Special Report 1

GEOPOLITICAL ENERGY FUTURES

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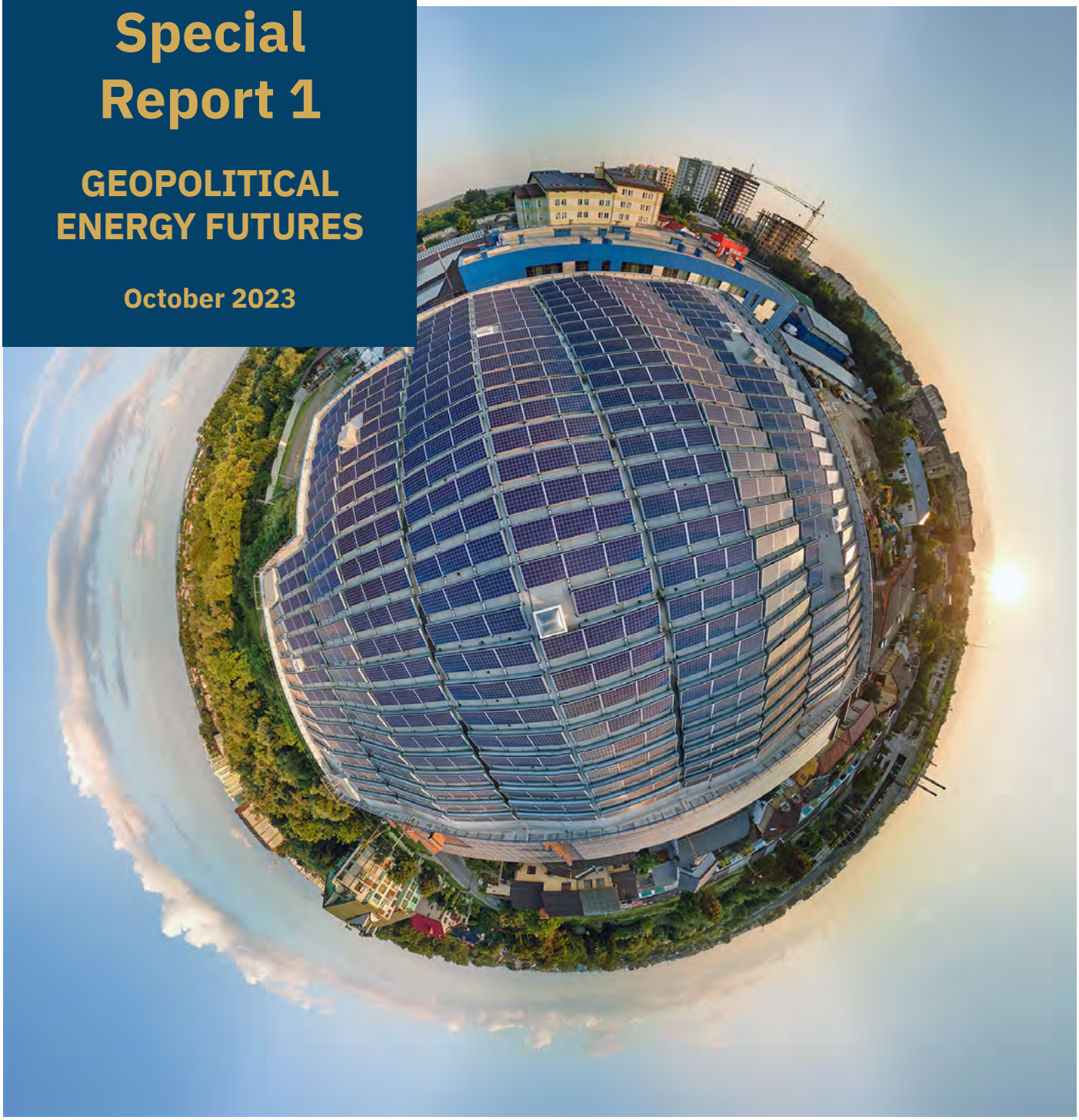

Global Markers in South Africa's Just Energy Transition

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African perspectives
Global insights

SAIIA
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Executive summary

COP21 was the first time that political will converged around the goal of decarbonising global economies. This shift to lower carbon emissions is positioned around a transition from reliance on fossil fuels – such as coal and oil – towards renewable energy sources. This global energy transition reinforces the importance of living within planetary boundaries and developmental objectives, while navigating geopolitical uncertainty.

Systemic risks – such as global conflicts, energy insecurity and transitions, market fluctuations, amid the climate emergency – highlight the need for an exploration of the geopolitical energy landscape impacting on South Africa's energy systems and national energy prospects. The aim is to better understand, explain and anticipate international political behaviours through geographical variables, such as minerals and resources needed, for a just energy transition.

Presently, South Africa finds itself entangled in an energy crisis stemming from a range of factors, including ill-advised policy choices, governance failures, increased corruption and criminality, coupled with changing contextual factors in the global energy markets and regulatory environment. The country also faces challenges from its ageing fleet of coal-fired power stations, which are becoming increasingly costly to maintain, leading to frequent load-shedding. Additionally, the pressing climate emergency, driven by carbon emissions, demands a closely integrated energy transition within the country's development agenda. As Africa's most carbon-intensive economy and a substantial global polluter, the imperative to decarbonise South Africa and ensure energy security for all becomes paramount. But achieving significant change requires bold political, economic, technological and cultural transformations.

This special report is the first in a four-part series on the Geopolitical Energy Futures: Implications for South Africa. The series of special reports include:

Special Report 1
Global Markers in South Africa's Just Energy Transition

Special Report 2
The Geopolitics of Energy in the Post-COVID-19 era

Special Report 3
Navigating South Africa's Geopolitical Energy Transition by 2050

Special Report 4
Systemic Innovations for South Africa's Geopolitical Energy Futures: Towards a Draft Strategic Framework

This special report examines the facets surrounding South Africa's just energy transition while delving into its intricate energy history, uncovering complexities of the REIPPP and renewables-led industrialisation, the significance of the national grid, the role of municipalities, the financial aspects, and the geopolitical dynamics stemming from recent global events like the COVID-19 pandemic.

In conclusion, the report illuminates South Africa's intricate energy landscape, encompassing economic, environmental and geopolitical dimensions. It seeks to empower policymakers, stakeholders and readers with insights to navigate these complexities, to ultimately chart a path toward energy security and energy democracy for all. As South Africa confronts its geopolitical and domestic energy challenges and opportunities, its journey towards embracing sustainable energy futures hinges on futures-informed strategic choices and systemic innovations.

Abbreviations & acronyms

AfDB	African Development Bank
COP	Conference of the Parties
CPI	Climate Policy Initiative
DFIs	Development Finance Institutions
ED	Economic Development
GDP	Gross Domestic Product
IMF	International Monetary Fund
JET	Just Energy Transition
JETP	Just Energy Transition Partnership
JTF	Just Transition Framework
MEC	Minerals Energy Complex
NDCs	Nationally Determined Contributions
PTTC	Presidential Task Team on Climate Finance
REIPPPP	Renewable Independent Power Producer Programme
REDZ	Renewable Energy Development Zones
SOEs	State Owned Enterprises
UK	United Kingdom
US	United States of America

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CST Centre for Sustainability Transitions

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The CST is a flagship research and teaching hub at Stellenbosch University. It brings together complexity thinking, sustainability science and transdisciplinary research across five themes: knowledge co-production, social-ecological resilience, transformative futures thinking, finance and resource flows, and political economy and development. The CST offers a Postgraduate Diploma, MPhil, and PhD in Sustainable Development. Both teaching and research activities are theoretically grounded in Complex Adaptative Systems, Human-Nature Interconnectedness, Socio-Technical Transitions and Social Ecological Transformations.

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About SAIIA

SAIIA is an independent, non-government think tank whose key strategic objectives are to make effective input into public policy, and to encourage wider and more informed debate on international affairs, with particular emphasis on African issues and concerns.

SAIIA's special reports are fairly lengthy analytical papers, usually reflecting on and analysing the findings of field research.

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CHAPTER 1

Overview and background

The effects of human activity have changed earth systems so drastically that planetary conditions required for thriving communities and societies have been undermined. The effects experienced within this new epoch – the Anthropocene – have disproportionately been felt by already vulnerable and marginalised groups, mostly in the Global South, aggravating inequality even further.[1] We are seeing this in the decline and loss of global biodiversity, a growing middle class and subsequent consumption habits, ecosystem services under severe strain and climate change effects exacerbating it all.

The profound shifts in our systems of production and consumption, as well as our worldviews, values and institutions, are driving these momentous systemic changes. To achieve a fair, sustainable and resilient future, we must undertake a transformative journey that challenges the foundations of our societies, particularly our economies. This calls for reevaluating and challenging the underlying paradigms and deeply ingrained assumptions that currently shape and support our way of life. Only through such profound transformation can we pave the way for a just and sustainable future for generations to come. The global energy transition is an example of a system that intersects a number of these issues: the limits of the planetary systems and the planetary boundaries we have come up against; the effects of climate change; the necessity of energy security for development; and the need to transition to new sustainable and just methods of production and consumption.

COP21 was the first time global will converged around the goal of decarbonising global economies. This shift to lower carbon emissions technologies and carbon neutrality is positioned around an energy transition from a reliance on fossil fuels like coal and oil towards renewable 'green' energy sources. This global energy transition requires us to keep within these planetary boundaries and developmental objectives while navigating uncertainty. While modelling has been employed to acquire an understanding of the possible shift in energy sources, numerous current energy models have not completely incorporated macroeconomic aspects. This has resulted in a lack of understanding regarding the complete advantages and disadvantages of this transition in relation to indicators like gross domestic product, joblessness rates, price hikes, consumption and other macroeconomic elements. The absence of a connection between the energy transition and macro-economic factors restricts the precision of simulations for usual business operations as well as alternative scenarios within the wider macro-economic framework. This limitation is particularly notable for countries in the Global South, where

1 Keston K Perry, 'Realising Climate Reparations: Towards a Global Climate Stabilization Fund and Resilience Fund Programme for Loss and Damage in Marginalised and Former Colonised Societies' (Williams College: Social Science Research Network, March 1, 2020), https://ssrn.com/abstract=3561121.

energy shifts strive to tackle development obstacles amid the climate emergency. However, global conflicts, energy insecurity, market fluctuations and climate change add complexities – and call for an exploration of the geopolitical energy landscape's impact on South Africa's energy systems and national energy prospects.

Presently, South Africa finds itself entangled in an energy crisis stemming from a range of factors, including ill-advised policy choices, governance failures, increased corruption and criminality, coupled with changing contextual factors in the global energy markets and regulatory environment. The country faces challenges due to an ageing fleet of coal-fired power stations that are becoming increasingly costly to maintain, leading to frequent load-shedding. Additionally, the pressing climate emergency, driven by carbon emissions, demands a closely integrated energy transition within the country's development agenda. As Africa's most carbon-intensive economy and a substantial global polluter, the imperative to decarbonise becomes paramount, along with the need to ensure energy security for all. Achieving significant change requires bold political, economic, technological and cultural transformations.

In addressing our global energy concerns, we need to recognise the interconnections that exist between the natural environment, society and our deeply rooted systems of inequality. This report touches on areas of concern, interest and relevance for engaging in this conversation about the contestation around South Africa's just energy futures, taking as a starting point research that the Centre for Sustainability Transitions (CST) has conducted around South Africa's Just Energy Transition.

At the heart of this analysis lies the intricate interplay between the global push for renewable energy adoption and the challenges of lifting millions out of poverty and reducing inequalities. As countries invest heavily in renewable energy infrastructures, questions arise about the equitable distribution of the benefits of the just transition. The tensions between decarbonisation, job creation, and socio-economic inclusivity take centre stage as the world strives for a balanced and sustainable energy future.

This report aims to address key questions shaping the geopolitical energy futures of South Africa:

- What role does the concept of a just transition play in aligning global climate goals with the developmental aspirations of South Africa?
- What are the just transition narratives in South Africa that reveal the underlying assumptions about the relationships between economic development, decarbonisation and development?
- How can energy transitions be navigated through South Africa's Just Energy Transition Partnership (JETP) in a way that ensures not only environmental sustainability but also social justice and inclusive economic progress?

- How does South Africa's complex energy history inform its development priorities, especially relating to the employment impacts of decarbonisation?
- What are the development challenges and opportunities emerging from Renewable Energy Independent Power Producer Procurement Program (REIPPPP) that can help South Africa shift to renewable energy-led industrialisation?
- What is the role of the grid and key institutions like municipalities in enabling the just energy transition?
- What is the role of climate finance for South Africa's needs and what potential sources of finance should be explored?

The report explores the global markers of the moment, looking at the international dynamics at play in the just transition, the state of energy on the African continent, and finally, how the JETP emerged from this. The second section of the report dives into the specifics of the South African energy context, looking at South Africa's complex energy history. The bulk of the contextual assessment of the report examines the development challenges and opportunities that exist, with particular focus on the REIPPPP, renewables-led industrialisation, the importance of the national grid, the role of municipalities and finance, and the geopolitics of energy in the post-COVID-19 era, marked by the Russia–Ukraine war and the shift to a multipolar world.

Ultimately, the report seeks to provide insight into the complex geopolitical energy landscape of South Africa by shedding light on systemic, multifaceted issues cutting over economic, environmental and geopolitical dimensions. Further, it aims to equip policymakers, stakeholders and readers with insights to navigate the complex landscape of energy geopolitics, with specific reference to South Africa. The subsequent sections delve into the challenges, opportunities and strategic choices that lie ahead for South Africa to secure energy security for all citizens.

