnerable communities often struggle to attract commercial investment because of lower financial returns and higher perceived risks.

5.2.5 Opportunities for African Countries

To overcome the challenges of limited access and high-cost climate finance in Africa, implementing innovative financial instruments tailored to local conditions, can unlock new sources of funding. Mechanisms such as debt-for-nature swaps, carbon credit markets, and blended finance platforms can mobilise both public and private capital while reducing investment risks and linking financial flows to measurable environmental outcomes (OECD-DAC, 2025). Additionally, enhancing transparency and accountability in climate finance, through robust monitoring, reporting, and verification (MRV) systems, can improve investor confidence, ensure funds are efficiently allocated, and strengthen governance (Gonguet et al., 2021; Körner et al., 2025). Together, these approaches can expand the availability of climate finance, accelerate sectoral transitions, and support sustainable development across the continent.

Ghana presents important opportunities for climate finance mobilisation. The country possesses substantial renewable energy potential, particularly in solar energy, as well as growing opportunities for climate-smart agriculture, sustainable transport, and nature-based solutions. Ghana has also demonstrated increasing commitment to integrating climate finance into national development planning and strengthening transparency and accountability systems for climate-related expenditures. The growing interest of multilateral climate funds, development finance institutions, and private investors in African green investments provides additional opportunities for Ghana to expand blended finance initiatives and green bond markets.

Rwanda presents important opportunities for climate finance innovation in Africa. The country has developed strong institutional coordination mechanisms, clear national climate strategies, and transparent governance systems that have improved investor confidence and enabled direct access to international climate funds. Rwanda's emphasis on project preparation, technical assistance, and blended finance instruments has also strengthened its ability to mobilise private investment in green sectors. Moreover, the integration of climate finance into national development planning has allowed the country to align climate interventions with broader socio-economic development objectives.

Namibia presents considerable opportunities for climate finance mobilisation, despite facing several constraints. The country has substantial renewable energy potential, particularly in solar and green hydrogen development, which has attracted increasing international investor interest. Namibia's strong natural resource base and biodiversity assets also create opportunities for nature-based solutions, carbon markets, and conservation finance. Furthermore, the accreditation of the EIF to major international climate funds has improved the country's ability to directly access and manage climate finance while strengthening national ownership of climate interventions.

5.2.6 Lessons for South Africa

South Africa can leverage debt-for-nature swaps as an innovative mechanism to simultaneously address biodiversity conservation and manage sovereign debt (Meattle et al., 2025). By restructuring portions of debt in exchange for commitments to fund ecosystem restoration, protected areas, or marine conservation, the country can generate additional resources for environmental priorities without increasing fiscal pressure (OECD, 2025). This approach could help South Africa safeguard critical habitats, enhance carbon sequestration, and strengthen resilience to climate impacts, while demonstrating leadership in sustainable finance within the African context (Avellán et al., 2024). In addition, establishing blended finance platforms offers a pathway to attract private investment into renewable energy, low-carbon infrastructure, and other sustainable development projects. By combining concessional funding from development banks or international climate funds with commercial capital, these platforms can reduce investment risks, improve project bankability, and mobilise larger-scale financing (OECD, 2023). Replicating such approaches in South Africa can accelerate the country's energy transition, support climate-resilient urban and industrial development, and foster inclusive economic growth while leveraging both domestic and international financial resources (Meattle et al., 2025).

Several lessons emerge for South Africa from Ghana's experience. First, establishing dedicated institutional structures for climate finance coordination within national finance ministries can improve alignment between climate priorities and fiscal planning. Second, strengthening project preparation facilities and technical support mechanisms is essential for building a pipeline of bankable climate projects. Third, integrating climate finance into national budgeting systems can improve accountability, transparency, and long-term sustainability of climate investments. Finally, South Africa can learn from Ghana's efforts to mainstream climate finance across sectors rather than focusing exclusively on energy-related interventions.

For South Africa, Rwanda's experience provides several important lessons. First, the establishment of a dedicated national climate finance facility can significantly improve coordination, access, and management of climate finance. Second, blending concessional finance with private capital through credit guarantees, concessional lending, and project preparation support can help crowd in private investment. Third, strong governance systems, transparent monitoring frameworks, and alignment between climate finance and national development priorities are critical for building investor confidence. Finally, Rwanda demonstrates the importance of creating financing mechanisms that support multiple sectors, including energy, agriculture, water, transport, and ecosystem restoration, rather than focusing narrowly on the energy transition alone.

Namibia's experience offers several lessons for South Africa. First, accrediting national entities to international climate funds can improve direct access to climate finance while strengthening national control over project implementation (Manuamorn and Biesbroek, 2020). Second, dedicated climate finance institutions can play an important role in supporting community-based adaptation and resilience-building initiatives that may otherwise struggle to attract commercial finance. Third, leveraging emerging sectors such as green hydrogen and renewable energy can help attract international climate investment and stimulate broader economic transformation. Finally, Namibia highlights the importance of building local technical capacity for project preparation, fiduciary management, and

climate finance governance to improve long-term sustainability and effectiveness of climate finance interventions.

5.3 Case Studies: Asia

Asian countries provide a diverse range of case studies demonstrating how blended finance can be effectively integrated into public-private partnerships (PPPs) to accelerate sustainable development (ADB and World Bank, 2015). China stands out as a global leader, having scaled up renewable energy, energy efficiency, and green infrastructure projects through a combination of state-led investment, innovative financing instruments, and private sector participation (Wang and Chen, 2010). Its experience illustrates how strategic use of blended finance, combining concessional loans, green bonds, and risk-sharing mechanisms, can overcome high upfront costs, attract private capital, and ensure project bankability (Nedopil, 2025). Beyond China, other countries in this region, such as Indonesia, the Philippines, and India, offer valuable lessons for other developing regions such as Africa (World Bank, 2025c). Collectively, these Asian experiences provide valuable insights into structuring finance, managing risk, engaging stakeholders, and integrating policy with investment strategies, lessons that South Africa can adapt to accelerate its own sectoral transitions and unlock climate finance.

5.3.1 Blended Finance Initiatives in Indonesia

In June 2025, the World Bank approved a landmark blended finance package totaling USD2.13 billion to support Indonesia's transition to a high-income, low-carbon economy by 2045 (World Bank, 2025c). This initiative comprises two major components. Initially, USD1.5 billion was injected under Indonesia Productive and Sustainable Investment Development Policy Loan programme aimed at implementing wide-ranging policy reforms to strengthen the financial sector, promote digital financial services, remove credit infrastructure barriers, and expand capital markets. It also focuses on climate resilience, including adaptation to natural disaster risks, and addresses regulatory constraints in renewable energy development by reducing local content requirements and aligning industrial estate policies with international environmental and climate standards (World Bank, 2025d).

A further USD628 million was injected under the Sustainable Least-Cost Electrification-2 (ISLE-2) programme designed to bring electricity to more than 3.5 million people and enable the integration of 540 megawatts of solar and wind power into Indonesia's energy grid (World Bank, 2025e). This programme is expected to reduce electricity generation costs by at least 8% and greenhouse gas emissions by 10%, particularly in the Kalimantan and Sumatra regions (World Bank, 2025d). It also pilots the World Bank's step-up loan product, offering favourable interest rates during implementation and the opportunity to reduce loan costs through refinancing upon project completion. According to the World Bank, these blended finance initiatives exemplify how combining public and private funding can address infrastructure and sustainability challenges thereby fostering economic growth and improving clean energy access in emerging markets.

5.3.2 Geothermal Energy Development in Southeast Asia

In Southeast Asia, geothermal energy development faces challenges in Indonesia and the Philippines (Huttrer, 2020). After the U.S., Indonesia and the Philippines are the second and third-largest users of geothermal energy in the world (REN21, 2024). Both countries are actively promoting geothermal energy development to diversify their energy mix and reduce carbon emissions. Indonesia intends to use domestic fuel sources and diversify its fuel portfolio to include more renewable power (Rohit et al., 2023). Plans to increase renewable energy use to at least 23 % of the energy portfolio by 2025, depend heavily on further developing the country's geothermal and hydropower resources (Fahmi, 2025). Efforts focus on addressing key barriers, including complex regulatory frameworks, high upfront capital costs, and technical risks associated with exploration and drilling (Huttrer, 2020; Rohit et al., 2023). To overcome these challenges, governments and development partners are introducing regulatory reforms, risk mitigation instruments, and blended finance solutions that combine concessional funding with private investment (ADB and World Bank, 2015). According to the ADB and the World Bank report, these measures aim to unlock new capital, accelerate project development, and expand access to reliable, low-carbon geothermal energy in the region.

5.3.3 Green Energy Auctions in the Philippines

The Philippine government has advanced policy mechanisms to stimulate renewable energy investment through green energy auction schemes, particularly targeting geothermal energy projects (Jansen et al., 2022). According to the US Department of Trade and Commerce, the Philippines Energy Transition Strategy outlines the country's Renewable Energy law and the green energy auction programme as key mechanisms to accelerate renewable deployment (Barroco and Vithayasrichareon, 2023). These auctions are designed to increase competition, reduce project costs, and attract private sector participation by providing transparent and predictable pricing for renewable energy generation. Complementing this, the government is developing a "smart green grid plan" that prioritises the integration of renewable energy sources into the national electricity system, improving grid reliability and efficiency (Gulagi et al., 2021). Together, these initiatives demonstrate a strong policy commitment to creating an enabling environment for clean energy investment, fostering the growth of sustainable energy infrastructure, and supporting the country's low-carbon transition.

5.3.4 China's Energy Corporation's Approach

China has made significant strides in renewable energy development through innovative financial mechanisms and policy reforms (Wang and Chen, 2010; Ji and Zhang, 2019; Zhang et al., 2024). A notable example is the Energy Corporation's approach to expanding green development projects funded using both public and private funds. China is a major market for green and sustainable finance (Ji and Zhang, 2019). According to empirical analyses based on official data, China's green bond market reached approximately USD120–130 billion in cumulative issuance by 2020, making it one of the largest green bond markets globally (Tolliver et al., 2019; Flammer, 2021); within the same year, the value of green loans reached USD1.7–1.9 trillion (Du et al., 2023; Yang et al., 2024). This case study highlights the integration of blended finance, strategic partnerships, and advanced management

technologies to accelerate China's transition to renewable energy. By leveraging public and private capital, the Energy Corporation has been able to scale up its renewable energy initiatives, demonstrating the effectiveness of blended finance in overcoming investment barriers and promoting sustainable development (Xu Gallagher, 2022). This model offers valuable insights for other countries seeking to enhance their renewable energy sectors through innovative financing strategies (Han and Yang, 2024).

5.3.5 Challenges from Asian Countries

Asian countries pursuing geothermal energy face several significant challenges that can slow the development of this clean energy source (Huttrer, 2020; Ramadhan and Mon, 2026) as shown in Table 3. The high initial costs associated with the exploration and drilling phases make geothermal projects capital-intensive and financially risky, often deterring private sector investment despite their long-term benefits (Rohit et al., 2023). China faces several challenges in its renewable energy and green infrastructure development, despite its rapid expansion in these sectors (Du et al., 2023; Zhang et al., 2024). In addition, community opposition can arise due to safety concerns, potential environmental impacts, or limited understanding of geothermal technologies (Ji and Zhang, 2019; Wang et al., 2024). These social and technical barriers highlight the need for targeted policy interventions, risk mitigation mechanisms, and community engagement strategies to attract investment and ensure the sustainable expansion of geothermal energy across the region.

Table 3: Challenges faced by Asian Countries

Challenge	Description
Grid Integration and Transmission Bottlenecks	Large-scale renewable projects, especially wind and solar in remote regions (e.g., Inner Mongolia, Gansu), face difficulties in connecting to demand centers due to limited transmission infrastructure (Ji and Zhang, 2019; Tolliver et al., 2019; Flammer, 2021; Du et al., 2023; Han and Yang, 2024).
	Curtailment of renewable energy generation remains an issue, reducing efficiency and investor confidence (Wang and Chen, 2010).
High Upfront Capital Costs	Renewable energy projects, including offshore wind, solar PV, geothermal energy projects and hydropower, require substantial initial investment. Although financing mechanisms exist, the large scale of projects can strain capital availability (Huttrer, 2020; Rohit et al., 2023).
Financing and Risk Allocation	Despite blended finance and public-private partnerships, many investors perceive risks related to project bankability, policy changes, and long payback periods (ADB and World Bank, 2015).
	Some smaller developers struggle to access low-cost financing compared to large state-owned enterprises.
Environmental and Social Concerns	Large hydropower and industrial-scale projects can cause ecological disruption, displacement of communities, or conflict over water and land use (Wang and Chen, 2010).
Policy and Regulatory Coordination	Rapid expansion of multiple renewable sectors requires strong coordination between national, provincial, and local governments, which can be challenging. Policy uncertainty or delays in permitting can slow project implementation (Wang and Chen, 2010).