CHAPTER 2

Global markers of the moment

In exploring the uncertainties, disruptions and opportunities in the geopolitical energy landscape, we begin with the formal framing of globally sanctioned pathways towards a 'transformed' world – the framing within which the energy conversation takes place. We begin with the just transition.

Context for the just transition

Global investments in renewable energy infrastructures are now over $500 billion per annum, double total investments in fossil fuels and nuclear combined.[2] This is the outcome of steady growth since 2004, with roots in the so-called 'frontrunner countries' (ie, Denmark and Germany) dating back to the 1990s. Although the 1973 oil crisis briefly triggered an uptick in renewable energy investments in the West, it was not until the anti-nuclear movement in the late 1980s that significant progress was made in developing a viable renewable energy industry. The origins lie in anti-nuclear activists deciding they needed to go beyond protesting against nuclear by establishing viable renewable energy alternatives. Because of their egalitarian value systems, they decided to establish citizen-based cooperatives to raise the finances and develop the expertise to build renewable energy alternatives. This was mainly wind energy in Denmark; in Germany, it was mainly solar energy. By 2000, 80% of all Danish windmills were owned by cooperatives, which is why they were socially acceptable. By 2014, 50% of all solar energy was owned by cooperatives. In Germany, cooperatives and cooperative-like structures attracted the participation of non-profit and community banks, development finance institutions (DFIs) and local authorities.

During these early years (the 1990s), profit margins were such that for-profit energy companies were uninterested in the sector. However, favourable policy environments (including feed-in tariffs) and technological advances gradually reduced costs and enabled scale. As more companies became involved in the sector, they lobbied to replace feed-in tariffs with auction mechanisms. The resulting increased competition and drastic price reductions created market conditions favouring large corporations. However, the high wage regimes in Denmark and Germany prevented further price reductions and scale. To resolve this, German companies licensed Chinese companies to move into the mass production of increasingly cheap renewables from 2006 onwards. Chinese expenditure on research and development increased significantly over the period 2000 to 2020 and is marginally behind that of the US. However, upon closer inspection, when comparing research and development intensity rates, where research expenditure is expressed as a percentage of

2 Josh Saul and Will Mathis, 'Spending on Global Energy Transition Hits Record $500 Billion', Bloomberg, January 29, 2021, https://www.bloomberg.com/news/articles/2021-01-19/spending-on-global-energy-transition-hits-record-500-billion.

GDP, Chinese investments remain lower compared to that of the Organisation for Economic Co-operation and Development (OECD) country average and the US from 2010 to 2020.[3] Instead, their manufacturing capabilities were initially enabled via joint ventures coupled with ambitious local content requirements, reinforced by production subsidies. However, after benefitting from steep learning curves, it was possible to migrate the bulk of Chinese production into Chinese companies.

The world now depends on Chinese companies with German technology licenses to produce the renewable energy components needed to drive the global energy transition. In short, technologies developed in German and Danish cooperatives set up by anti-nuclear individuals in the 1990s are now mass produced in China's domestic economy. China is highly interconnected and has far-reaching influences on global markets, making it difficult to label it using traditional definitions. The uniqueness of China's economy is highlighted in the capitalist and entrepreneurial adventurism in property and services businesses, pointing more towards a Western-influenced political economy model while at the same time being the last communist state within the global capitalist economy thanks to licensing agreements with mainly German companies.

While consumption subsidies in Western countries enabled rapid growth in developed economies, by the 2010s, the fastest growth was in Global South countries with limited to no subsidies. This geopolitical dynamic shifted drastically in 2022 when the US Government approved the Inflation Reduction Act (IRA). The IRA aims to catalyse nearly $1 trillion worth of investments in a US-led competitive alternative to Chinese dominance of renewables production, and is a direct response to the negative inflationary impact of the Russia–Ukraine war on fuel prices. Although the US has become almost energy autonomous due to the shale gas revolution, this is not a long-term resource that the US can depend on. Most coal companies are either bankrupt or in business rescue. In the context of rising US–China tensions that started during the Trump era and was reinforced by the Biden administration, depending on imports of Chinese renewables infrastructures was not an option. Hence the realisation that the only alternative in the context of climate change is the rapid boosting of US capabilities to produce their own renewable energy infrastructures. The IRA is expected to trigger a subsidy war between the US, Europe and China that will suck up global investment resources. There is a good chance that this will exclude the Global South. The rising cost of capital and indebtedness in the Global South during 2023 is a clear sign that this exclusionary dynamic is under way.

However, as the energy transition to a decarbonised world accelerates, concerns have emerged regarding how this will relate to the sustainable development goals (SDGs) on poverty eradication and reducing inequalities. Over the past decade, the just transition (JT) narrative addressing this challenge has travelled from its origins in the international labour movement to the formal framing of globally sanctioned pathways towards what the Preamble to the SDGs refers to as a 'transformed' world.

3 'OECD Main Science and Technology Indicators. R&D Highlights in the March 2022 Publication.' (OECD Directorate for Science, Technology and Innovation, OECD 2022), https://www.oecd.org/sti/msti-highlights-march-2022.pdf.

At the broadest possible level, the JT is about reconciling environmental goals in general (SDGs 6, 7, 13–15) with the full range of social justice goals (SDGs 1–5, 8–12, 16). Put simply, the JT can be broadly defined as referring to the processes of change that will be required to achieve a socially just world while restoring the natural systems that all life depends on. The notion of a Just Energy Transition (JET) was incorporated into the Preamble of the Paris Agreement.[4] The wording reflected the influence of the International Labour Organization:

> [T]aking into account the imperative of a Just Transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities.

This became the basis for Decision 11 of the COP21 Agreement in 2015. A Working Group on Just Transitions and Decent Work was set up as part of the Marrakech Partnership for Global Climate Action. It was set up to facilitate a community of practice to share case studies of the implementation of the Paris Agreement. The International Labour Organization provides the Secretariat for the Working Group, which adopted the Guidelines for a Just Transition Towards Environmentally Sustainable Economics and Societies for All in 2015.

The JT featured prominently at COP24 in Katowice, Poland. The Silesia Declaration adopted at COP24, an initiative of the Polish COP Presidency and adopted by Governments, reaffirmed the commitment to the JT. Numerous side events at COP24 that complemented the Silesia Declaration helped to bring the JT into mainstream awareness. However, this conception of the JT was very much along the lines of the second narrative (further described below), ie, decarbonisation plus social mitigation. It was not until South Africa presented its JET Partnership at COP27 that the lens was widened to refer more explicitly to the third narrative of decarbonisation, plus social mitigation, plus upstream green industrialisation (including electric vehicles, green hydrogen, etc.).

The JET is a narrower definition of the JT. It is driven mainly by a desire to fuse together the environmental commitments to climate action (SDG 13) and affordable and clean energy (SDG 7) with the socio-economic commitments to end poverty (SDG 1) and reduce inequalities (SDG 10).

South Africa was the first country to include the notion of a 'just transition' in its Nationally Determined Contributions (NDCs). Many countries have since followed suit. In most cases, however, it remains unclear what is meant by 'just transition' when this notion is included in a country's NDCs. In most instances, it refers to the narrower definition, ie, a 'just energy transition' rather than the broader notion of reconciling environmental goals with social justice goals. And when this narrower definition is used, most NDCs mean decarbonisation plus social mitigation.

4 Paris Agreement, United Nations, 2015, https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

There are multiple interpretations of the JET. Four fairly distinct (but occasionally overlapping) JET narratives need to be recognised upfront. Each reflects very different underlying assumptions about the relationships between economic development, decarbonisation and development. These are outlined below.

1 **JET as decarbonisation plus 'trickle down' socio-economic impacts**: this essentially refers to the view that the priority is to unlock economic growth by rapidly deregulating the energy market so that a renewables-based energy system can be built as quickly as possible. The result will be accelerated economic growth, generating socio-economic benefits, especially jobs.

2 **JET as decarbonisation plus social mitigation**: this refers to the view that a narrow focus on decarbonisation will have a negative impact on those workers and communities who will suffer the consequences of 'coal closure'. As a result, decarbonisation must be coupled with a wide range of public, private and community-based interventions to mitigate the negative consequences of coal closure for workers and communities.

3 **JET as decarbonisation, plus social mitigation, plus upstream re-industrialisation**: from this perspective, decarbonisation plus social mitigation is too narrow because it ignores the real potential of renewables-led industrialisation that can drive the much-needed diversification of African economies in a way that is also climate-resilient (increasingly referred to as 'Climate-Resilient Development').[5] The result would be a focus not just on sustainable energy generation with social mitigation, but a wider transition to inclusive green economies.

4 **JET will only be achieved if there is a radical socio-economic transformation of society in ways that will result in authentic (or 'deep') decarbonisation, social mitigation and inclusive upstream industrialisation**: in this view, which is current amongst labour unions and many NGOs, relying on the private sector to deliver a just transition will not result in an inclusive green economy. Instead, emphasis is placed on 'energy democracy', which refers to reconfiguring ownership of the new sustainable energy system, with publicly owned utilities and community-owned institutions (eg, energy cooperatives) playing a major role.

There are multiple interpretations of the JET. Four fairly distinct JET narratives need to be recognised upfront. Each reflects very different underlying assumptions about the relationships between economic development, decarbonisation and development

5 TESS Forum on Trade Environment & the SDGs, Trade and Climate-Resilient Development in Africa: Towards a Global Green New Deal, (2022), https://cdn2.assets-servd.host/lyrical-cormorant/production/assets/images/Publications/TESS-Policy-Paper-Trade-and-Climate-Resilient-Development-in-Africa.pdf.

Given Africa's realities, the third and to some extent the fourth JET narratives are the most appropriate to address development challenges within the context of the climate crisis. Whereas up until recently, the JET narrative has hitherto been mainly dominated by the second narrative (with its origins in the German energy transition), South Africa's JETP has shifted the dial more in favour of the third narrative.

The COP27 agreement on the 'loss and damage' framework, after many years of struggle by Global South countries to get this onto the agenda, marks a significant opportunity for African governments to more clearly link the decarbonisation of development pathways, development priorities and the strategic allocation of international capital.

Africa's energy mix

Aligning Africa's traditional commitments to socio-economic development with the relatively new global commitments to climate action and decarbonisation is a major strategic opportunity for African countries. However, an overview of African NDCs would suggest that although there are always general statements about reconciling decarbonisation and the traditional set of African development priorities (as per Agenda 2063, for example), this coupling is not generally achieved by way of a reference to the notion of a 'just transition'. South Africa is a clear exception.

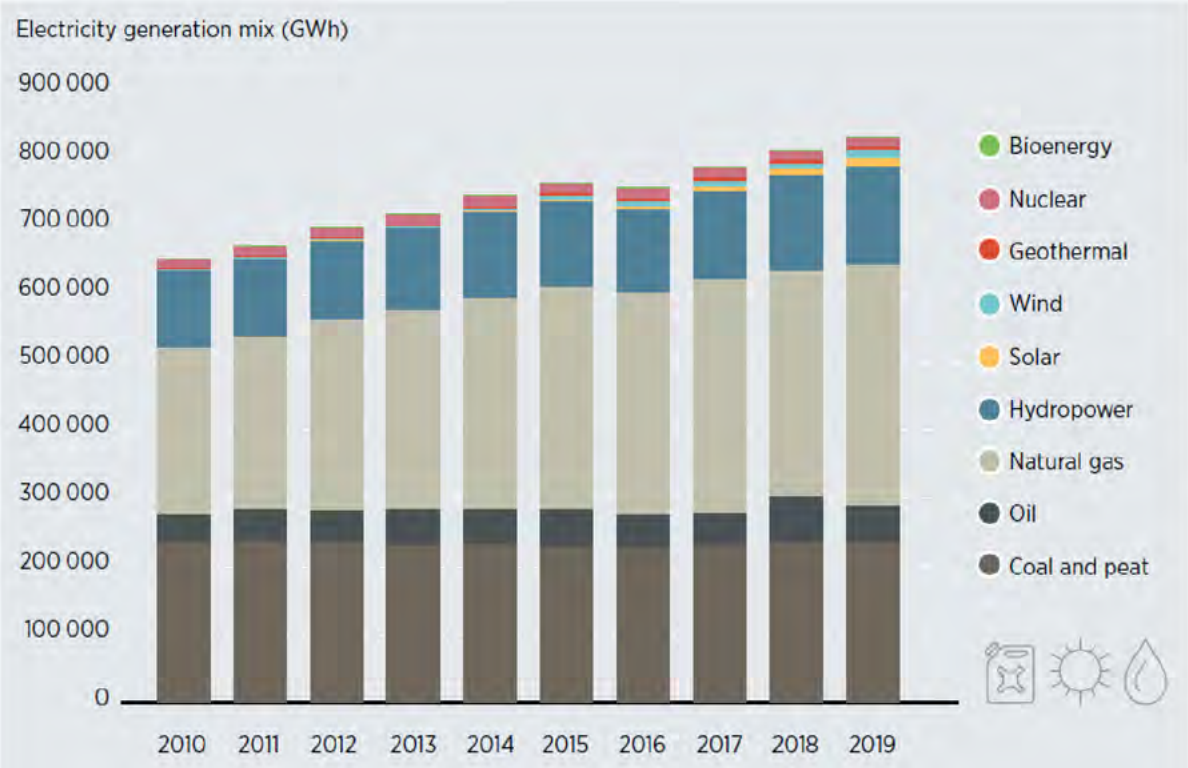
Half of the goals of the AU's Agenda 2063 programme are either about ensuring energy security or are dependent on an adequate supply of energy. Only 46% of people in sub-Saharan Africa have access to electricity, which means that in 2019, 570 million people did not have access to viable and affordable energy.[6] That year, the electricity generation mix in Africa was just over 800 000 GWh for a region with a population of 1.3 billion (Figure 1). This is roughly equal to the electricity generation of France and Germany, which serves a population of only 150 million people. Overall in Africa's electricity generation mix only gas-fired power grew significantly between 2010 and 2019, although solar and wind have grown from a non-existent base since 2016.

Africa needs to rapidly increase the total availability of electricity to drive development strategy implementation. Considering Africa's current population of over 1 billion and substantial development gaps evident across all indicators, reliance on fossil fuels will render the climate targets of the 2015 Paris Agreement unattainable. Therefore, the world is interested in Africa achieving what no other region has ever achieved: rapid socio-economic development without a concomitant increase in greenhouse gas emissions and the related destruction of ecosystem services.[7] This is the core challenge represented by the notion of a 'just transition'.

6 International Renewable Energy Agency & African Development Bank Group, Renewable Energy Market Analysis: Africa and its Regions, (IRENA, 2022), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Market_Africa_2022.pdf.

7 Africa Progress Panel, Power People Planet: Seizing Africa's Energy and Climate Opportunities, Africa Progress Report, (2015), https://www.seforall.org/sites/default/files/l/2015/06/APP_REPORT_2015_FINAL_low1.pdf.

Figure 1 Electricity generation mix in Africa, by source, 2010–2019



Source: International Renewable Energy Agency & African Development Bank Group, Renewable Energy Market Analysis: Africa and its Regions, (IRENA, 2022), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Market_Africa_2022.pdf

Figure 2 describes the status quo for 2021. Most African countries are dependent on fossil fuels, although only ten are dependent on fossil fuels for more than 60% of their energy generation capacity. Nine have the benefit of gas reserves, and 14 have neither significant fossil fuel generation nor gas reserves.

Mulugetta convincingly argues that it is possible to identify four generation technology pathways (see Figure 3).[8] Each pathway is determined by the potential for transitioning from a high- to low-carbon energy system over time. These pathways will require choices to be made along the way, creating an 'opportunity' space for strategic positioning. Each pathway in Figure 3 is represented by an exemplar:

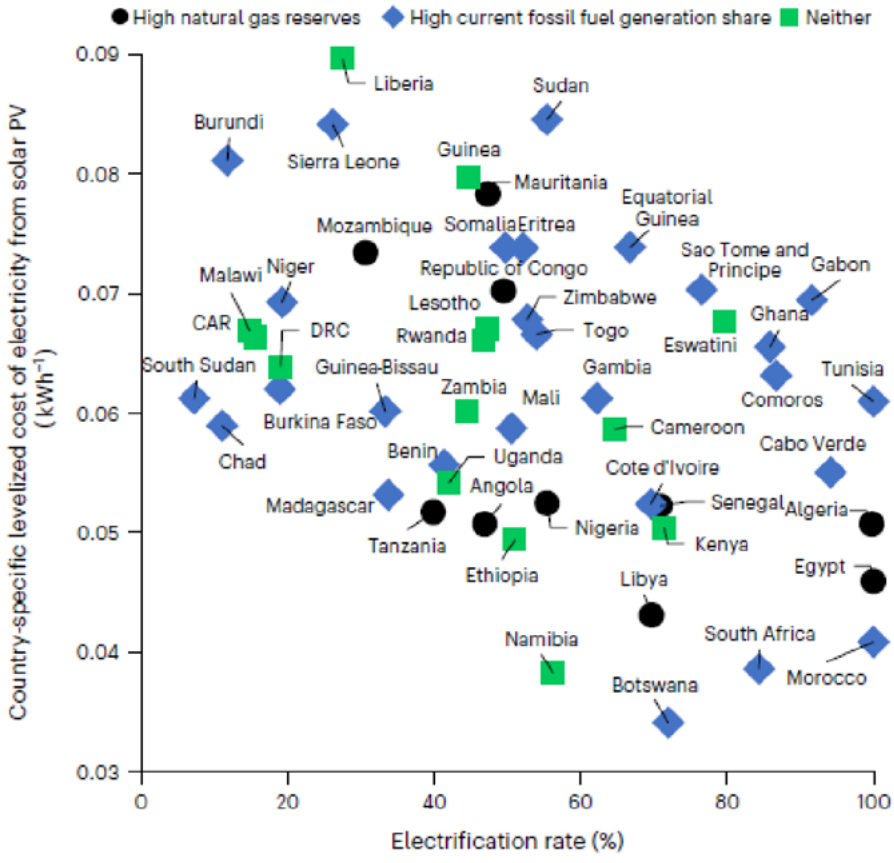
- Ethiopia exemplifies the potential of some African countries that are not currently highly dependent on fossil fuels to transition over time to a low carbon energy system based on renewables. Other examples in this category are Kenya and Namibia.
- South Africa exemplifies a country heavily dependent on fossil fuels (mainly coal) that needs to rapidly transition to cheap renewables because its fleet of coal-fired power

8 Yacob Mulugetta et al., "Africa needs context-relevant evidence to shape its clean energy future," *Nature Energy* 7, no. 11 (2022):1015-1022, doi: 10.1038/s41560-022-01152-0.

stations is old, inefficient, and suffering from systemic corruption. Funding to build new coal-fired power stations is not available and economic growth is severely constrained by what is referred to in South Africa as 'load-shedding' (ie, rolling blackouts). Renewables are some of the available practical options, but this is contested by vested interests, which may result in a slower transition than otherwise possible. Other countries in this category include Botswana and North African countries.

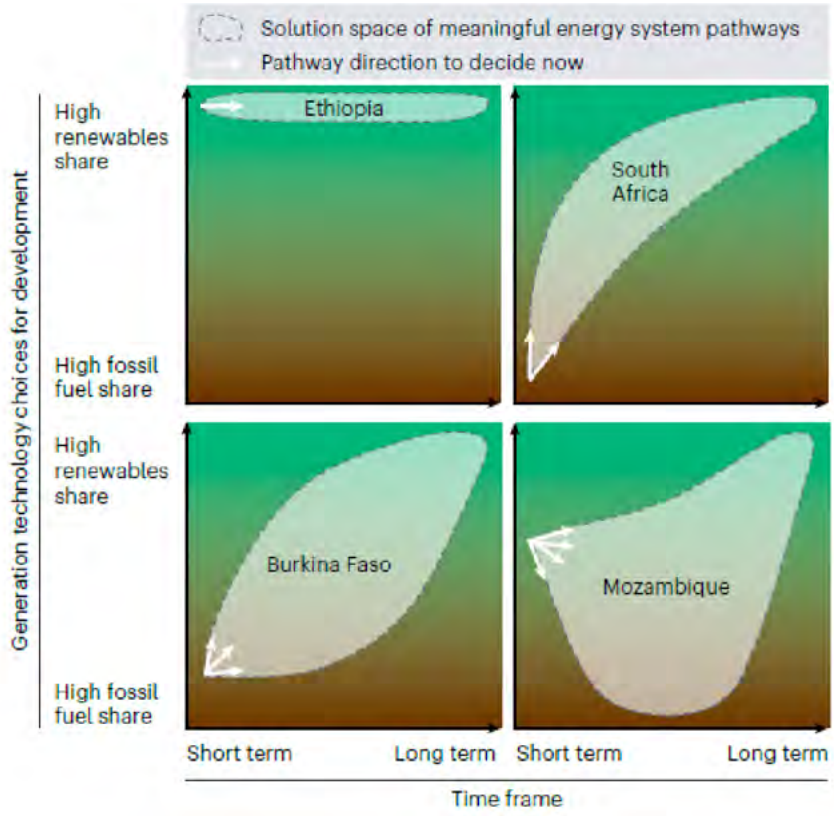
- Burkina Faso is an example of a country with a relatively low share (40%) of fossil fuels in its energy mix, but with a high potential to transition using decentralised modularised systems that gradually provide energy services to the majority who lack access. Most of the Sahel countries and Madagascar are similar.
- Mozambique is an example of an African country with gas reserves that offer the opportunity to provide energy access to the majority by deepening their dependence on fossil fuels as an attractive economic option. However, this may have negative implications over the medium- to long-term, such as stranded assets and exclusions from export markets due to border carbon taxes. Mauritania, Senegal, Nigeria and Congo-Brazzaville are in a similar position.

Figure 2 Country specific differences of current energy systems and relative generation technology favourability in Africa



Source: Yacob Mulugetta et al., "Africa needs context-relevant evidence to shape its clean energy future," *Nature Energy* 7, no. 11 (2022): 1015–1022

Figure 3 Meaningful generation technology pathways for different African countries



Source: Yacob Mulugetta et al., "Africa needs context-relevant evidence to shape its clean energy future," Nature Energy 7, no. 11 (2022):1015–1022.

The descriptions of these four energy transition pathways exclude any consideration of social inclusivity and justice. They could all potentially be 'unjust' energy transitions. For them to become the basis for authentic 'just' energy transitions, the overall socio-economic directionality of these different kinds of energy transitions will have to be shaped by a wider commitment to inclusivity and social justice. These socio-economic developmental commitments should be clearly articulated in each African country's NDCs in ways that are reinforced rather than undermined by the specificities of the socio-technical modalities of the energy transition pathway that are appropriate to each country. This may be brought together by means of an integrated JET approach.

South Africa's Just Energy Transition Partnership

South Africa's JETP provides a good example of the benefits of an integrated JET approach. Announced at COP26 in 2021, the South African Government presented the JETP investment strategy at COP27 in 2022. This was approved by the Cabinet in the lead-up to COP27.

Socio-economic developmental commitments should be clearly articulated in each African country's NDCs in ways that are reinforced rather than undermined by the specificities of the socio-technical modalities of the energy transition pathway that are appropriate to each country. This may be brought together by means of an integrated JET approach

sUp until that point, energy policy – as expressed in the Integrated Resources Plan (IRP) – was driven by the Department of Mineral Resources and Energy and South Africa's updated NDCs was driven by the Department of Environment, Forestry and Fisheries. This occurred despite the National Development Plan approved in 2012 calling for a 'transition to a low-carbon, resilient economy and just society'.[9]

These two separate policy processes were not aligned with each other as envisaged in the NDP. This dualist policymaking structure was overcome when the President followed a recommendation by the National Planning Commission to establish the Presidential Climate Commission (PCC) in 2020. Since then, the PCC has facilitated the integration of energy and climate policy, resulting in a policy framework called the Just Transition Framework (JTF). This included a process that led to updating the NDCs to include a more ambitious set of decarbonisation targets. Approved by Cabinet, the JTF became the basis for the JETP. The JETP was formulated by the Presidential Task Team on Climate Finance appointed in early 2021 and charged with drafting the JETP in time for presentation at COP27.

Although the mainstream narrative in South Africa has been the 'decarbonisation plus social mitigation', the JETP shifted the emphasis decisively into the third narrative (consistent with the NDP), ie, 'decarbonisation plus mitigation plus green industrialisation'. This is because the decarbonisation of the power sector was only one of three focus areas, the others being green hydrogen and electric vehicles. Provision is made for social ownership of renewables via cooperatives. Significantly, it is not just a policy framework – it is also an investment plan that estimates the total costs of the energy transition over the next five years (ZAR1.5 trillion) and then situates the donor contribution announced at COP26 of $8.5 billion (ZAR130 billion) in that context. The strategic implication is that the vast bulk of the funding will come from South Africa's domestic financial institutions. The combination of the JTF formulated by the PCC and approved by Cabinet, the Cabinet-approved JETP, the updated NDCs tabled at COP27 and the soon to be approved Climate Bill, means that South Africa has succeeded in merging its decarbonisation commitment with its developmental agenda.

9 Government of South Africa, National Planning Commission, "Chapter 5: National Development Plan 2030", 2012, https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf.

It matters deeply how key actors unite around the JETP and what it is mobilised for, necessitating an understanding of South Africa's political economy, including the evolution of the energy policy framework and the embeddedness of coal in communities, energy-related developmental challenges and opportunities and institutional and technical capacity and shortcomings related to key institutions. These include municipalities and energy infrastructure, such as the grid and the transmission system. Thus, insights into each of these key areas are provided in addressing South Africa's energy futures.

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South Africa's complex energy history

South Africa is in a precarious energy position, attributed in part to South Africa's complex energy history. Eskom plays a pivotal role in South Africa's energy supply, contributing 90% to the Minerals Energy Complex (MEC),[10] encompassing mining, manufacturing, and urban services. The main mining and manufacturing divisions made up 21% of the nominal GDP,[11] whereas the productive urban sector comprised 24% in the year 2019. Furthermore, when combined, these two sectors collectively contribute to 35.5% of the workforce,[12] emphasising the possible disturbance to the economy of South Africa in case the issues presented by an unstable and costly electricity provision are not appropriately tackled.