Source: Scoping review

5.3.6 Potential Opportunities

China has implemented several strategies to overcome the challenges in renewable energy and green infrastructure development as summarized in Table 4, offering valuable lessons for other countries. According to latest Handbook by Nedopil (2025) entitled “China Belt and Road (BRI) Investment Report”, China introduced three financing mechanisms that allow for accelerated project finance, particularly for sustainable infrastructure projects i.e., i) sustainability-linked loans, ii) infrastructure securitisation platforms, and iii) blended finance co-lending platforms². Through this combination of infrastructure investment, innovative finance, policy support, and technology development, China has managed to scale renewable energy deployment rapidly while addressing key technical, financial, and social challenges. This integrated approach offers a replicable model for countries seeking to accelerate low-carbon transitions while managing risks.

Table 4: Solutions based on Asia's experience

Solutions	Description
Strengthening Grid Infrastructure and Integration	China has invested heavily in ultra-high voltage (UHV) transmission lines and smart grid technologies to connect renewable energy-rich regions to high-demand urban centers (Wang and Chen, 2010).
	Energy storage projects, including large-scale batteries and pumped hydro storage, help address intermittency and reduce curtailment of wind and solar power (Luo et al., 2015).
Innovative Financing Mechanisms	The government leverages blended finance, public-private partnerships, and green bonds to reduce capital costs and attract private investment (Taghizadeh-Hesary and Yoshino, 2020).
	Large state-owned enterprises (SOEs) provide financial stability and risk absorption for early-stage renewable projects, enabling smaller developers to enter the market (Zhang and Gallagher, 2016).
Policy and Regulatory Support	Feed-in tariffs, renewable energy quotas, and priority grid access ensure a predictable revenue stream for investors (Yin and Powers, 2010).
	National and provincial coordination has been strengthened to streamline permitting, licensing, and environmental approval processes (Zhao et al., 2016).
Environmental and Social Safeguards	Environmental impact assessments and community engagement initiatives are increasingly integrated into project planning to mitigate ecological disruption and social conflicts (He et al., 2020).
	Nature-based solutions, such as reforestation and wetland restoration, are often combined with infrastructure development to offset environmental impacts (Seddon et al., 2020).
Technological Innovation and Localization	Investments in R&D and local manufacturing of wind turbines, solar panels, and storage technologies reduce costs and promote industrial competitiveness (Zhang et al., 2013).

²<https://greenfdc.org/>

Solutions	Description
	Pilot programmes for smart grids, distributed energy, and microgrids enhance efficiency and reliability (Mengelkamp et al., 2018).

Source: Scoping review

5.3.7 Lessons for South Africa

South Africa can draw important lessons from renewable energy programmes in Asia to accelerate its own energy transition and unlock climate finance. Similar to geothermal initiatives in Indonesia and the Philippines, the country possesses significant renewable energy potential, particularly in solar and wind power, which remains underutilized due to financial and regulatory barriers. By addressing challenges such as high upfront capital costs, complex permitting processes, and grid integration constraints, South Africa can create a more enabling environment for investment. Innovative financing mechanisms, including blended finance, public-private partnerships (PPPs), and green bonds, can help reduce investment risk and attract private sector participation, following the example set by China, where strategic use of concessional and private capital enabled large-scale renewable deployment.

Community engagement is another critical lesson for South Africa since renewable energy projects can encroach private and community owned land (He et al., 2020). In Southeast Asia, the success of geothermal projects has often depended on active participation of local communities in planning, decision-making, and benefit-sharing (Huttrer, 2020). Applying this approach in South Africa's renewable energy programmes, particularly for wind and solar farms in rural or semi-arid regions, can help reduce social opposition, address local concerns about environmental impacts, and ensure equitable distribution of economic benefits. This fosters social acceptance and long-term sustainability of energy projects while enhancing country climate and development goals.

Finally, South Africa can also learn from China's integrated approach to renewable energy deployment, which combines regulatory support, technology development, and financial innovation. By aligning policy incentives, grid planning, and financing instruments, South Africa can reduce project risk, enhance bankability, and scale up renewable energy infrastructure more rapidly. Leveraging lessons from both Asian countries and China's experience demonstrates how a coordinated strategy, integrating finance, regulation, technology, and community participation, can unlock climate finance and accelerate the country's transition to a low-carbon, resilient energy system.

5.4 Case Studies: South America

South America, much like Asia, provides a wealth of valuable lessons for South Africa and other developing economies due to its innovative use of climate finance instruments tailored to local economic and environmental priorities. The region has pioneered mechanisms such as green bonds, sustainability-linked loans, biodiversity credits, and blended finance models that attract both public and private capital while addressing climate, social, and development challenges (Brazilian Development Bank, 2017; Ferrando et al., 2021; Sosa and Ivanova, 2025). These financial innovations reflect South America's ability to align national policy objectives with international climate finance opportunities, demonstrating practical

pathways for funding low-carbon transitions, protecting biodiversity, and promoting inclusive economic growth (Sosa and Ivanova, 2025). As a result, South America's experience is not only relevant but highly replicable for South Africa and its neighbours, particularly in designing financial solutions that are adaptable, scalable, and responsive to the needs of emerging economies (OECD, 2019).

5.4.1 Green Bonds in Brazil

Brazil has emerged as a regional leader in sustainable finance, leveraging green bonds to fund climate and infrastructure projects (Flammer and de Mariz, 2025). In November 2023, the Brazilian government issued its inaugural sovereign green bond, raising USD2 billion with a 7-year maturity and a 6.25% yield. This marked Brazil as the 50th country to enter the sovereign green bond market (Climate Bonds Initiative, 2023), reflecting the rapid global expansion of green finance instruments (Ferrando et al., 2021). The proceeds are earmarked for environmental and social initiatives, including forest conservation, biodiversity protection, and clean energy projects. The issuance was followed by a second USD2 billion bond in June 2024, which attracted strong investor interest despite global market volatility (National Treasury of Brazil, 2024). By mid-2024, Brazil had issued approximately USD4 billion in sustainable sovereign bonds, positioning it as a significant player in Latin America's green finance landscape (World Bank, 2024b).

Domestically, the Brazilian Development Bank (BNDES) has been instrumental in mobilising green finance. In 2017, BNDES raised USD1 billion through its inaugural green bond issuance, marking a milestone for Brazilian banks in the international green bond market (Brazilian Development Bank, 2017). In 2024, BNDES continued to lead by issuing green debentures totaling approximately USD19 billion, a record for Brazil, to fund projects in renewable energy, sustainable agriculture, and urban mobility (Bakst et al., 2025).

These developments underscore Brazil's commitment to sustainable development and its capacity to mobilise significant capital for climate initiatives (Bakst et al., 2025). The country's experience offers valuable insights for other nations seeking to leverage green bonds as a tool for financing environmental and social projects (World Bank, 2024b; Flammer and de Mariz, 2025).

5.4.2 Sustainable Investing in Colombia and Chile

Latin American countries such as Colombia and Chile are increasingly adopting sustainable investing practices, focusing on environmental, social, and governance (ESG) criteria to address climate challenges and promote long-term development (Flammer and de Mariz, 2025). This shift is evident in various national initiatives and regional collaborations aimed at mobilising capital for sustainable projects. In Colombia, the government launched the world's first biodiversity bonds during the Convention On Biological Diversity (CBD) 16th Conference of Parties (COP16) in October 2024, marking a significant innovation in nature-based financing instruments aimed at mobilising private capital for biodiversity conservation (Sosa and Ivanova, 2025). These bonds aim to fund projects that protect, conserve, and restore biodiversity. Banco Davivienda issued a biodiversity bond with up to USD50 million investment from the International Finance Corporation (IFC), while BBVA Colombia issued another USD70 million biodiversity bond, structured in two tranches of USD35 million each subscribed by IDB Invest and the IFC (IFC, 2025; BBVA, 2024). This innovative financial

instrument underscores Colombia's commitment to integrating biodiversity conservation into its financial markets (Echeverri et al, 2023).

Chile is also making significant progress in sustainable investing. The country has adopted a National Green Hydrogen Strategy, aiming to produce up to 160 million tons of clean hydrogen annually by 2050 (Losada, 2022; International Energy Agency, 2025). This ambitious plan includes raising electrolyzer capacity to 5 GW by 2025 and 25 GW by 2030, with a targeted price of USD0.8- USD1.1 per kilogram of hydrogen by the end of the decade (International Energy Agency, 2025). According to the International Energy Agency, the strategy is supported by substantial international financial backing, including a €225 million fund from the European Investment Bank and KfW Development Bank, a USD150 million loan from the World Bank, and a USD400 million loan from the Inter-American Development Bank. These examples illustrate the growing momentum of sustainable investing in Latin America, with countries like Colombia and Chile leading the way in integrating ESG principles into their financial systems. Such initiatives not only attract international investment but also contribute to the region's efforts in combating climate change and promoting sustainable development.

5.4.3 Challenges for South America

Countries in South America, including Brazil, Colombia, and Chile, face several challenges in fully realising the potential of sustainable investing and green finance (Mejia-Escobar et al., 2020). One major barrier is market transparency (Frisari, 2022). In some cases, information on the environmental, social, and governance (ESG) performance of projects or issuers is limited or inconsistent, which can undermine investor confidence (Wang et al., 2022). Without clear standards for reporting and verification, investors may be hesitant to commit capital to green bonds, biodiversity projects, or renewable energy initiatives, slowing the growth of sustainable finance markets (Alcarva et al., 2026). Ensuring rigorous monitoring, reporting, and verification (MRV) frameworks is therefore critical to enhance credibility and attract both domestic and international investment (Perez and Verbruggen, 2026).

Another significant challenge is regulatory barriers (Larcker and Watts, 2020). Differences in policies, tax incentives, and financial regulations across South American countries can complicate cross-border investment in sustainable projects (Wang et al., 2022). For instance, a green bond issued in Brazil may face different reporting requirements, legal frameworks, or tax treatments than a similar instrument in Colombia or Chile, making it harder for multinational investors to participate efficiently (Alcarva et al., 2026). These inconsistencies can limit the scalability of regional climate finance initiatives and reduce the attractiveness of the market for global investors (World Bank, 2024b). Harmonizing ESG standards, aligning green finance regulations, and facilitating regional cooperation can help overcome these obstacles and unlock larger flows of sustainable investment across South America.

5.4.4 Potential Opportunities for South Africa

To strengthen sustainable investing in South Africa, enhancing transparency in financial markets is a critical step for the country as illustrated by cases such as Brazil, Colombia, and Chile (Frisari, 2022). By establishing robust frameworks for monitoring, reporting, and verification (MRV) of environmental, social, and governance (ESG) outcomes, the country can

provide investors with reliable and comparable information on the impacts of green bonds and other sustainable finance instruments (Sibiya et al., 2023; Körner et al., 2025). Clear disclosure standards, independent audits, and standardised ESG reporting can increase investor confidence, reduce perceived risks, and encourage larger-scale participation from both domestic and international capital markets (Flammer, 2021; Gianfrate and Peri, 2019).

In addition, harmonising regulations across countries can significantly facilitate cross-border investments in sustainable projects between South Africa and other countries (OECD, 2024). Differences in tax treatments, legal frameworks, and reporting requirements often create barriers for multinational investors and limit the potential for regional collaboration on climate and sustainability initiatives (OECD, 2024). By aligning green finance regulations, establishing common ESG standards, and promoting regional coordination, South Africa will create a more integrated market for sustainable finance as demonstrated by the case studies from South America (Frisari, 2022). This would not only attract greater international investment but also enhance projects scalability, enabling more ambitious climate mitigation and adaptation interventions in South Africa.

5.4.5 Lessons for South Africa

South Africa can draw valuable lessons from the sustainable investing experiences of Brazil, Colombia, and Chile to strengthen its own climate finance landscape. One key lesson is the potential of tailored or localized green bonds to mobilise capital for renewable energy, low-carbon infrastructure, and other sustainability-focused projects. By issuing sovereign or municipal green bonds with clear environmental objectives and robust monitoring frameworks, South Africa can channel domestic and international investment into projects that directly support its energy transition and climate resilience goals. Localizing bond structures to reflect South African priorities, e.g. solar, wind, water infrastructure, and ecosystem restoration, can make these instruments more attractive to investors while ensuring that funds address pressing national needs.

Another important lesson is the integration of environmental, social, and governance (ESG) criteria into investment decisions. By adopting ESG standards across public and private sector financing, South Africa can create a more transparent and accountable investment environment that appeals to global sustainable finance markets. Incorporating ESG metrics into project evaluation, reporting, and performance monitoring can build investor confidence, reduce risk perception, and attract long-term capital. Together, these approaches, issuing well-structured green bonds and embedding ESG principles, can accelerate South Africa's transition to a low-carbon, resilient economy while leveraging lessons from successful Latin American examples.

Finally, the Just Energy Transition Partnership (JETP) demonstrates the importance of coordinated concessional finance, policy alignment, and strong governance in mobilising large-scale climate investment. The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) illustrates how transparent procurement mechanisms can attract private capital while delivering socio-economic benefits. Municipal green bonds show the potential for cities to access capital markets to finance climate-resilient infrastructure, while sustainability-linked bonds provide a mechanism for aligning financing costs with environmental and social performance targets. Furthermore, green taxonomies play a critical role in defining eligible investments, reducing greenwashing risks, and

enhancing investor confidence, thereby supporting the scaling up of sustainable finance across the economy.

5.5 Case Studies: Developed Region

5.5.1 Case study of Australia's Solar-Assisted Power Generation

Australia's Liddell and Kogan Creek solar boost projects represent pioneering examples of integrating solar thermal augmentation into existing coal-fired power stations to improve efficiency and reduce emissions. At Kogan Creek, a solar thermal installation was developed to preheat feedwater, thereby reducing coal consumption and operational costs, while the Liddell project explored similar hybridisation concepts to extend the operational life of aging coal infrastructure. These initiatives were supported through a combination of public energy innovation funding, utility-led investment by major generators such as AGL Energy, and collaboration with research institutions like the Australian Renewable Energy Agency (ARENA) and CSIRO. Financing structures blended public grants with utility capital expenditure, reducing investor risk while enabling demonstration-scale deployment.

Key challenges included technical integration complexity, intermittency of solar input, and limited scalability beyond demonstration phases due to evolving market conditions favouring full renewable replacement. Nevertheless, the projects provide important operational evidence that hybrid systems can improve transitional flexibility in coal-dependent grids. For South Africa, the opportunity lies in leveraging similar solar-assisted coal hybridisation to reduce emissions intensity of existing Eskom assets while maintaining grid stability. The key lesson is that hybridisation can act as a transitional bridge technology, but requires strong institutional coordination, tariff reform, and clear long-term policy certainty to attract sustained investment.

5.5.2 Case study of Ammonia Co-firing from Japan

Japan has emerged as a global leader in ammonia co-firing trials, particularly through projects led by utilities such as JERA and supported by government agencies including METI (Ministry of Economy, Trade and Industry). These trials involve blending ammonia with coal in thermal power plants to reduce carbon emissions without requiring full plant replacement. Japan's approach is heavily supported by public-private partnerships, state-backed R&D funding, and international supply chain development for green ammonia, including bilateral financing discussions with countries such as South Africa, Australia, and the Middle East. Financial instruments include concessional loans, export credit guarantees, and long-term offtake agreements designed to de-risk early-stage adoption.

Despite technological progress, key challenges include the high cost of green ammonia production, supply chain constraints, combustion efficiency issues, and uncertainty regarding long-term lifecycle emissions benefits. For South Africa, ammonia co-firing presents an opportunity to extend the life of existing coal plants while reducing emissions intensity and positioning the country within emerging green fuel value chains. The key lesson is that early-stage co-firing requires strong state-led coordination and international partnerships and should be embedded within broader hydrogen and industrial policy frameworks to ensure cost competitiveness and scalability.

5.5.3 Case study of Coal Sector Restructuring from Poland

Poland remains one of Europe's most coal-dependent economies, with state-controlled utilities historically burdened by unprofitable coal assets. In a significant policy shift in July 2025, Poland abandoned earlier plans to carve out coal assets into separate entities and instead introduced direct support mechanisms to maintain energy system stability and protect employment. Institutions such as the Ministry of Climate and Environment, state-owned utility groups (PGE, Tauron, Enea), and the Polish Development Fund played central roles in managing the restructuring process. Financial instruments included capacity payments, state subsidies, and transitional support funds to ensure grid reliability while managing social impacts.

The primary challenge has been balancing EU decarbonisation obligations with domestic energy security and political resistance from coal-dependent regions. The restructuring approach highlights the importance of gradual transition pathways rather than abrupt asset separation. For South Africa, particularly Eskom, the opportunity lies in designing structured financial and institutional mechanisms to manage coal asset decline without destabilising the utility or the grid. The key lesson is that coal transitions must prioritise system stability and labour protection, using blended public finance instruments rather than rapid asset divestment strategies.

5.5.4 Case study of Solar-Augment Potential from the United States

In the United States, studies by the National Renewable Energy Laboratory (NREL) and the Electric Power Research Institute (EPRI) identified significant potential for solar augmentation at fossil fuel plants, including over 11 GW of parabolic trough and more than 21 GW of power tower integration opportunities. These projects are typically implemented through utility partnerships, federal research funding, and state-level clean energy incentives. Institutions such as the Department of Energy (DOE) and utility regulators have supported pilot demonstrations, often using tax credits, research grants, and performance-based incentives as financial instruments.

However, the US experience also highlights the socio-economic consequences of unmanaged coal decline, particularly in regions where mine closures led to job losses, economic decline, and community out-migration, creating "ghost towns." This underscores the importance of coupling technical transition strategies with socio-economic planning. For South Africa, the opportunity lies in adopting solar augmentation as a transitional technology for Eskom's coal fleet while simultaneously developing just transition mechanisms for coal-dependent regions. The key lesson is that technological innovation must be integrated with place-based development strategies to avoid severe socio-economic dislocation.

5.5.5 Case study of Germany – Natural Gas Transition and Energy Crisis Response

Germany's recent energy transition experience has been shaped significantly by its reliance on natural gas as a transitional fossil fuel and the disruption caused by the Russia–Ukraine war. Prior to the crisis, Germany had made substantial progress in expanding renewables; however, the sudden reduction in Russian gas supplies forced a temporary reactivation and expansion of coal and liquefied natural gas (LNG) infrastructure to ensure energy security. Institutions such as the Federal Ministry for Economic Affairs and Climate Action (BMWK),

utility companies like RWE, and the KfW Development Bank played key roles in stabilising energy markets. Financial instruments included emergency energy subsidies, state-backed credit guarantees, LNG infrastructure investments, and accelerated permitting frameworks.

The key challenges included rising energy prices, inflationary pressures, and public resistance to coal reactivation despite climate commitments. At the same time, the crisis accelerated renewable deployment and energy efficiency measures. For South Africa, the opportunity lies in recognising the role of transitional fuels such as gas in ensuring system resilience during energy transition phases. The key lesson is that energy security shocks can significantly reshape transition pathways, and therefore diversification, redundancy, and flexible generation capacity must be embedded into Just Energy Transition planning to avoid systemic vulnerability.

5.5.6 Potential Opportunities for South Africa

Several important lessons emerge from these case studies in advanced or industrialised economies, particularly regarding how energy transitions are designed, financed, and implemented in practice rather than in theory. First, these experiences demonstrate that successful transitions are typically incremental and technology-diverse, relying on a mix of renewable energy expansion, transitional fuels, hybrid systems, and efficiency improvements rather than rapid or single-technology shifts. Second, they highlight the central role of strong institutional coordination and policy certainty, where governments, utilities, regulators, and financial institutions work within clearly defined long-term frameworks that reduce investment risk and support large-scale infrastructure deployment.

In addition, these case studies show that innovative and blended financing mechanisms, including concessional finance, public–private partnerships, guarantees, and state-backed transition funds, are essential to mobilise capital for complex and capital-intensive projects. A further key lesson is the importance of managing socio-economic impacts proactively, particularly in coal-dependent regions, where failure to plan for employment losses and regional decline can result in severe social disruption. Finally, they underscore the need to integrate energy security considerations into decarbonisation pathways, as illustrated by recent global energy shocks, reinforcing that resilient systems must balance climate objectives with affordability, reliability, and industrial competitiveness.

South Africa has significant opportunities to leverage international experience to develop a diversified and financeable Just Energy Transition portfolio. These include solar-assisted coal hybridisation, ammonia co-firing, natural gas peaking systems, renewable energy zones, green hydrogen production, and coal value-added industries such as coal-to-chemicals and carbon materials. Additional opportunities exist in grid modernisation, battery storage manufacturing, mine rehabilitation, and regional industrial diversification, particularly in coal-dependent provinces such as Mpumalanga. These opportunities can be financed through blended finance mechanisms involving development finance institutions, climate funds, sovereign guarantees, and private sector co-investment.

Importantly, South Africa can position itself as a regional hub for transition technologies by integrating industrial policy with climate finance. The opportunity is not only decarbonisation, but also re-industrialisation through green manufacturing, energy export

potential, and localisation of clean technology value chains. This requires strong coordination between National Treasury, Eskom, the Industrial Development Corporation (IDC), and international partners such as the World Bank, African Development Bank, and climate finance institutions.

5.5.7 Lessons for South Africa

The international case studies collectively highlight that successful energy transitions are not purely technological, but deeply institutional, financial, and socio-economic in nature. A key lesson is that hybrid systems and transitional technologies can play a critical role in maintaining grid stability while reducing emissions, but they require strong policy certainty and tailored financial instruments. An important consideration within the just transition framework is the role of transitional technologies that facilitate the shift from high-carbon to low-carbon development pathways. Technologies such as natural gas, energy storage systems, grid modernisation, cleaner industrial processes, carbon capture and storage, and low-emission transport solutions may play a temporary but strategic role in maintaining energy security, economic competitiveness, and employment during the transition. However, their deployment should be guided by clear governance frameworks, transparent sustainability criteria, time-bound transition pathways, and robust monitoring mechanisms to ensure that investments support long-term decarbonisation objectives and do not create carbon lock-in risks (NBI, 2023). Climate finance instruments should therefore prioritise transitional technologies only where they demonstrably contribute to emissions reductions, social inclusion, economic resilience, and the achievement of South Africa's broader Just Energy Transition goals.

Another lesson is that coal transitions must be managed carefully to avoid socio-economic collapse in mining regions, requiring targeted regional development strategies and labour transition planning. Australia's solar-assisted power generation demonstrates how integrating renewable technologies into existing generation assets can reduce emissions while improving system flexibility and energy security. Japan's ammonia co-firing experience highlights the importance of technological innovation, supportive policy frameworks, and targeted investment in decarbonising hard-to-abate sectors while maintaining grid reliability. Poland's coal sector restructuring underscores the need for comprehensive just transition strategies that combine economic diversification, worker reskilling, social protection measures, and stakeholder engagement to manage the socio-economic impacts of energy transitions. The United States' solar augmentation initiatives illustrate the potential of repurposing existing energy infrastructure and leveraging private investment to accelerate renewable energy deployment. Collectively, these cases emphasize the importance of technological adaptation, policy certainty, investment mobilisation, institutional coordination, and social inclusion in achieving a balanced and equitable energy transition in South Africa.

Furthermore, the cases demonstrate that innovative financing—such as blended finance, capacity payments, concessional loans, and public–private partnerships—is essential for de-risking capital-intensive transition projects. Finally, energy crises, such as Germany's gas disruption, illustrate the importance of energy security and flexibility in transition planning. For South Africa, the overarching lesson is that a successful Just Energy Transition must balance decarbonisation with affordability, reliability, and industrial development, supported by a diversified and realistically sequenced investment pipeline.