The history of South Africa's electricity industry is intricately linked to the mining sector, industry and state-owned enterprises, and is set within the historic features of the apartheid legal and regulatory framework. This has resulted in social and political consequences. To explain South Africa's unique form of industrialisation, Fine and Rustomjee developed

10 David A. McDonald, *Electric Capitalism: Conceptualising Electricity and Capital Accumulation in (South) Africa, Cape Town*, HSRC Press, 2009, 12.

11 "Gross domestic product 2nd quarter 2019," Stats SA, 2019, https://www.statssa.gov.za/publications/P0441/GDP%202019%20Q2%20(Media%20presentation).pdf.

12 Stats SA, 'Gross domestic product 2nd quarter 2019'.

the concept of the MEC.[13] 'The MEC is a constellation of economic activities built around mining, particularly gold mining and energy industries, which have developed symbiotically in South Africa in the last century.'[14]

By 1948, South Africa's state-owned utility company Eskom owned most power stations and the transmission system. By 1973, the transmission grid was interconnected; it was completely nationally controlled after the De Villiers Commission in 1983 and the rules governing Eskom changed significantly.[15] In its early parastatal stage, Eskom functioned with self-regulation. Subsequently, it entered into pricing agreements aimed at reducing the actual cost of electricity by 20% between the years 1985 and 2000. A national regulator – later the National Energy Regulator of South Africa – was established, leading to an adversarial relationship between it and Eskom from 2001 to 2008. In this timeframe, Eskom made a formal request to the Minister of Minerals and Energy as a result of incentive-based regulation, which led to an additional decrease in the genuine cost of electricity. This action diverged from the objective of progressing towards pricing that accurately represents costs.[16]

Eskom continues to hold significant control over South Africa's power industry[17] and retains exclusive ownership of the nation's high-voltage transmission grid.[18] The utility is responsible for 60% of energy distribution, with municipalities responsible for the remaining 40%.[19] Approximately 80% of Eskom's installed generation capacity is coal based.[20] It is currently unable to meet electricity demand due to poor plant performance, an ageing coal fleet, mismanagement, the consequences of state capture, corruption scandals, increasing debt, lack of cost-reflective tariffs and maintenance backlogs; with policy and planning uncertainty contributing to this situation.[21] Eskom is unable to service its debt of more than ZAR 480 billion as of 31 March 2020 and relies heavily on government support packages.[22]

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13 Ben Fine and Zavareh Rustomjee, *The Political Economy of South Africa: From Minerals-Energy Complex to Industrialisation*, Johannesburg, Witwatersrand University Press, 1999.

14 Andrew Marquard, *The Origins and Development of South African Energy Policy*, Cape Town University, 2006, 66, https://open.uct.ac.za/handle/11427/4963.

15 Anton Eberhard, "The Political Economy of Power Reform in South Africa," in *The Political Economy of Power sector Reform*, ed. David Victor and Thomas Heller, Cambridge, Cambridge University Press, 2006, 215–253.

16 Eskom, Eskom Annual Report 2003," https://www.eskom.co.za/heritage/wp-content/uploads/2021/10/2003-Annual-Report.pdf; Deon Joubert, 'Funding of Investment for Asset Replacement and Expansion of Regulated Infrastructure Industries: Theoretical Criteria and Parameters to Ensure Adequate Capital', in 1st Annual Competition and Economic Regulation (Acer) Week, Southern Africa March 20 & 21, 2015, Victoria Falls, Center for Competition Regulation and Economic Development, https://static 1.squarespace.com/static/52246331e4b0a46e5f1b8ce5/t/575703c4f8baf328e17d1242/1465320395464/Deon+Joubert_Funding+of+Investment +for+Asset+Replacement+and+Expansion+of+Regulated+Infrastructure+Industries_2016.pdf.

17 Lucy Baker, Wei Shen and Seife Ayele, *Governing Procurement of Renewable Electricity Amid Power Sector Reforms: A View of Experiences from China, South Africa, and Ethiopia*. Energy and Economic Growth: Applied Research Programme, Oxford Policy Management, 2021.

18 Eskom, "Restoring Trust: Integrated Report 2020," 2020, https://www.eskom.co.za/wp-content/uploads/2021/06/2020IntegratedReport_secured.pdf.

19 Baker et al, 'Governing Procurement'.

20 Eskom, Restoring trust.

21 Anna Geddes et al.,"The Politics of Climate Finance: Consensus and Partisanship in Designing Green State Investment in the UK and Australia," 60, 2020, doi: https://doi.org/10.1016/j.erss.2020.101583; Baker et al., 'Governing Procurement'.

22 Eskom, 'Restoring trust'.

Rotational load-shedding has been a Demand Side Management tool implemented as needed since 2008, to prevent a national blackout.[23] The result of load-shedding has been a loss of investor confidence in the country and a negative impact on GDP through loss of productivity.[24]

South Africa's developmental priorities

Alongside these energy security concerns and environmental goals, South Africa has specific developmental priorities. Approximately 43% of South Africans face the challenge of 'energy poverty'.[25] This condition can be described as the inability to fulfil essential energy requirements, particularly those directly influencing household wellbeing. Energy poverty disproportionately affects low-income households, leading to issues like malnutrition and various health concerns, especially for women as their income-generation activities are limited.[26] Therefore, in planning a fair and just energy transition, it is crucial to prioritise gender mainstreaming of energy policies and strategies.[27] The restricted involvement of women within the energy sector obstructs the efficient execution of energy policies and strategies developed to cater to their distinct requirements. Incorporating gender considerations at the core of energy planning can foster a more inclusive and effective approach to tackling energy poverty.

In the South African context, energy poverty can be closely associated with the spatial planning policies during the apartheid era, which have resulted in enduring inequalities in the built environment.[28] Even after 20 years of democratic rule, these spatial discrepancies endure and the issue of energy poverty is exacerbated as communities of impoverished individuals, still living on the fringes of urban areas, are marginalised from economic and societal prospects. In addition, structural unemployment challenges persist, coupled with relatively low levels of informal economic activity, given the youthful demographic structure of South Africa perpetuating energy poverty that reinforced economic exclusion.

To address electricity access and affordability, the South African government developed two energy subsidy policies: the Free Basic Electricity subsidy in 2003, and the Free Basic Alternative Energy subsidy in 2007.[29] However, both subsidies are now oudated and do not reflect the current reality of energy poverty needs in the country.[30]

23 Eskom, 'Restoring trust'.
24 Eskom,"Eskom factor 2.0," 2018, https://www.eskom.co.za/wp-content/uploads/2021/02/Eskom_Factor_2.0.pdf.
25 Nthabiseng Mohlakoana and Peter Wolpe, A just energy transition to facilitate household energy access and alleviate energy poverty, Trade and Industrial Policy Strategies Policy Brief (5), 2021, https://www.tips.org.za/policy-briefs/item/4199-a-just-energy-transition-to-facilitate-household-energy-access-and-alleviate-energy-poverty.
26 Abigail Knox, Jiska de Groot and Nthabiseng Mohlakoana, "Post-apartheid Spatial Inequalities and the Built Environment: Drivers of Energy Vulnerability for the Urban Poor in South Africa," in *Energy Poverty and Vulnerability: A Global Perspective*, ed. Neil Simcock et al., London, Routledge, 19.
27 Mohlakoana and Wolpe, 'A just energy transition'.
28 Knox et al., 'Post-apartheid spatial inequalities'.
29 Mohlakoana and Wolpe, A just energy transition.
30 Mohlakoana and Wolpe, A just energy transition.

Tackling energy poverty and improving access to energy constitutes a crucial element in realising a fair shift toward an economy and society that are low in carbon emissions and resilient to climate changes. Nonetheless, this issue is frequently not given sufficient consideration. Despite worldwide accords and ambitious goals to eliminate poverty and guarantee widespread access to sustainable energy, the endeavour of eradicating poverty, including energy poverty, remains demanding in the Global South.

Employment impacts of decarbonising

Climate change is among the world's most complex contemporary political challenges.[31] Although decarbonisation generates a worldwide common benefit (alongside beneficial local side effects like decreased air pollution), it centralises expenses within sectors heavily reliant on fossil fuels and intensive energy use. This situation results in resistance from labour unions and private enterprises, as the international obligations to confront the climate crisis have compelled numerous nations to pledge emission reductions and establish strategies for climate change alleviation.[32] This commonly involves a plan for the gradual discontinuation of coal usage, a process that is presently under way on both a local scale in South Africa and across the world. As a result, countries are adopting JT policies to compensate communities that are negatively impacted by decarbonisation.[33]

Issues related to JT have significant resonance in developing nations due to their reliance on coal, which is often the most affordable and locally accessible energy source for electricity generation.[34] Consequently, the closure of coal mines could potentially lead to substantial costs for specific communities. It can be argued that, given technological advancements, workers in declining sectors (eg, coal) might be expected to transition to emerging industries (eg, renewables). However, unlike developed countries where the renewable sector has rapidly progressed and its employment impacts are visible, renewable energy industries in developing nations are still in their early stages. Therefore, the expectation that workers from fossil fuel sectors will swiftly find employment opportunities in renewables is not feasible.[35]

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31 Michaël Aklin, Matto Mildenberger, "Prisoners of the Wrong Dilemma: Why Distributive Conflict, Not Collective Action, Characterizes the Politics of Climate Change," *Global Environmental Politics* 20(4), 2020, 4–27, doi: ttps://doi.org/10.1162/glep_a_00578.

32 Nthabiseng Mohlakoana et al., *Varieties of Just Transition: Climate Policy and Coal Communities in South Africa*, World Development Working Paper, 2023.

33 Dimitris Stevis and Romain Felli, "Green Transitions, Just Transitions," Kurswechsel, 3, 2016, 35–45; Parrish Bergquist, Matto Mildenberger and Leah Stokes, Combining Climate, Economic, and Social Policy Builds Public Policy Support for Climate Action in the US, Environmental Research letters, 15(5), 2020, doi: 10.1088/1748-9326/ab81c1.

34 Sandeep Pai et al., "Solar Has Greater Techno-economic Resource Suitability than Wind for Replacing Coal Mining Jobs," *Environmental Research Letters*, 15(3), 2020, doi: 10.1088/1748-9326/ab6c6d; Peter Glynn, Andrzej Błachowicz and Mark Nicholls, Incorporating Just Transitions Strategies in Developing Country Nationally Determined Contributions, Climate Strategies, 2020, https://climatestrategies.org/wp-content/uploads/2020/03/CS_Just-Transition-NDCs-report_web.pdf; Ayobami Solomon Oyewo, "Just Transition Towards Defossilised Energy Systems for Developing Economies: A Case Study of Ethiopia," *Renewable Energy*, 176, 2021, 346–365, doi: https://doi.org/10.1016/j.renene.2021.05.029; Nikhar Gaikwad, Federica Genovese and Dustin Tingley, "Creating Climate Coalitions Mass Preferences for Compensating Vulnerability in the World's Two Largest Democracies," *American Political Science Review*, 116 (4), 2022, 1165–1183, doi: https://doi.org/10.1017/S0003055422000223.

35 Mark Swilling, Josephine Musango and Jeremy Wakeford, "Developmental States and Sustainability Transitions: Prospects of a Just Transition in South Africa," *Journal of Environmental Policy & Planning*, 18(5), 2016, 650–672.

Furthermore, many developing countries are grappling with high unemployment rates and widespread poverty due to growing populations. Since mining jobs often offer relatively higher wages, particularly in the private sector, shutting down coal mines without a clear and secure pathway for alternative employment could trigger social unrest.

CHAPTER 3

Development challenges and opportunities

The previous arguments presented in this report come together in the current moment in South Africa's just energy transition. As South Africa's energy system is on the brink of collapse, the world sees South Africa's JETP-IP as a major pioneering breakthrough. It matters deeply how government policy supports the just energy transition investment plan, and how institutions interrogate it, to secure more equitable outcomes.

As South Africa's energy system is on the brink of collapse, the world sees South Africa's JETP-IP as a major pioneering breakthrough. It matters deeply how government policy supports the just energy transition investment plan, and how institutions interrogate it, to secure more equitable outcomes

As noted, there are four distinct JET narratives around which potential pathways and energy futures could be catalysed. A fifth narrative emerges on the periphery of the JET conversation and is contradictory to it in many ways: 'A right to develop, ie., development without decarbonisation.' This narrative is supported by many arguing for the right to rapid socio-economic development without the restrictions imposed by global climate targets. The five alternative energy futures and the associated pathways are pivotal and require introspection and review, namely: 1) the role of the REIPPPP; 2) the aim for renewables-led industrialisation; 3) the importance of the grid; 4) the role of municipalities; and 5) the role of finance.

REIPPPP

The initiation of the REIPPPP presents alternative energy prospects for South Africa, highlighting how these potentials can be shaped through policies and how they are contested, endorsed and undermined by different entrenched political and economic interests.[36] South Africa has implemented one of the most intricate systems to ensure that local economies reap benefits from renewable investments and manufacturing regulations governing local content. Guidelines stipulate that a portion of turnover and profits must be reinvested within the local region for the establishment of a renewable energy

36 Lucy Baker, Peter Newell and Jon Phillips, "The Political Economy of Energy Transitions: The Case of South Africa," *New political economy*, 19(6), 2014, 791–818, doi: http://dx.doi.org/10.1080/13563467.2013.849674.

facility. Consequently, the cumulative socio-economic development spending in local communities has amounted to ZAR1.3 billion since 2011. By June 2018, the expenditure on local content had reached ZAR42.1 billion, resulting in the creation of 55,217 jobs for the construction of slightly over 5GW of installed energy generation capacity.