5.6 Comparative Analysis of Case Studies

Table 5 presents a comparative analysis of case studies discussed from Africa, Asia, South America and first world countries. The analysis demonstrates that successful innovative financing instruments for a just energy transition depend on strong institutional frameworks, policy certainty, blended finance mechanisms, and inclusive governance systems. Across most regions, enabling conditions such as regulatory clarity, public-private partnerships, concessional finance, and access to multilateral climate funds were critical for mobilising investment. Social protection mechanisms were equally important, particularly where projects incorporated worker reskilling, local economic diversification, community benefit-sharing, and targeted support for vulnerable groups. The case studies further reveal that blended finance, green bonds, concessional lending, and carbon markets are among the most scalable instruments for developing countries because they lower investment risks and crowd in private capital. Debt-for-nature swaps and climate insurance also emerged as important tools for strengthening resilience and protecting ecosystems and vulnerable populations. For South Africa, the key lesson is that climate finance instruments must be integrated with social dialogue, industrial policy, local development objectives, and strong governance to ensure that the transition delivers both climate outcomes and socio-economic justice.

Table 5: Comparative matrix across various cases

Financial instrument	Country	Enabling condition	Social protection mechanism	Lessons for South Africa
Climate Finance Facilities	Indonesia, Colombia, South Africa, Rwanda	Strong national climate policies, strategies, institutional coordination, MDB support, investment platforms, Green Fund (FONERWA)	Support for vulnerable communities, Community resilience projects, green jobs, reskilling and local enterprise support and development programmes	Dedicated climate finance facilities can strengthen project preparation, coordinate investment pipelines, improve direct access to international finance. and strengthen alignment between climate goals and socio-economic priorities.
Grants	African countries and GCF-supported initiatives, e.g., Ghana, USA, Australia	Donor partnerships, adaptation-focused funding windows, project preparation support, institutional readiness	Community adaptation support, support for vulnerable coastal and farming communities, capacity building, inclusion of women and youth	Grant finance is essential for adaptation of local resilience projects and early-stage projects that are not commercially viable but generate strong social benefits.
State subsidies	Poland	Strong fiscal capacity, clear subsidy	Functions as a short- to medium-term	Subsidies should be carefully time-bound and progressively phased out

		targeting frameworks, reliable beneficiary identification systems, and alignment with Just Energy Transition priorities	support tool that cushions households, workers, and vulnerable communities from energy price increases, job losses, and transition-related economic shocks through targeted cash transfers, energy vouchers, and lifeline tariffs.	while being tightly targeted to vulnerable groups, ensuring they support structural transition goals rather than entrenching inefficient energy consumption or unsustainable fiscal burdens.
Guarantees	South Africa, Namibia, Southeast Asia, Japan	Risk-sharing frameworks, DFI participation, stable regulatory systems, regulatory reforms, renewable energy procurement frameworks	Reduced investment risk supports job retention, local enterprise participation, support for local contractors	Guarantees can crowd in private investment for renewable energy and infrastructure projects with high perceived risk. Guarantees can reduce investment risks and unlock private finance for renewable energy and infrastructure.
Equity Investments	China, Brazil, Chile and Rwanda	Strong domestic financial markets, ESG investment frameworks, green industrial policies, innovation support	Job creation, local ownership opportunities, industrial employment creation and youth entrepreneurship	Equity finance can support green industrialisation, innovation, emerging sectors and long-term low-carbon manufacturing.
Debt-for-Nature Swaps	Seychelles, Ecuador and Gabon	International conservation partnerships, debt restructuring mechanisms, biodiversity governance frameworks	Conservation-linked livelihoods and community-based restoration, restoration employment	Debt-for-nature swaps can simultaneously reduce debt pressure and finance biodiversity and climate resilience projects.
Concessional Loans	Japan, Indonesia, Ghana and South Africa, MDB-supported projects	MDB and bilateral support, concessional climate windows, blended finance structures	Lower-cost financing for public infrastructure, vulnerable municipalities and public services	Concessional loans are critical for financing resilient infrastructure and adaptation projects with long payback periods.

Green Bonds	Brazil, Colombia, South Africa (Cape Town) and Namibia	Developed capital markets, green taxonomies (green finance frameworks), sustainability reporting standards	Financing sustainable transport, housing, water infrastructure and urban resilience	Green bonds can mobilise institutional capital/investors while financing large-scale bankable climate infrastructure projects.
Sustainability-Linked Loans	Chile, Brazil and Rwanda	ESG disclosure frameworks and corporate sustainability targets	Incentivises firms to protect jobs while improving environmental performance	Sustainability-linked finance can encourage industries to meet emissions and social performance targets.
Carbon Markets	Colombia, Ghana, Gabon, and South Africa, global Article 6 examples	Carbon pricing systems, MRV systems, regulatory certainty, forestry and conservation programmes	Revenue-sharing opportunities for land users and rural communities	Carbon markets can unlock new finance streams for nature-based solutions and industrial decarbonisation.
Blended Finance	Australia, Indonesia, Rwanda, South Africa, African renewable energy projects	Public-private partnerships, concessional capital, DFI support	Supports inclusive infrastructure investment, SME participation and local economic diversification	Blended finance is essential for de-risking projects and attracting large-scale private investment.
Climate Insurance and other de-risking instruments	Australia, Japan, Ghana, Rwanda, and African climate resilience initiatives	Insurance partnerships, climate risk data, public support mechanisms	Protects vulnerable households, farmers, and SMEs from climate shocks	Climate insurance can strengthen resilience and reduce financial vulnerability in climate-affected sectors.
Tax credits, Performance-based Incentives and Accelerated Depreciation	Namibia, South Africa, China, Southeast Asia, USA	Clear fiscal policy frameworks, renewable energy tax frameworks, and industrial incentives	Encourages business investment and job creation in green industries	Fiscal incentives can accelerate renewable energy, energy efficiency, and low-carbon manufacturing investments.
Transitional support funds	Poland	Require dedicated institutional arrangements (e.g., national transition funds or multi-donor platforms), strong	Provides structured financial support for workers, communities, and regions affected by energy	Transitional support funds must be well-governed, transparently managed, and explicitly linked to place-based development strategies to ensure that coal regions such as Mpumalanga are not left

		governance and accountability systems, and predictable contributions from government, DFIs, and climate finance institutions aligned with Just Energy Transition priorities	transition through funding for reskilling, income support, local economic diversification, and infrastructure investment in coal-dependent areas.	behind during decarbonisation.
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In the African context, countries such as Gabon, Ghana, Namibia, and Rwanda are increasingly adopting innovative climate finance instruments to support low-carbon and climate-resilient development. Rwanda's FONERWA demonstrates the value of national climate finance facilities in mobilising blended finance and strengthening local ownership, while Gabon's debt-for-nature swaps and carbon markets highlight opportunities to leverage biodiversity assets for conservation and livelihoods. Ghana's emphasis on adaptation finance, climate insurance, and social protection underscores the importance of supporting vulnerable communities, whereas Namibia's use of green bonds and renewable energy incentives shows how policy certainty can attract private investment into sustainable infrastructure. Across all case studies, strong governance, public-private partnerships, and inclusive social dialogue were critical to success, offering important lessons for South Africa's just energy transition.

5.6.1 Cross-Regional Lessons for South Africa

This subsection concludes by summarising and synthesising cross-regional insights, highlighting opportunities for replication, adaptation, and innovation that can support South Africa's ambition to mobilise climate capital at scale while promoting equitable and sustainable development outcomes. A cross-cutting lesson emerging from the analysis is that climate finance instruments should not be viewed as universally applicable solutions, but rather as tools whose effectiveness depends on context, governance arrangements, and implementation capacity.

5.6.2 Regulatory Support

The government of South Africa recognises that regulatory support is equally essential for unlocking "at scale" climate finance for South Africa (DFFE, 2022). Evidence based on international best-practices demonstrates that clear, consistent regulatory frameworks covering renewable energy tariffs, carbon pricing mechanisms, land-use regulations, and green building standards are necessary to boost investor confidence and reduce project risk (Qu et al., 2023; World Bank, 2025a; 2024b). South Africa can accelerate climate investment by harmonising policies across sectors and establishing predictable long-term incentives aligned with the country's Nationally Determined Contribution (NDC) and Just Energy Transition commitments (OECD, 2025e).

5.6.3 Innovative Financial Instruments

Cross-regional experiences from Asia and South America offer critical lessons for South Africa as it seeks to unlock climate finance and accelerate implementation of sectoral policies. While African case studies such as Gabon's experience with debt-for-nature swaps and climate finance facilities in Ghana, Rwanda, and Namibia offered context specific lessons, case studies from other regions provided important insights into innovative financing mechanisms, enabling policy environments, institutional arrangements, and governance frameworks that can help mobilise climate finance at scale while ensuring that social, economic, and environmental objectives are achieved (Montmasson-Clair, 2021). A key opportunity lies in adopting innovative financial instruments such as debt-for-nature swaps, sustainability-linked bonds, and blended finance facilities. These instruments have successfully reduced sovereign debt burdens, enhanced creditworthiness, and mobilised private capital for climate projects in other regions. By tailoring these mechanisms to local priorities such as water security, biodiversity restoration, and just energy transition objectives, South Africa can diversify its climate finance portfolio and reduce reliance on public funding. Not all financing instruments are equally mature, relevant or proven; while some have demonstrated their ability to mobilise investment in South Africa, others remain largely untested and their future contribution is uncertain, depending on policy, regulatory, and market developments.

5.6.4 Market Transparency

Improving market transparency is crucial for attracting both domestic and international capital (Frisari, 2022; Lubinga and Mazenda, 2024). Successful models from emerging markets show transparent monitoring, reporting, and verification (MRV) systems combined with disclosure requirements for green finance instruments to enhance accountability and credibility (World Bank, 2025b). By strengthening climate finance tracking, reporting standards, and data accessibility, South Africa can increase investor trust and ensure that climate funds deliver measurable environmental and social impact (Ochieng et al., 2016; Sibiya et al., 2023; Körner et al., 2025). Together, these lessons provide a strategic roadmap for scaling up climate finance through institutional innovation, inclusive governance, and an enabling policy environment (Jansen, 2022; OECD, 2025e).

5.6.5 Community Engagement

An important lesson central to climate finance deployment, is community engagement (Jenkins et al., 2021; Global Deal, 2024). Evidence from Asia and Latin America shows that projects with strong local participation not only achieve better environmental outcomes but also enhance social acceptance and long-term sustainability (Echeverri et al., 2023; Flammer, 2021). South Africa can strengthen this approach by embedding community ownership models, supporting local cooperatives, and ensuring that climate investments generate tangible co-benefits such as jobs, livelihoods, and ecosystem services for vulnerable populations (Adom et al., 2025a; Heckwolf and Soubeyran, 2025).

5.7 Based on Realistic Options in Coal Dependent Global South countries

This subsection presents blended finance platforms and pragmatic financing options tailored to coal-dependent Global South countries, with a focus on South Africa's just energy transition context. It highlights how concessional finance, guarantees, and public-private partnerships can be structured to de-risk investments and crowd in private capital. Drawing on international experience and domestic policy frameworks, it identifies scalable mechanisms aligned with sectoral priorities and socio-economic objectives. Emphasis is placed on solutions that are implementable within existing institutional capacities, while advancing an inclusive and equitable transition.

5.7.1 Blended finance platforms

Blended finance platforms such as the Development Bank of Southern Africa (DBSA), the Industrial Development Corporation (IDC), and the National Empowerment Fund (NEF) offer significant opportunities for unlocking climate finance by leveraging private sector investment in sectoral projects (IFC, 2025; OECD-DAC, 2025). These platforms combine public and concessional funds with private capital to reduce investment risks, enhance project bankability, and scale up financing for renewable energy, water infrastructure, and urban development initiatives (Avellán et al., 2024). By strategically mobilising resources through blended finance, these institutions help bridge financing gaps and accelerate the implementation of national climate priorities.

5.7.2 Green and Sustainability Linked Bonds

The issuance of green and sustainability linked bonds at both national and municipal levels provides a mechanism to mobilise long-term capital for climate-resilient and low-carbon projects (DFFE, 2022). These bonds channel investment into priority sectors such as energy, water, transport, and urban development, while linking financial returns to environmental and social performance indicators (Flammer, 2021). By providing a transparent and standardized investment instrument, green bonds attract institutional investors and enable sustained financing for large-scale climate initiatives.

5.7.3 Nature-based Solutions and Carbon Markets

Integrating nature-based solutions (NbS) and carbon market mechanisms into sectors such as AFOLU, biodiversity and water, provides additional revenue streams that can unlock climate finance (World Bank, 2025a; IETA, 2025). NbS initiatives, including reforestation, wetland restoration, and sustainable land management, generate ecosystem services and potential carbon credits, which can be monetised to fund ongoing climate interventions (Echeverri et al., 2023; Bosma et al., 2025). By linking environmental outcomes with financial incentives, these approaches enhance the sustainability and scalability of climate projects while supporting national mitigation and adaptation objectives (OECD, 2023).

5.7.4 Dedicated Funds

Establishing dedicated funds, including the Just Transition Financing Facility and the Green Fund, creates targeted opportunities to finance decarbonisation and socio-economic

transition projects (Meattle et al., 2024). These funds prioritise investments that support equitable transition strategies, such as renewable energy deployment, energy efficiency, and community-based adaptation projects (Heckwolf and Soubeyran, 2025; Adom et al., 2025a). Dedicated funds also serve as mechanisms to coordinate national priorities with sectoral interventions, ensuring that climate finance is aligned with both environmental and social objectives (Gonguet et al., 2021).

5.7.5 Public-private Partnerships

Public-private partnerships (PPPs) present a valuable governance mechanism to modernise infrastructure in energy, water, transport, and urban sectors (Avellán et al., 2024). By combining public sector oversight with private sector investment and expertise, PPPs enhance efficiency, reduce financial risks and scale up the implementation of climate-resilient infrastructure (Adhikari and Safaee Chalkasra, 2023). These partnerships enable the delivery of transformative projects that contribute to sustainable development while leveraging additional financial resources beyond public budgets (IFC, 2025; OECD, 2023).

5.8 South Africa's Just Energy Transition Technological Pathways and Innovative Financing

According to the Just Energy Transition (JET) framework for South Africa, as outlined in JET–South Africa and the Presidency (2023), the transition is structured around five key technological and investment pathways that guide funding requirements and implementation priorities. These include the electricity sector, new energy vehicles, green hydrogen, skills development, and municipal financing. The electricity sector pathway focuses on decarbonising power generation through a mix of renewable energy, grid expansion, and transitional technologies that maintain system reliability. The new energy vehicle pathway supports the shift from internal combustion engines to electric mobility, including supporting infrastructure such as charging networks and local manufacturing capacity. The green hydrogen pathway aims to develop hydrogen production and export markets as a future clean energy carrier. Skills development is a cross-cutting pathway that addresses the labour transition by reskilling and upskilling workers affected by coal phase-down. Municipal financing focuses on enabling local governments to invest in resilient infrastructure and manage the socio-economic impacts of the transition.

However, while this framework provides a high-level investment structure, critics such as Gomes (2026) argue that it remains overly generic and insufficiently grounded in project-level analysis. In particular, the six policy recommendations derived from the framework do not adequately reflect the technical and financial realities of specific transition technologies. A more robust JET investment pipeline would explicitly include a broader set of technologies beyond renewables, illustrated in Figure 9. Such technologies include clean coal and hybrid systems, alongside innovative financing mechanisms tailored to the distinct risk profiles of technologies like underground coal gasification (UCG), supercritical and advanced pulverised coal generation (SAPG), circulating fluidised bed (CFB), and ammonia co-firing. It would also require regulatory reforms to remove institutional bottlenecks, including water use licensing constraints for UCG and restrictive small-scale embedded generation rules affecting hybrid systems. Furthermore, Gomes (2026) highlights the need to quantify system-level costs, including the “coal cost hurdle,” to properly compare transition

pathways, and to integrate low-hanging opportunities such as flexible plant operations and mine rehabilitation into the Just Energy Transition Investment Plan (JET-IP) pipeline.

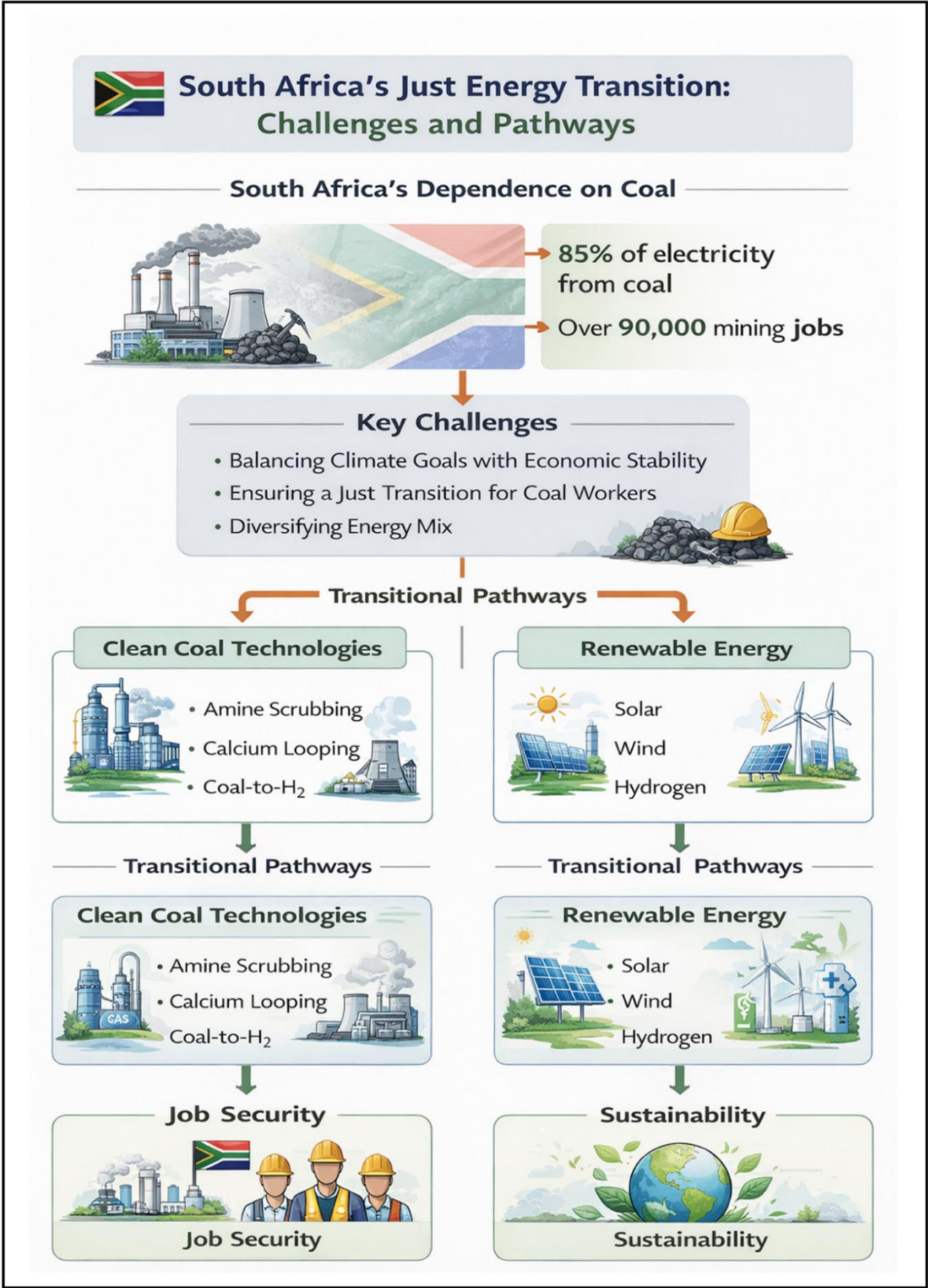


Figure 9: South Africa's Just Energy Transition technological pathways and innovative financing
Source: Gomes (2026)

5.9 Implications for Social Dialogue

Evidence presented in Table 6 indicates that scaling just energy transition in South Africa will depend on deploying a diversified climate finance toolbox with implications for social dialogue. These include, but not limited to, combining green and sustainability linked bonds, blended finance and risk-sharing facilities, debt-for-nature swaps and nature-based solutions, supported by coherent regulation and transparent monitoring, reporting and verification. South Africa can adapt proven climate financing models from other African countries, Asia and South America to national priorities and strengthen implementation capacity through social dialogue. Table 6 summarises considerations for social dialogue from case studies on workers' consultation, compensation for affected communities, local benefits distribution, consideration of gender and youth impacts, and assessment of affordability.

Table 6: Considerations for social dialogue from case studies

Case study	Were workers consulted?	Were affected communities compensated?	Were benefits locally distributed?	Were gender and youth impacts considered?	Were affordability effects assessed?
South Africa – Just Energy Transition Partnership (JETP)	Yes, through social dialogue platforms involving organised labour, government, and business	Partially, through proposed reskilling, social protection, and municipal support programmes	Partially, with focus on local jobs, renewable energy value chains, and community development	Increasingly recognised in policy frameworks, though implementation remains uneven	Yes, especially regarding electricity prices, employment impacts, and municipal revenue risks
South Africa – Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)	Limited direct worker consultation during early phases; improved stakeholder engagement over time	Community trusts and socio-economic development commitments included in projects	Yes, through local procurement, community ownership schemes, and enterprise development	Partially considered through local economic development and enterprise support targets	Yes, with emphasis on balancing investment costs and electricity affordability
South Africa – Green Bonds and Municipal Climate Finance	Consultation mainly through municipal planning and public participation processes	Limited direct compensation mechanisms for affected groups	Yes, particularly through investments in public transport, water, and urban resilience infrastructure	Partially integrated through inclusive urban development and social infrastructure priorities	Yes, especially regarding municipal debt sustainability and service affordability
South Africa – Carbon Market and Nature-	Community and land-user engagement	In some cases, communities	Partially, through local livelihood	Gender and youth inclusion considered in	Limited affordability assessment,

Based Solutions Projects	varies across projects	benefit through restoration employment and conservation incentives	support and ecosystem restoration programmes	selected community-based projects	as benefits are often long-term and indirect
South Africa – Eskom Energy Transition and Coal Region Repurposing	Yes, particularly through labour unions and national just transition consultations	Proposed through reskilling, economic diversification, and social support initiatives	Intended through regional economic diversification and infrastructure investments	Increasing policy focus on women, youth, and vulnerable worker groups	Yes, particularly concerning energy tariffs, employment losses, and regional economic impacts

An important lesson emerging across the international case studies is that successful climate finance mobilisation depends not only on the availability of financing instruments but also on robust institutional arrangements that facilitate continuous stakeholder engagement (Patel, 2021). Similar conclusions have been reached by the Presidential Climate Commission, which recognises social dialogue as a prerequisite for achieving socially legitimate and politically sustainable Just Transition outcomes (PCC, 2021; 2022). Countries that institutionalise dialogue between governments, investors, organised labour, communities and civil society generally demonstrate stronger implementation performance, greater policy certainty and improved public acceptance of transition investments.

In conclusion, the case studies demonstrate that social dialogue is becoming increasingly important in shaping climate finance and just energy transition initiatives. While worker consultation and stakeholder engagement are increasingly embedded within national policy frameworks, implementation remains uneven across sectors and projects. Most initiatives recognise the need for community benefits, local economic participation, and support for vulnerable groups, although compensation and affordability concerns are not always comprehensively addressed. The evidence further suggests that stronger institutional coordination, transparent governance, and inclusive participation of labour, municipalities, women, youth, and affected communities are essential to improve legitimacy and long-term sustainability of climate finance interventions. Collectively, these cases point to key design principles for South Africa, including the need for policy certainty, technology-neutral planning, blended public–private finance, strong institutional coordination, and explicit integration of social protection into energy transition planning. They also reinforce the importance of embedding structured social dialogue into project design and implementation. In particular, social dialogue processes should explicitly interrogate who carries the risks of transition, who benefits from new investments, who pays for transition costs, and how affected communities can meaningfully influence project selection, prioritisation, and implementation to ensure a just and inclusive energy transition. Key social dialogue guiding questions on innovative financing instruments for a just energy transition include:

- Who carries the risks of the transition?
- Who benefits from new investments and energy system changes?