Although the REIPPPP has been hailed internationally as a success, the programme and its progress cannot be separated from South Africa's highly politicised energy landscape, resulting in challenges for the country's inclusion of renewable energy. Baker, Shen and Ayele note that 'the programme took place in a political and economic climate that has long witnessed strong ideological opposition to private ownership and the introduction of foreign companies.'[37] The stalling of the REIPPPP between 2015 and 2018 is one expression of this context that was also tied up with the wider political struggles during former president Jacob Zuma's leadership. The State Capture report, released in November 2016 by the Public Protector, outlined the high levels of corruption, bribery, misuse of public funds and the capture of South Africa's state-owned enterprises with the goal of extracting rents from the state during the Zuma presidency.[38] Eskom was a central feature of this state capture. Former president Thabo Mbeki's 2004 State of the Nation Address highlighted a shift in national development policy, stating that SOEs would play a bigger role in the new investment led strategy.[39] It situated Eskom and other SOEs as drivers of redistribution, growth and global expansion. Under the Zuma presidency, the driver of South Africa's goals of socio-economic development and economic transformation shifted from the economy to the state and 'specifically to SOEs that outsourced massive industrial contracts to private sector service providers.' Thus, Eskom, Transnet, South African Airforce and other SOEs were positioned as vehicles for economic change.

The contested nature of South Africa's energy futures and the role of renewables is expressed in the controversial nuclear deal with Russia, which was found to be unlawful by the Western Cape High Court in 2017.[40] The IRP 2011 included a 9,6GW nuclear programme in a period of drastically decreasing renewable energy prices and increasing energy insecurity in the country. Although the REIPPPP had been launched and successfully attracted foreign investment and combined economic development with energy infrastructure, Zuma continued to pursue the nuclear deal with Russia. In 2014, after a meeting with Russian officials, he signed a nuclear procurement deal.[41] Bhorat states that 'alternative energy futures are at the heart of the South Africa political crisis'.[42] The intergovernmental agreements signed between South Africa and Russia, laying the foundation for trade, cooperation and exchange of nuclear technology and procurement

37 Baker et al., *Governing Procurement*, 5.

38 Nina Callaghan, Robyn Foley and Mark Swilling, eds., Anatomy of State Capture, Stellenbosch, SUN Press, 2021.

39 Eskom, "Building Capacity Embracing the Future, Annual Report 2005," 2005, https://www.eskom.co.za/heritage/wp-content/uploads/2021/10/2004-2005-Annual-Report.pdf.

40 "High Court Rule SA Nuclear Deal Unlawful and Unconstitutional," Lindsay Dentlinger, *EWN*, 2017, https://ewn.co.za/2017/04/26/western-cape-high-court-rules-sa-nuclear-deal-unlawful-and-unconstitutional.

41 Brian Levy et al., "South Africa: When Strong Institutions and Massive Inequalities Collide," Paper, Carnegie Endowment for International Peace, 2021, https://carnegieendowment.org/2021/03/18/south-africa-when-strong-institutions-and-massive-inequalities-collide-pub-84063.

42 Bhorat et al., "Betrayal of the Promise," 17.

of the 9,6GW, exemplify this statement.[43] Including nuclear in South Africa's energy planning policy (IRP) did not align with economic rationale by adhering to least cost planning in the long term. In 2016, the CSIR reported that over the life cycle, the price of renewable energy was 62c/KwH, with coal at ZAR1.03-ZAR1.20/KwH, while nuclear was ZAR1.30/KwH over the life cycle[44]. The lack of economic rationale for the nuclear deal highlights the importance of political power structures as well as international relationships in South Africa's energy futures.

A further example of the contested and politicised nature of South Africa's energy futures is the stagnation of the REIPPPP between 2015 and 2018. Eskom enacted strategies of resistance, including refusing to sign the required Power Purchase Agreements from Bid Window 4, arguing that the utility would lose the renewable energy purchased from Independent Power Producers (IPPs) as surplus capacity was available from the utility's own generation.[45] The combination of this resistance to the REIPPP and slow energy policy, which the IRP 2011 envisioned as a 'living document', was updated once in 2019 and is outdated. This has contributed to the continuation of South Africa's coal based energy system.

A significant shift occurred with the election of Cyril Ramaphosa as President and the appointment of Jeff Radebe as Minister of Energy, marking a change in political leadership. In 2019, after the national elections, the Ministry of Mineral Resources and Energy had been established under Gwede Mantashe. Radebe's prior role was as a Minister in the Presidency, where he supervised the National Planning Commission and played a part in initiating a nationwide consultation process on pathways toward a just transition in South Africa. In April 2018, Radebe resolved the long-standing inertia by signing the pending Power Purchase Agreements that had been in limbo since the 2015 bid rounds. Later the same year, he also mentioned the potential for an additional bid round. Beyond the absence of consistent policy for the REIPPPP, this period of disturbance and postponement triggered a broader nationwide dialogue about the country's energy future, encompassing suitable mechanisms for procuring renewable energy and the necessity for contemporary and forward-looking energy policies.[46]

In the wake of the pivotal address by President Ramaphosa in July 2022, the sought-after generation capacity in Bid Window 6 of the REIPPPP surged from 2.6GW to 5.2GW. The government initiates a bid window outlining the amount of renewable energy it aims to acquire, and the IPPs then respond with their proposals. To be eligible, they require approval from Eskom, confirming that their proposed utility-scale facilities can connect to the energy grid and that Eskom will purchase the energy. In exchange, the government offers sovereign guarantees to facilitate the release of loan funds. However, the challenge

43 Department of Energy Annual Report 2015/2016, Republic of South Africa, 2016, https://www.energy.gov.za/files/annual%20reports/doe-annual-report-2015-16.pdf.

44 Bhorat et al., "Betrayal of the Promise."

45 Baker et al., *Governing Procurement*.

46 Chantal Naidoo, "Transitioning South Africa's Finance System Towards Sustainability", in, *Sustainability Transitions in South Africa*, ed., Najma Mohamed, London, Routledge, 2019, 23.

lies in the fact that after numerous years of neglected investment and insufficient coordination in grid planning and the siting of renewable projects, the Eskom grid has limited capacity to accommodate added load and to manage the transmission of various energy sources effectively.

Eskom stated its requirement to allocate ZAR 130 billion within the next five years to address this issue and a considerably higher amount thereafter. To the surprise of many within the energy domain, the Minister of Mineral Resources and Energy in South Africa revealed just five approved bidders, collectively amounting to a mere 860MW, a figure that could potentially increase to 1GW if negotiations with a sixth qualifying project yield positive results. The underlying cause for this unsatisfactory outcome lies in the limited grid capacity available for all the potentially viable projects that are effectively in competition with private IPPs within the non-REIPPPP commercial and industrial sector.

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Renewable energy-led industrialisation

The influence on supplementary manufacturing and service enterprises that will gain advantages from regulations on local content requirements, as outlined in procurement tender procedures and contracts, includes areas like transportation, repairs and maintenance. These strict regulations mandate developers to secure up to 60% of overall infrastructure projects from local firms.

Envision an annual investment of ZAR 50 billion to construct solar and wind farms, allocating a minimum of half of this amount for local expenditures on components, turbines, solar panels, electronic devices, transportation, repair, maintenance services and more. According to wind turbine developer Iwecon in the Western Cape, it is feasible to construct 2.5MW turbines using 80% of inputs obtained within South Africa. Consequently, the positioning of solar and wind farms could impact the economies of the regions where these facilities are established and the value chains of industrial and service sectors connected to them.

Hence, the crucial strategic inquiry pertains to two considerations: 1) the source of renewable energy, such as the optimal positioning of wind and solar farms, and 2) the locations of current and future demands concerning factors such as access to raw materials, skilled

workforce, manufacture resources and the target market. The crucial link between these considerations is energy storage, due to the intermittent nature of supply in renewable sources. The Renewable Energy Development Zones (REDZ) provide a general response to this inquiry – however, the actual intricacies hold the significance. The prioritisation of specific REDZ and the proactive actions of local stakeholders hold genuine importance. Effective foresighted economic planning at the local, regional and provincial levels, spearheaded by capable institutions will be of paramount importance.

Industrialisation, which is primarily associated with upstream manufacturing industries, is desirable because of its ability to create jobs and induce a positive knock-on effect on surrounding businesses through local economy stimulation.[47] The industrialisation of South Africa's renewable energy sector has primarily been centred around the use of ambitious local content requirements in the REIPPPP roll-out to catalyse upstream industries.[48] The emergence of manufacturing companies has been minimal however, with only one wind tower manufacturer currently established in the local wind energy industry.[49] The use of localisation measures to catalyse and protect nascent industries has therefore been at the centre of the renewable energy industrialisation discourse in South Africa.

The efficacy of local content requirements and the limited effects they have garnered in South Africa's renewable energy sector has been analysed extensively in literature.[50] The prioritisation of price over economic development criteria has been one aspect that has been highlighted,[51] another being the lack of coherent policy design and implementation.[52] Different renewal energy industry stakeholders have also expressed their views on the use of localisation policies. Critics have pointed out some of the pitfalls, such as the higher input costs associated with protected industries.[53] The prioritisation of increasing

47 Michael Peneder and Gerhard Streicher, "De-industrialisation and Comparative Advantage in the Global Value Chain," *Economic Systems Research*, 30(1), 2018, 85–104; Eric Evans Osei Opoku and Isabel Kit-Min Yan, "Industrialization as Driver of Sustainable Economic Growth in Africa," *Journal of International Trade and Economic Development*, 28(1), 2018, 30–56.

48 Christopher Ettmayr and Hendrik Lloyd, "Local Content Requirements and the Impact on The South African Renewable Energy Sector: A Survey-based Analysis," *South African Journal of Economic and Management Sciences*, 20(1), 2017, 1–11.

49 Thomas Hebo Larsen and Ulrich Elmer Hansen, "Sustainable Industrialization in Africa: The Localization of Wind-turbine Component Production in South Africa," *Innovation and Development*, 12 (2), 2020: 198–208; Mike Morris et al., Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The Political Economy Dynamics Driving a Stuttering Localisation Process.. PRISM Working Paper Series 2020-3, University of Cape Town, South Africa, 2020.

50 Lucy Baker, "Technology Development in South Africa: The Case of Wind and Solar PV," SWPS 2016-05, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2745973; Lucy Baker and Benjamin Sovacool, "The Political Economy of Technological Capabilities and Global Production Networks in South Africa's Wind and Solar Photovoltaic (PV) Industries,," *Political Geography*, 60, 2017, 1–12; James Leigland and Anton Eberhard, "Localisation Barriers to Trade: The Case of South Africa's Renewable Energy Independent Power Program," *Development Southern Africa*, 35(4), 2018, 569–588; Tyler Matsuo and Tobias Schmidt, "Managing tradeoffs in green industrial policies: The role of renewable energy policy design," *World Development*, 122, 2019, 11–26; Mike Morris et al., Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The Political Economy Dynamics Driving a Stuttering Localisation Process. PRISM Working Paper Series 2020-3, University of Cape Town, South Africa, 2020, Mark Swilling et al., "Linking the Energy Transition and Economic Development: A Framework for Analysis of Energy Transitions in the Global South," *Energy Research & Social Science*, 90, 2022.

51 Matsuo and Schmidt, 'Managing tradeoffs'.

52 Morris et al., 'Energy and Industrial Policy'.

53 Center for Development and Enterprise, The Siren Song of Localisation – Why Localisation Policy Will Not Lead to Industrialisation (2021), https://www.cde.org.za/wp-content/uploads/2021/11/The-siren-song-of-localisation-6-2021.pdf.

energy security to protect existing industries has also been emphasised,[54] as the current energy shortage stunts the productive capacity of the overall economy. The capability of the local industrial base to fully leverage the benefits of the renewable energy sector needs is also a point of contention.

On the other hand, industrial policy and the involvement of the state have been identified by many authors as key enablers of economic transformation,[55] which is a requirement for a JET. Many stakeholders in the JET discourse have also called for a more state-facilitated process to ensure that benefits of the growing renewable energy sector are distributed more evenly through the stimulation of more industries and job creation.[56] Examples of such initiatives are:

- Trade and investments within BRICS countries could be included to connect the global financial flows to South Africa's energy system;[57]
- China's global domination of renewable energy technology trade will influence South Africa's green industrialisation plan rendering the renewable energy-led industrialisation plan to doom before it commences; and
- Green hydrogen as a driver of renewable energy-industrialisation could be a possible opportunity for South Africa's industrialisation goals, due to its natural resource abundance. It is ideally suited to support the increased energy demand from developed countries.

The grid, the bad & the ugly: South Africa's grid

Most of South Africa's coal fleet (and its transmission network) is located in the province of Mpumalanga in the north-eastern part of the country (Figure 4). However, the solar and wind potential is concentrated in the north-west. This disconnect – between where future resources will come from and where the current infrastructure exists – needs to be addressed as soon as possible.

The adoption of renewable energy technology is also dependent on Eskom and its ability to maintain transmission lines. A study recently found that building a national transmission network would be cheaper than adding storage options to those areas that are not

54 Intellidex, "Localisation: what is realistic?," 2021, https://hub.blsa.org.za/wp-content/uploads/2021/05/Intellidex-Localisation-what-is-realistic-May-2021.pdf.