- Who pays for the costs of transition, including stranded assets and infrastructure upgrades?
- How can communities meaningfully influence project selection, prioritisation, and implementation to ensure a just and inclusive energy transition?
- What trade-offs will government, labour, business and community accept to govern the climate finance toolbox – and who gets what, where?
- What regulatory and monitoring, reporting and verification system will ensure accountable, investible and just energy transition finance in South Africa?

6 CONCLUSION AND POLICY RECOMMENDATIONS

6.1 Summary of Findings

This report examined opportunities and mechanisms for mobilising and unlocking climate finance to support the effective implementation of South Africa's sectoral and thematic climate policies under the PCC. Its main objective was to identify scalable, inclusive, and sustainable financial pathways that enable the country to meet its Nationally Determined Contribution (NDC) and Just Energy Transition commitments. Using a scoping review and global comparative evidence, the report assessed financing gaps, institutional readiness, and policy frameworks while highlighting innovative financial instruments that can bridge the divide between ambition and implementation. Thus, the report complements rather than replaces South Africa's national climate finance tracking programme. Whereas the Presidential Climate Commission's Climate Finance Landscape reports quantify climate finance flows, the present study focuses on interpreting that evidence to identify financing instruments, implementation barriers, institutional requirements and opportunities for strengthening social dialogue.

The findings reveal that South Africa has established a solid policy foundation, including the Climate Change Act, Carbon Tax Act, and Just Energy Transition Investment Plan, but faces persistent challenges related to limited concessional funding, fragmented coordination, and uneven access to finance across sectors and regions. Lessons from Africa, Asia, and South America demonstrate that policy coherence, blended finance models, strong community engagement, addressing institutional capacity and skills requirements, project preparation, need for robust monitoring and evaluation are critical for unlocking large-scale investment. Innovative approaches such as debt-for-nature swaps, sustainability-linked bonds, and public-private partnerships have proven effective elsewhere and could be localised for South Africa. These instruments, combined with robust monitoring and transparency mechanisms, can enhance investor confidence, align financial flows with climate priorities, and ensure social inclusivity in the transition process.

The report highlights three key messages: (i) governance and social dialogue as cornerstone of climate finance; (ii) translating structural barriers to scalable solutions; (iii) mobilising climate finance for an inclusive energy transition, elaborated as follows. The report demonstrates that successfully financing South Africa's just energy transition requires more than access to climate finance; it depends on strong governance, inclusive social dialogue, and the ability to address institutional, policy, and financial barriers that constrain investment. While a range of climate finance instruments, including grants, concessional loans, green bonds, blended finance, guarantees, equity finance, and carbon markets, can support the transition, their effectiveness relies on policy certainty, regulatory coherence, transparent governance, and meaningful community engagement. International experience shows that innovative financing mechanisms can mobilise substantial resources, but ensuring that these investments deliver social inclusion, worker protection, skills development, local economic opportunities, and affordable energy access is essential for achieving a truly just transition. Overall, the report concludes that climate finance is not only a financial challenge but also a governance and development challenge, requiring coordinated action to align climate objectives with broader economic and social priorities.

6.2 Broad Policy Recommendations for Social Dialogue

South Africa's evolving climate finance landscape presents both opportunities and challenges that require structured engagement across government, business, labour, civil society, and communities. Social dialogue offers a platform to interrogate key policy choices, align incentives, and surface trade-offs associated with the transition to a low-carbon and climate-resilient economy. Consistent with recommendations from the National Business Initiative, future social dialogue should increasingly focus on resolving practical investment bottlenecks, including project preparation, blended finance design, procurement frameworks, local supply chains and investor confidence, rather than limiting engagement to broad policy consultation. The evidence in Sections 4 and 5 suggests that enabling framework conditions (legislation, coordination, MRV) must be strengthened before complex instruments (green bonds, carbon markets) can function at scale. The themes below outline priority areas for dialogue, with guiding questions aimed at shaping collective understanding and shared solutions. Table 7 summarises the policy recommendations, lead organisations, timeframes, social dialogue mandate and follow-up actions. The National Treasury is positioned as the primary catalyst while the Presidential Climate Commission (PCC) as the strategic lead and coordinating institution for climate finance and just transition financing in South Africa. In their roles, both institutions are responsible for providing overall policy direction, mobilising domestic and international financial resources, coordinating financing priorities across government departments and state-owned enterprises, and ensuring alignment between climate finance interventions and national development objectives.

Table 7: Summary of policy recommendations

Recommendation	Who leads	At what level	Timeframe	Social dialogue mandate	Follow-up actions
Strengthening Enabling Frameworks	National Treasury, PCC, sector departments, regulators, DFIs	National, provincial, and municipal levels	6–12 months	Identifying bottlenecks, coordinating reforms, and aligning priorities.	Roadmaps, annual reviews, monitoring, reporting, and accountability mechanisms.
Enhance Institutional Coordination and Capacity Building	National Treasury, PCC, DPME, sector departments, DFIs, and local government associations	National, provincial, and municipal levels.	1–5 years for capacity strengthening and institutional coordination.	Identifying capacity gaps, improving readiness, facilitating coordination, and knowledge sharing.	Technical support facilities, training, peer learning, annual assessments, monitoring, and reporting.
Foster Market Transparency and Data Systems	National Treasury, Statistics South Africa, PCC, South African Reserve Bank,	National, provincial, and municipal levels.	1–5 years for establishing the framework and reporting systems.	Identifying data gaps, improving transparency, harmonising reporting standards,	Climate finance database development, annual reporting, stakeholder

	sector departments, and regulators			and stakeholder engagement.	reviews, monitoring, and accountability mechanisms.
Expand and Diversify Financial Instruments	National Treasury, PCC, SARB, DFIs, regulators, and private financial institutions	National, provincial, municipal, and sectoral levels.	2–5 years for development and scaling of diversified instruments.	Identifying financing gaps, assessing instruments, and building investment pipelines.	Pilot programmes, annual performance reviews, monitoring capital mobilisation, and reporting on just transition outcomes.
Promote Inclusive and Just Financing	National Treasury, PCC, sector departments, DFIs	National, provincial, municipal, and community levels.	1–3 years for establishing enabling frameworks, followed by annual reviews.	Stakeholder forums, monitoring of finance distribution, social impact discussions, transparent reporting, and annual review processes.	Priority setting, monitoring, reporting, accountability, and evaluation of outcomes.
Catalyse Innovation and Private Sector Participation	National Treasury, DTIC, DSTI, DFIs, industry associations	National, sectoral, municipal, and local levels.	1–3 years for establishing enabling frameworks, followed by annual reviews.	Identification of barriers, project pipeline development, innovation promotion, and stakeholder engagement.	Monitoring investment mobilisation, job creation, local benefits, reporting, and accountability.

6.2.1 Strengthening Enabling Frameworks

A predictable, coherent, and stable policy environment is essential for unlocking climate finance, attracting investment, and guiding long-term planning across sectors. The enactment of the Climate Change Act and related fiscal reforms create an emerging framework, yet important questions remain regarding implementation, coordination, and integration with budgeting processes. Implementation has been constrained by fiscal, institutional, and capacity factors.

Strengthening enabling frameworks for climate finance requires coordinated leadership from National Treasury, the Presidency, the Presidential Climate Commission (PCC), sector departments, regulatory authorities, and development finance institutions at the national level, supported by provincial and municipal governments. Over the next 6 – 12 months, these institutions should work through structured social dialogue platforms involving

government, labour, business, civil society, municipalities, state-owned enterprises, and affected communities to identify policy bottlenecks, harmonise regulatory frameworks, and align climate finance priorities with national and local development objectives. Follow-up actions should include the development of clear implementation roadmaps, annual multi-stakeholder reviews, monitoring of regulatory reforms, and regular reporting on progress in improving investment readiness, project bankability, and access to climate finance across sectors and regions. These issues form the basis for dialogue around how enabling frameworks can support a credible transition.

- In what ways can climate finance be integrated into national and municipal budgets to ensure transparency, accountability, and long-term planning?
- How can the implementation of the Climate Change Act support investor certainty, regulatory coherence, and policy stability?
- What mechanisms can strengthen coordination between national, provincial, and municipal authorities in setting climate finance priorities?

6.2.2 Enhance Institutional Coordination and Capacity Building

Climate finance governance intersects with multiple entities, from treasury and regulators to DFIs and sector departments, requiring alignment on priorities, mandates, and investment strategies. Fragmentation and capacity constraints continue to limit access to global funds and hinder effective deployment domestically. Strengthening municipal capacity should be prioritised as a core component of South Africa's climate finance strategy. This includes enhancing technical skills in project preparation, financial management, climate finance applications, and the development of bankable Just Energy Transition projects capable of attracting both public and private investment. Improved tracking and reporting of municipal climate finance flows is needed to identify funding gaps, monitor investment effectiveness, and ensure that local governments receive an equitable share of climate finance resources. Dedicated systems for climate finance tagging and reporting would strengthen accountability and evidence-based decision-making. Improving municipal financial sustainability through stronger financial management systems, cost-reflective tariff structures, and enhanced revenue collection mechanisms is essential for improving municipal creditworthiness and increasing access to climate finance. Stronger financial fundamentals can also help crowd in private investment for local climate and energy transition projects.

Building on the Presidential Climate Commission's Social Dialogue Framework, climate finance decision-making should institutionalise social dialogue within climate finance governance by incorporating structured and continuous engagement among government, organised labour, business, civil society, local communities, municipalities and development partners (PCC, 2022). Such engagement should extend beyond consultation to include joint priority setting, investment planning, implementation oversight, monitoring and adaptive learning. Institutionalised social dialogue will strengthen accountability, improve policy legitimacy, reduce implementation risks and increase the effectiveness of climate finance in delivering equitable Just Transition outcomes.

Enhancing institutional coordination and capacity building should be led by National Treasury, the Presidential Climate Commission (PCC), the Department of Planning,

Monitoring and Evaluation (DPME), sector departments, development finance institutions, and local government associations through a coordinated national climate finance capacity-building programme implemented over the next 1–5 years. At the national, provincial, and municipal levels, structured social dialogue platforms should bring together government institutions, state-owned enterprises, municipalities, labour unions, civil society organisations, academia, and the private sector to identify capacity gaps, strengthen project preparation capabilities, improve climate finance readiness, and promote knowledge sharing. Follow-up actions should include the establishment of dedicated technical support facilities, regular training programmes, peer-learning networks, annual institutional capacity assessments, and public reporting on progress in developing bankable projects, accessing climate finance, and implementing just transition initiatives.

Dialogue is therefore critical for clarifying institutional roles, strengthening coordination, and building the capabilities needed to manage finance flows.

- How can climate finance governance be better aligned across treasury, sector departments, regulators, and development finance institutions?
- What capacity gaps exist for accessing global climate funds, and how might direct-access accreditation and fiduciary systems be strengthened?
- What institutional arrangements could improve monitoring, evaluation, and reporting of climate finance flows?

6.2.3 Foster Market Transparency and Data Systems

In terms of strengthen the integration between climate finance tracking and social dialogue, future climate finance assessments should combine quantitative evidence from the PCC Climate Finance Landscape reports with qualitative assessments of governance, institutional readiness and stakeholder participation. Integrating these complementary evidence streams would provide a more comprehensive understanding of South Africa's progress towards financing an inclusive and equitable Just Transition.

Reliable information, standardised metrics, and transparent reporting are fundamental to market confidence, accountability, and effective investment decision-making. While efforts to improve ESG disclosure and MRV systems are advancing, gaps remain in data integrity, comparability, and tracking of climate finance flows. Fostering market transparency and strengthening climate finance data systems should be led by National Treasury, Statistics South Africa, the Presidential Climate Commission (PCC), the South African Reserve Bank, sector departments, and financial regulators through the establishment of a coordinated national climate finance tracking and reporting framework with mandatory ESG disclosure and integrated MRV systems within the next 1–5 years to improve data integrity, investor confidence, and accountability across all climate-related investments.

At the national, provincial, and municipal levels, social dialogue platforms should engage government institutions, financial institutions, state-owned enterprises, municipalities, civil society, academia, and private sector stakeholders to identify data gaps, improve transparency standards, and develop harmonised reporting methodologies for climate finance flows and just transition outcomes. Follow-up actions should include the creation of a national climate finance database, annual publication of climate finance and investment reports, regular stakeholder reviews of data quality and accessibility, and continuous

monitoring of climate finance allocation, mobilisation, and socio-economic impacts to support evidence-based decision-making and accountability. Social dialogue can surface practical challenges and identify priority reforms in support of a more transparent financial ecosystem.

- How can South Africa improve the tracking of climate finance to align with national climate goals?
- What data, MRV, or disclosure systems are needed to enhance transparency and build investor confidence in climate finance?
- How might ESG frameworks and taxonomies be standardised across public and private capital markets?

6.2.4 Expand and Diversify Financial Instruments

Mobilising finance at scale will require a broader suite of financial instruments capable of de-risking investment, aligning incentives, and linking environmental outcomes to fiscal benefits. South Africa has tested several mechanisms, yet the market remains underdeveloped relative to its climate ambition and investment needs. The National Treasury, the Presidential Climate Commission (PCC), the South African Reserve Bank, development finance institutions, financial regulators, and the private financial sector can lead the development of a coordinated climate finance innovation agenda over the next 2–5 years as well as expanding and diversifying climate finance instruments through a robust national climate finance facility that scales blended finance, green bonds, carbon markets, guarantees, and concessional lending to de-risk investment and mobilise private capital for just transition projects in energy, transport, industry, and adaptation sectors. At the national, provincial, municipal, and sectoral levels, social dialogue platforms should bring together government, financial institutions, investors, state-owned enterprises, businesses, labour unions, civil society organisations, and community representatives to identify financing gaps, assess the suitability of different instruments, and develop pipelines of bankable projects capable of attracting diverse sources of capital. Follow-up actions should include piloting innovative instruments such as blended finance facilities, green and blue bonds, sustainability-linked loans, guarantees, carbon market mechanisms, and climate insurance products; establishing annual reviews of instrument performance; monitoring mobilisation of public and private capital; and publishing regular progress reports on their contribution to just transition, climate resilience, and sustainable development objectives. Social dialogue can help assess the viability, sequencing, and institutional roles in developing new instruments suited to national circumstances.

- What role can blended finance platforms (e.g., DBSA, IDC, NEF) play in crowding in private capital and de-risking climate investments?
- Which innovative financial instruments (e.g., sustainability-linked bonds, biodiversity credits, debt-for-nature swaps) are most appropriate for South Africa's fiscal and sectoral context?
- How can financial instruments be structured to align environmental outcomes with fiscal incentives?

6.2.5 Promote Inclusive and Just Financing

Promoting inclusive and just financing requires clearly defined leadership, implementation responsibilities, and accountability mechanisms across all levels of government and society. At the national level, National Treasury, the Presidential Climate Commission (PCC), relevant sector departments, and development finance institutions should lead the development of inclusive climate finance frameworks and investment guidelines within the next 1–3 years. At the provincial and municipal levels, local authorities, state-owned enterprises, community representatives, labour unions, civil society organisations, and private sector actors should participate in structured social dialogue processes to identify financing priorities, monitor the distribution of climate finance benefits, and address potential social impacts. These dialogues should be institutionalised through regular stakeholder forums, transparent reporting mechanisms, and annual review processes to ensure that climate finance supports equitable development outcomes, protects vulnerable groups, and advances South Africa's Just Transition objectives.

Climate finance raises important distributional questions regarding who pays, who benefits, and who bears the risks of the transition. Ensuring that climate investments advance equity, support vulnerable populations, and recognise community interests is central to a just energy transition. Engagement across labour, civil society, and local communities can illuminate these trade-offs and inform more inclusive models of financing.

- How can climate investments ensure equitable benefit-sharing with local communities, particularly where land use and energy transitions are involved?
- What approaches can support gender-responsive, pro-poor, and rural-inclusive climate finance?
- How can dialogue platforms ensure that vulnerable and informal sector groups shape climate investment priorities?

6.2.6 Catalyse Innovation and Private Sector Participation

Technological innovation and private investment will shape the pace and direction of South Africa's transition, particularly in emerging sectors such as green hydrogen, low-carbon transport, and nature-based solutions. However, commercialization barriers, policy uncertainty, and risk perceptions continue to inhibit investment. Catalysing innovation and private sector participation requires coordinated leadership across government, industry, financial institutions, and innovation ecosystems. At the national level, National Treasury, the Department of Trade, Industry and Competition (DTIC), the Department of Science, Technology and Innovation (DSTI), development finance institutions, and industry associations should lead the establishment of enabling policies, incentive frameworks, and blended finance facilities within the next 1–3 years to accelerate private climate investment. At the sector and municipal levels, structured social dialogue platforms should bring together businesses, investors, labour unions, research institutions, municipalities, and community representatives to identify investment barriers, develop bankable project pipelines, and promote local innovation opportunities. Follow-up actions should include annual stakeholder reviews, monitoring of private capital mobilisation, assessment of job creation and local economic benefits, and the publication of progress reports to ensure accountability and alignment with South Africa's Just Transition objectives.

Expanding public-private partnerships (PPPs) offers an important opportunity to mobilise additional resources for municipal climate action. Simplified PPP models, supported by standardised guidance, legal support, and capacity-building programmes, can help municipalities attract private investment for renewable energy, energy efficiency, and climate-resilient infrastructure projects. Dialogue can help define opportunity spaces, incentive structures, and collaborative approaches to accelerate market development.

- Which sectors (e.g., green hydrogen, low-carbon transport, biodiversity-based solutions) offer high-potential opportunities for climate-aligned investment and innovation?
- What incentives or risk-sharing mechanisms could accelerate private sector participation in climate solutions?
- What institutional barriers hinder commercialization and scale-up of emerging climate technologies?

These recommendations for policy dialogue position South Africa to harness international best practices, mobilise finance at scale, and deliver a just, inclusive, and sustainable low-carbon transition.

6.3 Actionable Policy Recommendations for Social Dialogue

Moving from broad to implementable policy recommendations, this study identified five priority actions: (i) consider a national just energy transition finance coordination platform, (ii) develop a pipeline of bankable municipal climate projects, (iii) create just energy transition finance tracking indicators, (iv) expand concessional and grant finance for adaptation and communities; and embed worker and community safeguards into finance instruments. The lead institution, supporting actors, timeframe and social dialogue focus is summarised in Table 8.

Table 8: Proposed actionable policy recommendations

Recommendation	Lead institution	Supporting actors	Timeframe	Social dialogue focus
Consider a national energy just transition finance coordination platform	National Treasury / Presidential Climate Commission	DBSA, DFFE, DMRE, Labour, Business	Short term	Governance and accountability
Develop a pipeline of bankable municipal climate projects	DBSA/ Municipalities	SALGA, DFFE, Private sector	Short to medium term	Local needs and service delivery
Create just energy transition finance tracking indicators	National Treasury / Presidential Climate Commission	CPI, Stats SA, DFFE	Short term	Transparency and equity
Expand concessional and grant finance for	National Treasury/	MDBs, donors	Medium term	Vulnerable groups and affordability

adaptation and communities	DFIs			
Embed worker and community safeguards into finance instruments	Presidential Climate Commission / Labour/ Government	Investors, employers, municipalities	Immediate	Jobs, reskilling, local procurement

6.4 Actionable Project Identification for Social Dialogue

The most significant cross-cutting gap in the current discussion on South Africa's Just Energy Transition (JET) relates to the identification of specific, actionable, and finance-ready projects that can anchor meaningful social dialogue. A central question for policymakers, labour unions, investors, municipalities, communities, and industry stakeholders is not merely which financial instruments are available, but rather which projects should be financed, under what institutional arrangements, and through which financing mechanisms. Without clearly defined projects, discussions around blended finance, concessional lending, guarantees, transition bonds, climate finance, and public-private partnerships remain largely theoretical. International climate finance institutions and private investors require concrete and bankable project pipelines with identifiable implementation pathways, risk-sharing arrangements, employment impacts, and measurable developmental outcomes.

The JET-IP Q3 2025 Report partially addresses this challenge by identifying approximately 227 active projects across four strategic portfolios, supported by pledges amounting to approximately USD14.28 billion. However, there remains a need to translate these portfolios into socially and economically actionable projects that stakeholders can engage with during social dialogue processes. The projects must also reflect South Africa's broader developmental priorities, including energy security, industrial competitiveness, localisation, employment retention, municipal sustainability, and regional economic diversification in coal-dependent regions. Importantly, the project pipeline should not be limited to renewable energy projects alone, but should also include clean coal technologies, hybrid systems, mine rehabilitation, grid modernisation, flexible generation, green hydrogen, electric mobility, and industrial decarbonisation initiatives.

The projects are categorised according to sector, potential funding source, indicative financing instruments, and implementation readiness over the short term (3–5 years), medium term (5–10 years), and long term (10–20 years). Another useful criterion for assessing project readiness in the context of South Africa's Just Energy Transition is institutional and regulatory readiness. This criterion evaluates whether the necessary policy frameworks, permits, governance arrangements, stakeholder agreements, and regulatory approvals are in place to support project implementation. It considers factors such as environmental authorisations, water use licences, land access arrangements, municipal approvals, grid connection permissions, procurement compliance, and alignment with national energy and industrial policies. Institutional and regulatory readiness is particularly important for emerging technologies such as underground coal gasification (UCG), carbon capture utilisation and storage (CCUS), hybrid energy systems, and embedded generation projects, where regulatory uncertainty can significantly delay investment and

implementation. Projects with high institutional readiness are generally more attractive to investors because they face lower implementation risks and shorter lead times.

Table 9 presents top ten actionable and implementable projects aligned with South Africa's JET objectives, financing opportunities, and technological transition pathways. A list of different projects that could be considered for social dialogue is also available in Table A1 of Annex A. These ten projects are selected because they collectively represent the most implementable and systemically important interventions within South Africa's JET pipeline. First, they include high-readiness infrastructure projects such as transmission expansion, EV charging networks, and municipal energy systems, which can be implemented within the short term (3–5 years) due to strong institutional backing and established financing channels. Second, they incorporate strategic transition technologies such as green hydrogen, renewable energy zones, and coal-to-liquids optimisation, which are critical for medium-term decarbonisation and industrial competitiveness. Importantly, the selection also ensures inclusion of just transition and socio-economic stabilisation projects, such as skills development, mine rehabilitation, and regional diversification in Mpumalanga, which directly address employment risks associated with coal phase-down. Finally, the inclusion of flexible coal-related and hybrid solutions reflects the need for system reliability and transitional resilience, recognising that South Africa's energy system requires pragmatic pathways that combine decarbonisation with affordability and security of supply. Together, these projects form a balanced, finance-ready, and socially anchored JET investment portfolio.