55 Dani Rodrik, *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*, Oxfordshire, Princeton University Press, 2007; Ernst Aryeetey and Nelipher Moyo, "Industrialisation for Structural Transformation in Africa: Appropriate Roles for the State," *Journal of African Economies*, 12, 2012, 55–85; Swilling et al., "Linking the Energy Transition".

56 Institute for Economic Justice (IEJ), Challenging Privatization, Centring Public Ownership and Decent Work, SAREM policy brief, 2021, https://www.iej.org.za/wp-content/uploads/2021/10/IEJ-policy-brief-SAREM.pdf.

57 'BRICS Bank Raises R1.5 Billion in First South Africa Bond Auction', *NEWS24 Business*, 16 August 2023, https://www.news24.com/fin24/economy/brics-bank-raises-r15-billion-in-first-south-africa-bond-auction-20230816.

connected to the grid.[58] Currently, in South Africa, there are 28,000 km of high voltage lines.[59] According to Ronald Marais, the Strategic Grid Planning Manager from Eskom, significant grid development is still needed each year to help reach the energy goals set forth by the Transmission Development and Integrated Resources plans of South Africa.[60] Per Eskom's Transmissions Development Plan, 4 – 5GW a year of renewable energy needs to be generated and connected to achieve a reliable and secure energy system by 2030.[61] The recent renewable build and connect rate of 0.7GW per year, in combination with the lack of capacity on the transmission grid for new connections, means that without significant investment in the grid, South Africa's just energy transition is unlikely.[62]

Figure 4 Localities of coal-fired plants and the grid network

Source: ESKOM (2008)

58 John Feffer, "Chinese Fossil Fuel Investments in Africa," *Foreign Policy in Focus*, 2021, https://fpif.org/chinese-fossil-fuel-investments-in-africa/.

59 Thinus Booysen and Arnold Rix, "South Africa's Power Grid is Under Pressure: The How and the Why,," *The Daily Maverick*, 2 November 2021, https://www.dailymaverick.co.za/article/2021-11-02-south-africas-power-grid-is-under-pressure-the-how-and-the-why/.

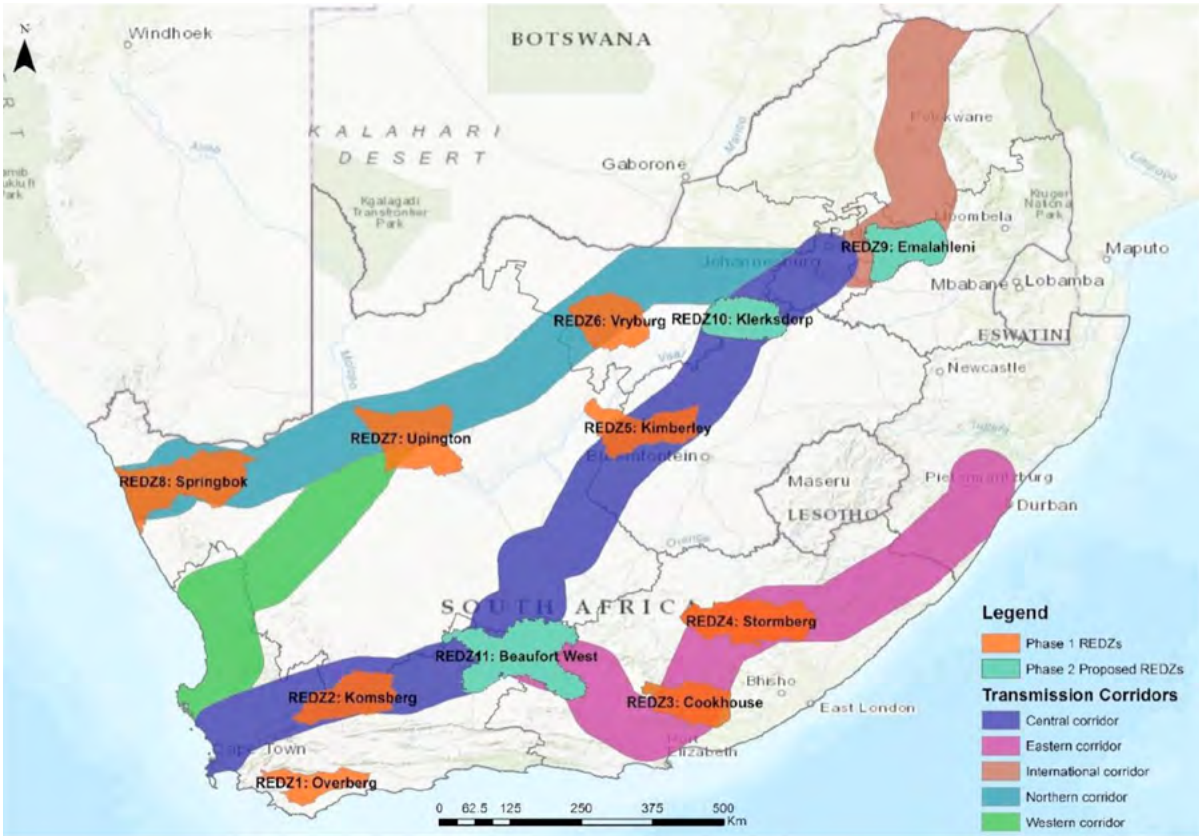
60 Ronald Marais, Grid Reliability: Challenges & Opportunities, Solar Power Africa, 2022, https://solarpowerafrica.za.messefrankfurt.com/content/dam/messefrankfurt-southafrica/solar-power-africa/2022-speaker-presentations/Ronald%20Marais%20Presentation%20Breakaway%20Session%2011.pdf.

61 Mark Swilling et al., *Better Finance, Better Grid: Mobilising Capital to Scale Transmission Grid Capacity in South Africa to Improve Energy Security, Create Jobs and Support Inclusive Growth*, 2023, https://static1.squarespace.com/static/5acdc066c258b4bd2d15050b/t/6425731d09043f38826fb465/1680175974621/Better+Finance+Better+Grid.pdf.

62 Swilling et al., '*Better Finance*'.

There is a consensus that bureaucratic hurdles and logistical realities mean that the implementation of infrastructure projects take years to complete; however, efforts have been made to reduce these hurdles. Zones have been identified for renewable energy projects to develop – known as the REDZ.[63] The power corridors should go through the REDZ, which were selected to reduce concerns related to environmental impact and land displacement that could be caused by the construction of these new renewable power plants (Figure 5).[64]

Figure 5 Localities of REDZ and transmission corridors



Source: CSIR, "Additional Renewable Energy Development Zones Proposed for Wind and Solar PV," media release, November 4, 2019, https://www.csir.co.za/renewable-energy-development-zones

REDZ reduce some of the bureaucratic steps IPPs need to undertake before constructing their facilities. Therefore, it is necessary to build the grid in this area otherwise the issue of curtailment will become a big problem in the future. Curtailment results in limiting the output of renewable energy generation, thus negating the use of this precious commodity. The intermittency challenge of renewable energy is a major reason why there needs to be a focus on strengthening the transmission grid system. The lack of sufficient grid capacity

63 CSIR, "Additional Renewable Energy Development Zones Proposed for Wind and Solar PV,' media release November 4, 2019, https://www.csir.co.za/renewable-energy-development-zones.

64 CSIR, "Additional renewable energy".

has already restricted the number of successful bidders for Bid Window 6 of the REIPPPP. While grid constraints have impacted the success of the REIPPPP, there is also a significant impact on the ability to grow future green industrialisation having a negative impact on job creation, as transmission infrastructure has the potential to support green industries such as electric vehicles.[65]

Eskom needs to raise capital to finance the necessary grid expansion, maintenance and upgrades. One way the utility has addressed this has been to seek industry wide support on 'negotiations with private landowners' or securing servitudes in grid constrained areas.[66] Eskom has envisioned ZAR 178 billion to go towards grid development to add and integrate new renewable energy capacity.[67] Unlocking capital to strengthen South Africa's transmission grid is central to addressing the issue of energy security, as well as developmental objectives of low carbon growth and job creation; there is a need to accelerate the grid expansion at unprecedented levels.[68] ZAR 144 billion of this proposed expenditure will be allocated for grid expansion, as a large amount of capital is required to finance the transmission infrastructure. This, in combination with Eskom's debt, necessitates alternative models for financing this infrastructure (ie, off Eskom's balance sheet).[69]

One model that has been successful in emerging markets such as Brazil, Kenya, Peru and India has been the Independent Transmission Projects model.[70] It allows for flexibility, requires few regulatory changes, has the potential to unlock investment, mitigate perceived risk and achieve cost avoidance (between 35–40%). Eskom's familiarity with working with IPPs is beneficial when considering this model, and that it 'allow[s] for different ownership models and control structures by the transmission company.'[71] However, this model does rely on swift movement and collaboration between the institutions in establishing the independent transmission company. The main issue Eskom needs to address is building a transmission grid to the generation source and connecting it with the existing distribution capacities.

65 Swilling et al., Better Finance, Better Grid. "Eskom's R178bn Grid Plan Points to 'Scary' Step Change in Expansionary Capex

66 GreenCape, 2022 Large- Scale Renewable Energy Market Intelligence Report, 57, https://green-cape.co.za/wp-content/uploads/2022/10/RE_MIR_29_3_22_FINAL-3.pdf.

67 Terence Creamer, "Eskom's R178bn Grid Plan Points to 'Scary' Step Change in Expansionary Capex," *Engineering News*, 26 October, 2021, https://www.engineeringnews.co.za/error.php?error=404&al_id=651728.

68 Creamer, "Eskom's R178bn Grid".

69 Swilling et al., *Better Finance, Better Grid*, 8.

70 Swilling et al., *Better Finance, Better Grid*, 9.

71 Swilling et al., *Better Finance, Better Grid*, 9.

CHAPTER 4

The role of key institutions in enabling the JET in South Africa: Municipalities

The South African distribution model and its links to local government finance are currently deeply challenged by increasing embedded generation, load-shedding, Eskom price increases and ageing distribution infrastructure. South African municipalities rely on surpluses generated by electricity sales to fund electricity provision to poor households and to cross-subsidise other services and discount property rates where applicable. This has been an established practice since the early to mid-20th century.[72] Municipalities collectively draw over a quarter of their revenue from the sales of electricity.[73]

The South African distribution model and its links to local government finance are currently deeply challenged by increasing embedded generation, load-shedding, Eskom price increases and ageing distribution infrastructure

The recent raising of the unlicensed embedded generation limit to 100MW – and the subsequent announced removal of the limit completely – have seen the announcement of significant private embedded generation projects by industry and commercial enterprises.[74] This is largely a response to load-shedding, but also the low cost of renewable electricity compared to Eskom or municipal electricity. Eskom price increases have increased the incentive for municipal users to defect or reduce demand from municipal grids.[75] They have also shrunk the margin that municipalities can charge on electricity and reduced the competitiveness of municipal electricity as compared to private embedded generation.

72 Theodore Covary, "A Historical Institutionalist Analysis of the Evolution of South Africa's Municipal Electricity Sector within the Broader Electricity Supply Industry," (PhD diss., University of Cape Town, 2020); Joshua Kirshner et al., "A Regime in the Making? Examining the Geographies of Solar PV Electricity in Southern Africa," *Geoforum*, 103, 2019, 114–125.

73 Government of South Africa, Stats SA, "Statistical release: Financial Census of Municipalities for the year ended 20 June 2021," (Pretoria: Stats SA, 2021), https://www.statssa.gov.za/publications/P9114/P91142021.pdf.

74 Terence Creamer , "Embedded Generation Project Pipeline Stands at 9 GW," *Engineering News*, 28 November, 2022, https://www.engineeringnews.co.za/article/embedded-generation-project-pipeline-stands-at-9-gw-ramaphosa-2022-11-28/.

75 Government of South Africa: Western Cape, Dept of Economic Development and Tourism, "Overview of Municipal Energy Resilience (MER) Initiative WC Energy Workshop," (Cape Town: Western Cape Govt, 2022), https://www.westerncape.gov.za/110green/files/atoms/files/MER%20Overview%20H%20Davies%2027072022_0.pdf.

Load-shedding and underinvestment in municipal distribution infrastructure implies that the grid is in need of renewal and upgrading.[76] The mechanical implications of load-shedding can damage existing frail infrastructure, which is not designed to be switched on and off regularly. This dramatically reduces its life expectancy. Pursuing own embedded generation or wheeling will require municipalities to upgrade their grids to provide connection points for new generators.

The local government financial model is currently overdependent on electricity.[77] To a certain extent this must shift, but the options for alternative revenue sources are limited and not justice-neutral. Some could improve just transition outcomes; some will reduce just transition outcomes. This is as a result of electricity revenue surpluses currently used to compensate loss leader service offerings, and to subsidise low-income households within the electricity service. The options for recovering these revenues elsewhere can be progressive or regressive, depending on the chosen option.

There is an emerging tension between the local government electricity business model and the Eskom distribution strategy. Eskom could alleviate some of the risk in their business model by integrating distribution in some municipalities, particularly heavily indebted ones. Until now, Eskom has been delivering electricity distribution services in municipalities where they have electrified, bypassing the prescribed processes outlined in the Municipal Systems Act for the external provision of a municipal function, specifically, providing electricity.[78] Eskom also seeks to do this with full control of the electricity revenue, eliminating the surplus that municipalities earn through electricity sales. High capability municipalities are thus increasingly seeking to procure electricity from alternative sources. This is especially true in metropolitan areas, which are Eskom's largest municipal customers, and some Western Cape municipalities. They are doing this to ensure customer retention and as a bulwark against load-shedding and rising electricity prices.[79] In the short-term this will assist with load-shedding alleviation; in the long-term it will reduce electricity demand from Eskom.[80]

This combination threatens the weakest municipalities and their residents the most, who could potentially lose electricity revenue and experience declining levels of service. Residents in more capable municipalities will be shielded to some extent from this, creating divergent justice outcomes in the energy transition. That is if current policies remain with specific reference to energy distribution, which is modelled on the early-industrial economic models where infrastructure, supply and control is centralised by the state. However, new patterns of technology adoption are emerging in terms of

76 Government of South Africa, the Presidency, "South Africa's Just Energy Transition Investment Plan (JET IP)", (Pretoria: The Presidency, 2022, https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027.

77 Government of South Africa, The Presidency, "South Africa's Just Energy Transition Investment Plan".

78 Parliamentary Monitoring Group, *Electricity Distribution in South Africa: Departmental and Entity Briefings*, Meeting Summary, (February 21, 2012), https://pmg.org.za/committee-meeting/13967/.

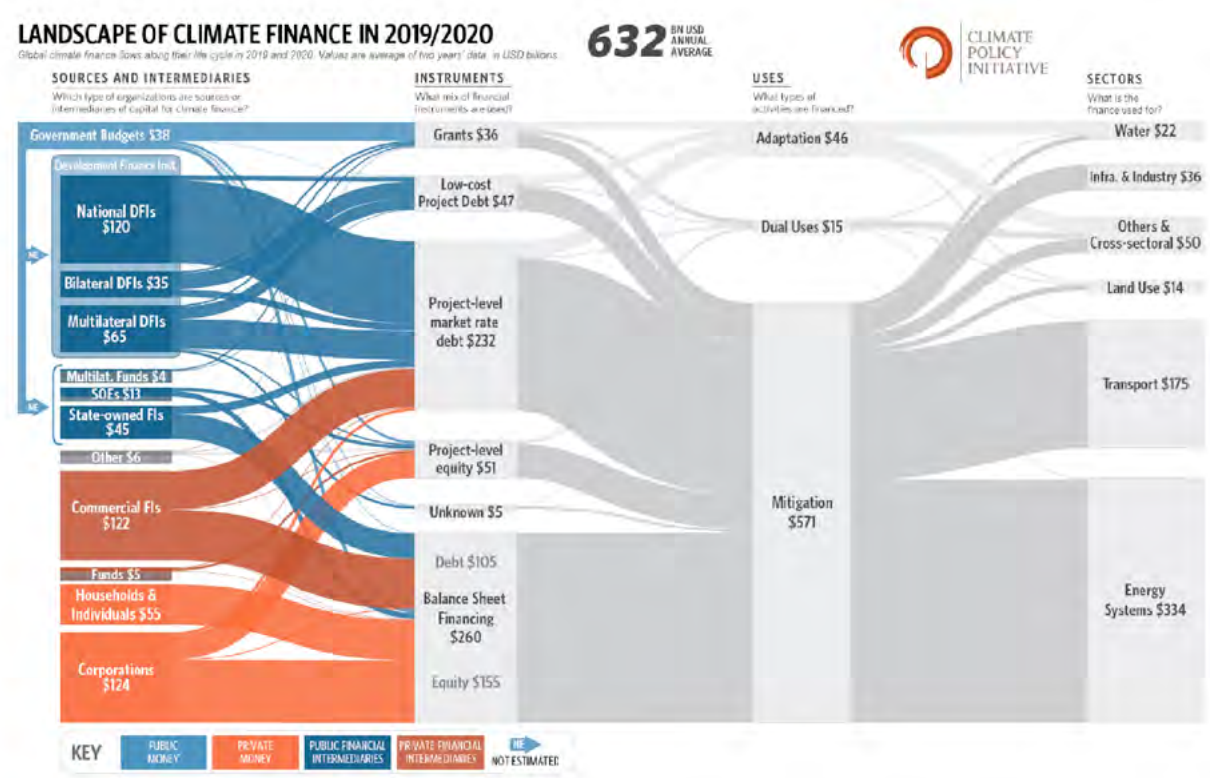
79 City of Ekurhuleni, "Overview of Municipal Energy Resilience (MER) Initiative WC Energy Workshop"; Hendrick Raedani, Ekurhuleni IPP Power Procurement Program (2022), https://www.cityenergy.org.za/wp-content/uploads/2022/06/Ekurhuleni-IPPpower-procurement-programme-pdf.

80 Government of South Africa, The Presidency, "South Africa's Just Energy Transition Investment Plan".

renewables where large-scale production is complemented with small-scale generation and distribution capacities. The pace and scale of technology adoption traditionally outperforms the regulatory environment, and more displacement should be anticipated for municipalities where residents and businesses have increased options to source alternative services. This dynamic broadens the focus from centralised energy generation and distribution capacities through municipalities, to include the roles and choices of citizens and businesses at individual, community or sectoral level. They can influence energy market mechanisms through participation and bottom-up innovation, enabled by regulatory incentives, while navigating towards more just energy outcomes.

The Role of Finance: Climate finance

Figure 6 Landscape of climate finance in 2019/20 ($ billions)



Source: Climate Policy Initiative, Global Landscape of Climate Finance (2021)

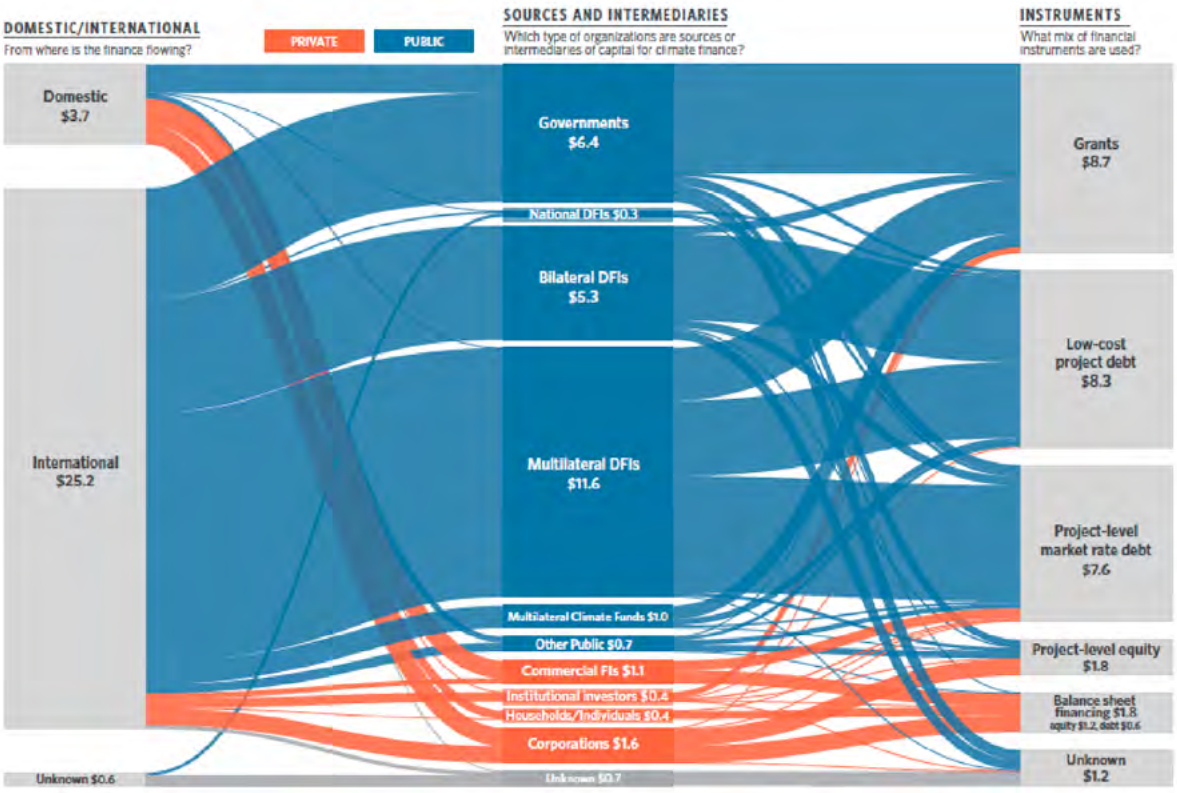
Over the last decade there has been a significant increase in investments in sustainable transitions. Climate finance is the dominant form of sustainable transition financing. According to the Climate Policy Initiative,[81] climate finance reached $632 billion in

81 Climate Policy Initiative, Global Landscape of Climate Finance 2021, (London, 2021), https://www.climatepolicyinitiative.org/wp-content/uploads/2021/10/Full-report-Global-Landscape-of-Climate-Finance-2021.pdf.

2019/20 – an increase from $ 364 billion in 2011/12.[82] Investments came predominantly from private investors ($ 350 billion), and the remaining balance ($282 billion) from public sector investors (see Figure 6). Africa received less than 5% of this funding. While this percentage appears relatively low, it remains significant against the backdrop of Africa's relatively small energy enabled industrial base and consumption levels.

Total investment in adaptation and mitigation in Africa in 2019/20 was $29.5 billion, 84% of which was from international sources (Figure 7). Of this, investment in energy systems in Africa was $9.4 billion, creating a significant deficit against the total amount of $133 billion. South Africa accounted for 12% of the $9.4 billion invested in energy systems. Considering the current energy crisis, the need for investment in South Africa's grid infrastructure, and the issues of electricity affordability and access, there needs to be a concerted effort to reduce this deficit.

Figure 7 Climate finance flows in Africa, 2019/20 ($ billions)



Source: Climate Policy Initiative, Landscape of Climate Finance in Africa (2022)

Following on from the African Industrialisation Summit held in Niger in November 2022, it is necessary to engage in dialogue with key stakeholders to leverage regional strengths in

82 Anis Chowdhury and Mohammad Zulfan Tadjoeddin, 'Financing Green Transformation in Developing Countries', *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement* 0, no. 0 (September 27, 2022): 1–24.

the JET transition to adapt a regional approach to green industrialisation within the context of the African Continental Free Trade Area. Working within its framework and aligned with the African Union Agenda 2063, the aim must be an agreement on a regional approach to enable and capacitate African value chain developments to support green industrialisation and a level of willingness of prospective lenders to finance the projects.

In general, as emphasised by the African Development Bank (AfDB),[83] African governments and financial institutions lack the capacity to aggressively exploit the emerging opportunities that are opening up that could result in rapid increases in investment levels in the JET. It is in this context that African DFIs have a key role to play as creative lead arrangers of the vast array of blended finance solutions that will be required to fund the African JETs.[84] In addition to the AfDB, there are 133 DFIs on the African continent, making up 24.6% of the 571 DFIs in the world.[85] Compared to the requirement of $ 127.8 billion per annum for the continent, the estimated financing gap for the period 2020–2030 based on the assumption that current funding flows will remain constant is $ 99.9 billion.[86]

Transition finance

Transition finance is a relatively new term that has rapidly emerged to deal with a reality that was not previously anticipated. Until recently, there were two primary financial drivers of transition: climate finance that was channeled mainly into mitigation, and divestment from fossil fuels. However, as the landscape pressures have mounted and socio-technical regimes concluded they need to adapt to survive (in particular, the energy and mobility sectors), a range of incumbents emerged with commitments to transition to avoid the threat of collapsing.[87] For obvious reasons, neither climate finance nor divestment was suitable for these incumbents pivoting in response to both landscape pressures and new niche innovations. The upshot was the emergence of the notion of 'transition finance', ie, finance that could be allocated to fossil fuel companies who are transitioning into post-fossil fuel markets. Many energy utilities are moving out of fossil fuels and into renewables fall into this category (eg, Italy's ENEL, South Africa's Eskom). The OECD, EU and the Bank for International Settlements have developed 'taxonomies of sustainable finance' for guiding this kind of transition finance which, in its latest version, includes gas and nuclear as valid post-fossil fuel alternatives.[88] There is now a fierce debate as to whether transition finance

83 African Development Bank Group, African Economic Outlook 2022: Supporting Climate Resilience and a Just Energy Transitions in Africa, https://www.tralac.org/documents/resources/africa/4506-african-economic-outlook-2022-afdb/file.html.

84 McCallum et al., Catalysing the Just Energy Transitions: On the Potential of Development Finance Institutions, Reconfiguring Energy for Social Equity, 2022, http://energyforsocialequity.org/wp-content/uploads/2022/12/Catalysing-the-Just-Energy-Transition-On-the-Potential-of-Development-Finance-Institutions-December-2022.pdf.

85 Xu et al., "What are Public Development Banks and Development Finance Institutions? Qualification Criteria, Stylized Facts and Development Trends," *China Economic Quarterly International*, 1(4), 2021, 271–294.

86 African Development Bank Group, African Economic Outlook 2022, 93.

87 Eva Heiskanen et al., "Incumbent Energy Companies Navigating Energy Transitions: Strategic Action or Bricolage," *Environmental Innovation and Societal Transitions*, 28, 2018, 57–69; Andy Striling, "How Deep is Incumbency? A 'Configuring Fields' Approach to Redistributing and Reorienting Power in Socio-material Change," *Energy Research & Social Science*. 58, 2019, 101239.