Table 9: Top 10 Actionable JET projects, financing sources, and readiness status - full list is in Annex A

Sector	Project	Funding Source and Indicative Amount	Financing Instrument	Readiness Status
1. Electricity Transmission	Independent Transmission Programme and Grid Expansion	World Bank Group (USD3 billion+ loans), AfDB, Climate Investment Funds	Sovereign loans, concessional finance, guarantees	A: High B: Short term (3–5 years)
2. Renewable Energy	Mpumalanga Renewable Energy Zones	JETP grants, private IPP investment, Green Climate Fund	Blended finance, PPPs	A: Moderate–High B: Short term (3–5 years)
3. Transport and Mobility	Eskom–BYD Electric Vehicle Charging Infrastructure	Chinese investment partnerships, Eskom, DBSA	PPPs, infrastructure bonds	A: High B: Short term (3–5 years)
4. Green Hydrogen	Green Hydrogen Development Programme	European Union (€27.54 million), Germany KfW, private sector	Grants, blended finance, export credit finance	A: Moderate B: Medium to long term (5–15 years)
5. Clean Coal and Flexible Generation	Khanyisa IPP (450 MW CFB technology)	Development Finance Institutions, private investors	Capacity charge model, blended finance	A: Moderate B: Medium term (5–10 years)
6. Municipal Energy	Municipal Embedded Generation and Smart Metering	DBSA, National Treasury, Green Municipal Bonds	Municipal green bonds, concessional loans	A: Moderate–High B: Short term (3–5 years)
7. Mine Rehabilitation	Rehabilitation of Abandoned and Derelict Mines: Acid Mine Drainage Treatment Projects	Carbon markets, rehabilitation funds, JETP grants	Carbon finance, public works funding	A: Moderate B: Short to medium term (3–8 years)
8. Skills Development	Just Transition Skills and Reskilling Programme	Presidential Climate Commission, SETAs, donor funding	Grants, social investment finance	A: High B: Short term (3–5 years)
9. Regional Economic Diversification	Mpumalanga Industrial Diversification Zones	National Treasury, JETP partners, private sector	Regional development finance	A: Moderate B: Medium term (5–10 years)
10. Strategic Fuels & Coal Value Addition Programme	Sustainable Aviation Fuel and Coal-to-Liquids Optimisation	Sasol, international transition finance	Transition bonds, industrial finance	A: High B: Medium to long term (5–15 years)

A: Key Interpretation of Implementation Readiness Scale. Short term (3–5 years): Projects that are bankable, policy-ready, and can be implemented quickly using existing institutions and proven technologies. **Medium term (5–10 years):** Projects that are partially developed but require additional financing, regulatory alignment, or technology scaling before full implementation. **Long term (10–20 years):** Highly transformative, capital-intensive projects dependent on emerging technologies, future policy evolution, and long-horizon investment.

B: Key Interpretation of Institutional and Regulatory Scale. **High:** Clear regulatory frameworks, approvals largely in place, and implementation can proceed immediately or within existing policy structures. **Moderate:** Partial regulatory alignment; some approvals or institutional coordination still required. **Low:** Significant regulatory uncertainty, missing approvals, or unclear institutional frameworks limiting near-term implementation.

The proposed project pipeline demonstrates that social dialogue within the Just Energy Transition should move beyond broad policy commitments toward concrete investment decisions linked to specific technologies, financing mechanisms, implementation timelines, and socio-economic outcomes. This approach would strengthen stakeholder engagement by enabling labour, communities, municipalities, industry, and investors to deliberate on tangible projects with measurable employment, industrial, environmental, and developmental implications. It would also improve the credibility of South Africa's JET strategy by presenting a diversified and implementable portfolio capable of attracting both international climate finance and domestic private sector investment.

To facilitate and ensure success of the proposed project pipeline, the role of the Presidential Climate Commission (PCC) and other relevant institutions should be clearly defined to ensure effective coordination and accountability in the implementation of just transition projects. Success in terms of adequate financing would be reflected in increased mobilisation of concessional and blended finance, a lower cost of capital for priority just transition investments, stronger and more investable project pipelines, improved access to financing for vulnerable and affected groups, and the achievement of measurable social outcomes such as job creation, skills development, and enhanced community resilience. The PCC plays a central convening role by bringing together social partners, including government, labour, business, civil society, and affected communities, to facilitate structured dialogue on project selection, prioritisation, and implementation. In addition, the PCC is responsible for helping to define just transition criteria that can be applied consistently across the portfolio of projects, ensuring that social, economic, and environmental considerations are fully integrated into decision-making. Furthermore, the PCC provides an advisory function on social and environmental safeguards, ensuring that risks are identified and mitigated in a manner that protects vulnerable groups and promotes equitable outcomes. It also supports evidence-based dialogue by synthesising data, commissioning studies where necessary, and ensuring that discussions are grounded in credible analysis of costs, benefits, and distributional impacts. Importantly, the PCC and related institutions should also play a monitoring role to assess whether financing flows, implementation processes, and project outcomes are aligned with agreed just transition principles, including equity, inclusion, and sustainability across the identified JET project pipeline.

The national government is responsible for setting policy direction, regulatory frameworks, fiscal incentives, and overall coordination of the just transition agenda. Development finance institutions (DFIs) play a catalytic role in structuring finance, providing concessional capital, de-risking investments, and crowding in private sector participation. Municipalities are key implementing agents at the local level, responsible for project development, service delivery, infrastructure investment, and ensuring alignment with local development priorities. Just transition interventions need to be implemented at municipal level for more success. Incorporating just energy transition principles more fully and carefully, need to be shaped by social dialogue.

The analysis identifies South African Local Government Association (SALGA), municipalities, and the private sector as key agents for advancing localised renewable energy development, while National Treasury, the Development Bank of Southern Africa (DBSA), and municipal councils have an important role in strengthening municipal financial systems and institutional capacity to support local energy transition investments.

Private finance providers—including commercial banks, institutional investors, and project developers—mobilise and allocate capital at scale, responding to risk-adjusted returns and policy certainty. Labour plays a representational and oversight role by safeguarding worker interests, influencing transition planning, and ensuring fair labour standards and reskilling pathways. Communities are critical stakeholders in project acceptance, land access, benefit-sharing, and local legitimacy of investments. The Presidential Climate Commission (PCC) serves as a coordinating and convening body that facilitates social dialogue, defines just transition principles and criteria, provides evidence-based advisory support, and monitors whether financial flows and project implementation are aligned with inclusive and equitable transition outcomes.

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ANNEX A

Table A1: Ranking of Instruments based on practicality/applicability in South African context

Rank	Instrument	Practicality/ Applicability in South Africa	Assessment
1	Concessional Loans	Very High	Already central to the JET Partnership and South Africa's climate finance architecture. Suitable for Eskom transmission expansion, municipal infrastructure, adaptation projects, and social transition programmes. Can lower borrowing costs and support projects that may not be commercially viable.
2	Tax Incentives	Very High	South Africa already uses tax incentives (e.g., renewable energy allowances and rooftop solar incentives). Easy to administer through existing tax structures and highly effective in stimulating private investment.
3	Green Bonds	High	South Africa has one of Africa's most developed green bond markets, with issuances by municipalities, banks, DFIs, and corporates. Well suited for financing renewable energy, water, transport, and resilience infrastructure.
4	Sustainability-Linked Loans (SLLs)	High	Rapidly growing in South Africa's banking sector. Attractive because proceeds are not restricted to specific projects and interest rates are linked to sustainability performance targets. Particularly relevant for mining, industrial, and energy-intensive sectors.
5	Blended Finance	Moderate to High	Important for de-risking investments and attracting private capital. However, evidence suggests lower leverage ratios in Sub-Saharan Africa than global averages. Most effective when combined with concessional finance and strong project pipelines.
6	Carbon Tax	Moderate	Already operational through South Africa's Carbon Tax Act. Effective as a signalling and revenue-generation instrument, but current tax rates and allowances limit its transformative impact. Greater effectiveness depends on gradual strengthening and predictable escalation of carbon prices.
7	Carbon Markets	Moderate to Low	Potentially useful but currently less mature and more uncertain than other instruments. Challenges include low carbon prices, market volatility, high transaction costs, concerns about additionality and environmental integrity, and uneven benefit-sharing outcomes. Best viewed as a supplementary financing source rather than a primary funding mechanism.

Table A2: Proposed Actionable JET Projects, Financing Sources, and Readiness

Sector	Project	Funding Source and Indicative Amount	Financing Instrument	Readiness Status
Electricity Transmission	Independent Transmission Programme and Grid Expansion	World Bank Group (USD3 billion+ loans), AfDB, Climate Investment Funds	Sovereign loans, concessional finance, guarantees	A: High B: Short term (3–5 years)
Renewable Energy	Mpumalanga Renewable Energy Zones	JETP grants, private IPP investment, Green Climate Fund	Blended finance, PPPs	A: Moderate–High B: Short term (3–5 years)
Clean Coal and Flexible Generation	Khanyisa IPP (450 MW CFB technology)	Development Finance Institutions, private investors	Capacity charge model, blended finance	A: Moderate B: Medium term (5–10 years)
Coal Innovation	Majuba Underground Coal Gasification (UCG) Commercial Deployment	Strategic Industrial Fund, concessional climate finance	Risk-sharing finance, innovation grants	A: Low B: Medium term (5–10 years)
Green Hydrogen	Green Hydrogen Development Programme	European Union (€27.54 million), Germany KfW, private sector	Grants, blended finance, export credit finance	A: Moderate B: Medium to long term (5–15 years)
Transport and Mobility	Eskom–BYD Electric Vehicle Charging Infrastructure	Chinese investment partnerships, Eskom, DBSA	PPPs, infrastructure bonds	A: High B: Short term (3–5 years)
Municipal Energy	Municipal Embedded Generation and Smart Metering	DBSA, National Treasury, Green Municipal Bonds	Municipal green bonds, concessional loans	A: Moderate–High B: Short term (3–5 years)
Mine Rehabilitation	Rehabilitation of Abandoned and Derelict Mines	Carbon markets, rehabilitation funds, JET grants	Carbon finance, public works funding	A: Moderate B: Short to medium term (3–8 years)
Industrial Decarbonisation	Green Steel and Low-Carbon Industrial Clusters	Industrial Development Corporation (IDC), private sector	Transition finance, blended industrial finance	A: Moderate B: Medium to long term (5–15 years)
Coal Value Addition	Coal-to-Chemicals and Carbon Products Development	IDC, private mining houses, BRICS Bank	Industrial finance, innovation funding	A: Low–Moderate B: Medium term (5–10 years)

Water-Energy Nexus	Acid Mine Drainage Treatment and Water Reuse Projects	Green Climate Fund, municipal partnerships	Climate adaptation finance	A: Moderate B: Short to medium term (3–8 years)
Agriculture and Bioenergy	Biomass and Ammonia Co-firing Projects	Agricultural funds, climate transition finance	Blended finance, carbon credits	A: Low–Moderate B: Medium term (5–10 years)
Skills Development	Just Transition Skills and Reskilling Programme	Presidential Climate Commission, SETAs, donor funding	Grants, social investment finance	A: High B: Short term (3–5 years)
Energy Storage	Battery Manufacturing and Storage Facilities	Private investors, Chinese partnerships, AfDB	Industrial incentives, blended finance	A: Moderate B: Medium term (5–10 years)
Localisation and Manufacturing	Renewable Energy Component Manufacturing Hubs	DTIC, IDC, international investors	Industrial policy incentives, concessional finance	A: Moderate–High B: Medium term (5–10 years)
Rural Energy	Community-Owned Hybrid Energy Systems	Community trusts, donor finance, municipal partnerships	Community equity finance, grants	A: Moderate B: Short to medium term (3–8 years)
Gas and Hybrid Systems	Gas-to-Power and Hybrid Renewable Backup Systems	Private investors, infrastructure funds	PPPs, infrastructure finance	A: Moderate B: Medium term (5–10 years)
Carbon Management	Carbon Capture, Utilisation and Storage (CCUS) Pilot Projects	International climate funds, research partnerships	Innovation finance, concessional grants	A: Low B: Long term (10–20 years)
Strategic Fuels	Sustainable Aviation Fuel and Coal-to-Liquids Optimisation	Sasol, international transition finance	Transition bonds, industrial finance	A: High B: Medium to long term (5–15 years)
Regional Economic Diversification	Mpumalanga Industrial Diversification Zones	National Treasury, JETP partners, private sector	Regional development finance	A: Moderate B: Medium term (5–10 years)

A: Key Interpretation of Implementation Readiness Scale (A)

- **Short term (3–5 years):** Projects that are bankable, policy-ready, and can be implemented quickly using existing institutions and proven technologies.
- **Medium term (5–10 years):** Projects that are partially developed but require additional financing, regulatory alignment, or technology scaling before full implementation.
- **Long term (10–20 years):** Highly transformative, capital-intensive projects dependent on emerging technologies, future policy evolution, and long-horizon investment.

B: Key Interpretation of Institutional and Regulatory Scale (B)

- **High:** Clear regulatory frameworks, approvals largely in place, and implementation can proceed immediately or within existing policy structures.
- **Moderate:** Partial regulatory alignment; some approvals or institutional coordination still required.
- **Low:** Significant regulatory uncertainty, missing approvals, or unclear institutional frameworks limiting near-term implementation.



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