88 Torsten Ehlers, Diwen Gao and Frank Packer, A Taxonomy of Sustainable Finance Taxonomies, *BIS Papers*, (118), 2021, https://www.bis.org/publ/bppdf/bispap118.pdf.

really will help drive the sustainability transition, whether it is mere greenwashing to legitimise funding fossil fuel companies, or worse, whether it is a redirection of climate finance into sustaining carbon-intensive industries.[89]

> Many energy utilities are moving out of fossil fuels and into renewables fall into this category (eg, Italy's ENEL, South Africa's Eskom). The OECD, EU and the Bank for International Settlements have developed 'taxonomies of sustainable finance' for guiding this kind of transition finance which, in its latest version, includes gas and nuclear as valid post-fossil fuel alternatives

Just Transition Finance

A new category – 'just transition finance' – has emerged in the last two years. This notion came to the surface at COP26 in Glasgow when n $ 8.5 billion just transition (JT) package was announced to support the South African energy transition. The JETP between the US, UK, France and Germany has catapulted the South African notion of just transition finance onto the global agenda.[90]

The global financial system is not fit-for-purpose when it comes to funding the JT and the JET. This is particularly true with climate-related investments in Africa. Despite substantial global increases in total investments in renewables since the turn of the millennium, only 2% of the $ 2.8 trillion invested in renewables in the two decades since 2000 was invested within Africa. This is despite Africa having the resources to drive an ambitious low-carbon energy transition, including wind, solar, hydro, metal and mineral resources. This situation necessitates the need to rethink the transition finance of the JT by broadening the scope to include energy access and consumption factors when making investment decisions. For example, over 640 million Africans have no access to energy and the per capita energy consumption in sub-Saharan Africa (excluding South Africa) is 180 kWh, compared to 13 000 kWh per capita in the US and 6 500 kWh in Europe.[91] In South Africa, the average energy consumption per capita is 3 300 kWh[92], which is on average six times the value of other Southern African countries, thereby rendering South Africa an attractive country to

89 Chantal Pauline Naidoo, ""Transcending the Interregnum: Exploring How Financial Systems Relate to Sustainability Transition Processes," PhD thesis, (University of Sussex, 2020), http://sro.sussex.ac.uk/id/eprint/92245/1/Naidoo%2C%20Chantal%20Pauline.pdf; Raphael Heffron and Darren McCauley, "The 'Just Transition' Threat to our Energy and Climate 2030 Targets," *Energy Policy*, 165, 2022.

90 Harald Winkler et al., "Just Transition Transaction in South Africa: An Innovative Way to Finance Accelerated Phase-Out of Coal and Fund Social Justice," *Journal of Sustainable Finance & Investment*, 11, 2021, 1–24.

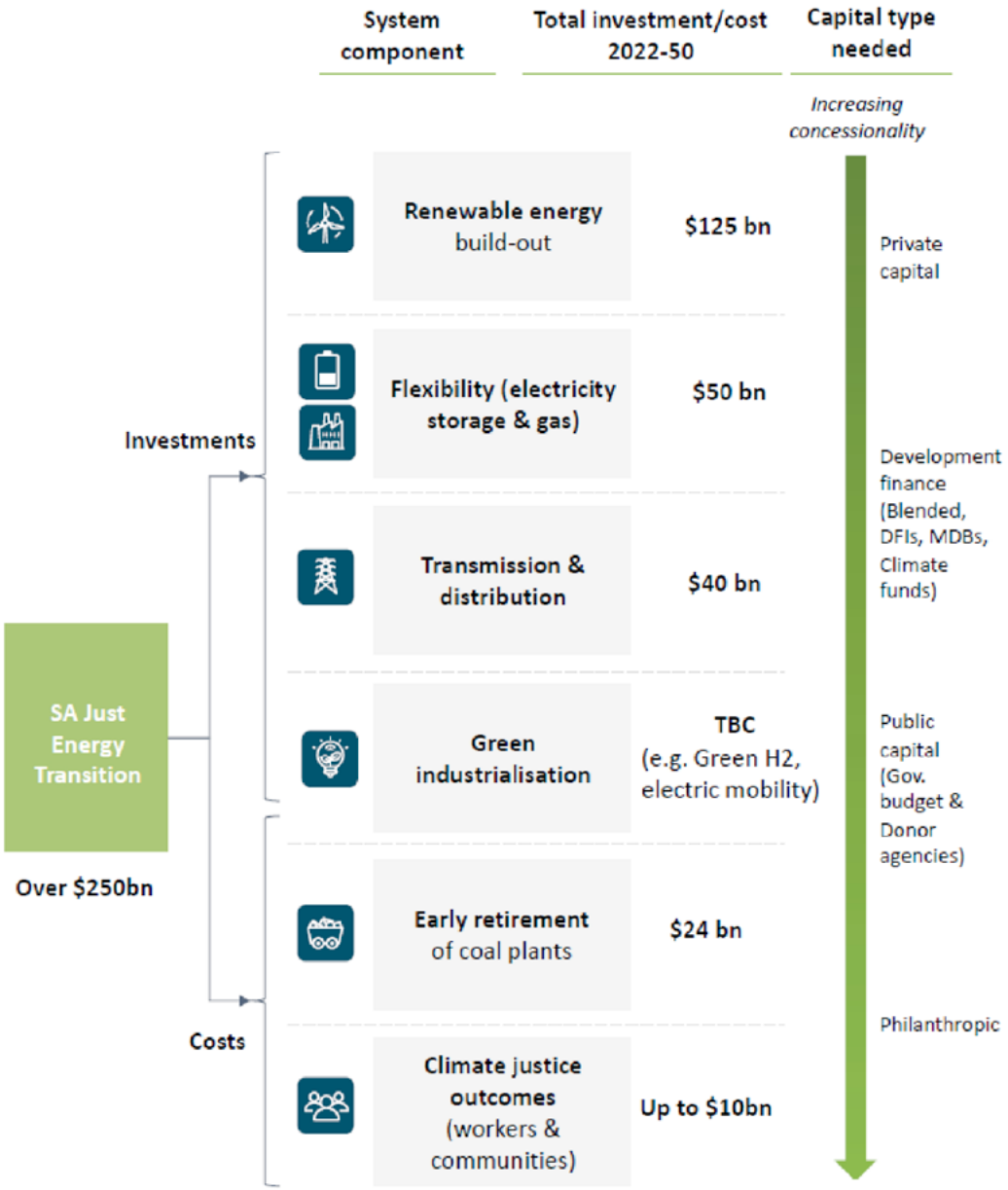
91 African Development Bank, 'Light Up and Power Africa – A New Deal on Energy for Africa', Text, African Development Bank Group – Making a Difference (African Development Bank Group, 7 June 2019), https://www.afdb.org/en/the-high-5/light-up-and-power-africa-%E2%80%93-a-new-deal-on-energy-for-africa.

92 'South Africa Energy Information | Enerdata', August 7, 2023, https://www.enerdata.net/estore/energy-market/south-africa/.

seek opportunities through migration. Therefore, it is in South Africa's interest to support African countries in their quest for energy democracy and security. Access to energy is crucial to the development of African countries and a driver of inclusive growth as it creates opportunities for women, youth and children in urban and rural areas.

South Africa's JET finance needs

Figure 8 Combination of investment in infrastructure required for the JET



Source: South African Blended Finance Taskforce and The Centre for Sustainable Transition, Making Climate Capital work: Unlocking $8.5bn for South Africa's Just Energy Transition, 20 (2022)

In South Africa, it is estimated that the required investment in infrastructure to transition from coal-fired power to renewable energy is over $250 billion.[93] The requirements per component of the energy sector and suggested source of finance are presented in Figure 8.

The JET IP, released in November 2022, estimates that $98.7 billion in investment will be required over the period 2023 to 2027. Investment will be required for specific sectors, namely the electricity sector (70%), new electric vehicles (NEV) (9%) and green hydrogen (GH2) (21%), as illustrated in Table 1.

TABLE 1 INVESTMENT REQUIRED IN DIFFERENT SECTORS ACCORDING TO THE JET IP IN ZAR BILLIONS ($ BILLIONS)

	Electricity	NEV	GH2	Subtotal
Infrastructure	978	83	313	1,374
Planning and implementation capacity	2.14	2	5.5	9.9
Economic diversification and innovation	40.4	43	–	83.4
Social investment and inclusion	9.6	–	–	9.6
Skills development	–	–	2.7	2.7
Subtotal	1,030.4 (68.7)	128 (9)	319 (21)	–
TOTAL				**1,480 (98.7)**

Source: Government of South Africa: The Presidency, "South Africa's Just Energy Transition Investment Plan (JET IP)," 14. https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027

93 Blended Finance Taskforce, Making Climate Capital work: Unlocking $8.5 billion for South Africa's Just Energy Transition, (Blended Finance Taskforce and Centre for Sustainability Transitions, Stellenbosch University), https://www.blendedfinance.earth/making-climate-capital-work.

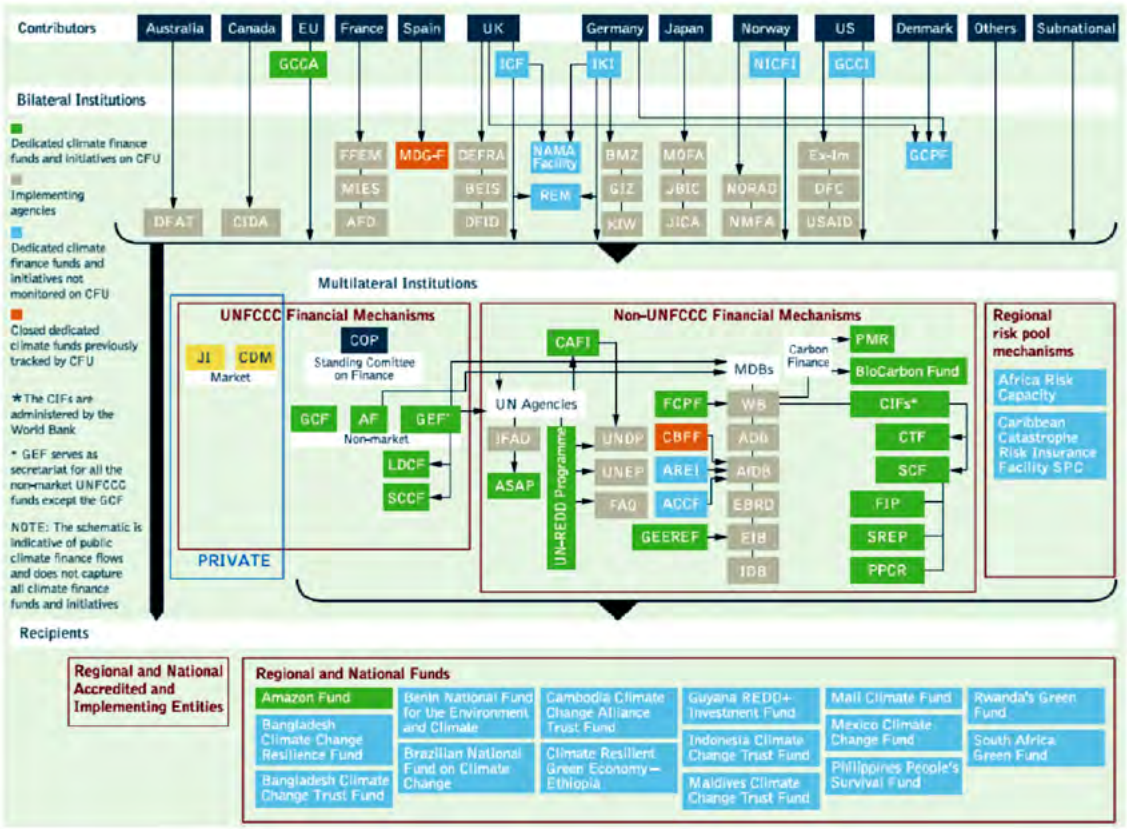
CHAPTER 5

Potential sources of finance for SA's JET

International finance

The global funding system is complex, however, three main funding channels exist: bilateral development assistance institutions, multilateral climate funds, and regional or national funds (Figure 9).

Figure 9 Global climate finance architecture



Note: CFU is Climate Funds Update. COP is Conference of the Parties. MDBs are multilateral development banks. SPC is Segregated Portfolio Company. UNFCCC is the UN Framework Convention on Climate Change.

Source: The Global Climate Finance Architecture, Climate Finance Fundamentals, (2022)

African regional finance

It is a mistake to only look to the international community to fund Africa's JETs. To date, most African governments have assumed that loan finance must be sourced from developed countries, specifically China and oil-rich countries. This means borrowing and repaying in foreign denominations, and that foreign banks must create the credit lines required by

African countries. However, there is no reason why African banks cannot do the same. With an appropriate reconfiguration of the regulatory framework governing the relationships between African central banks, DFIs and private banks (to achieve climate resilience as recommended by the Bank for International Settlements[94]), the bulk of the debt required to achieve African NDCs could be sourced from African financial institutions. This will contribute to the reversal of the decades-long outward flow of financial resources.

The AfDB has provided a rich landscape of financing options that African governments can consider, including green finance, carbon markets, debt-for-climate swaps, climate-linked debt, reallocation of special drawing rights in Africa's favour, natural capital accounting, areas of new domestic finance and increased private sector participation.[95]

Domestic finance

In general, the world of finance has shifted from the traditional split between public and private funding to what is now referred to as 'blended finance'. In this new world of blended finance, DFIs (ie, government-owned banks) including those in South Africa, will play a key role as the lead arrangers of these complex blended finance packages. Instead of 'bankers of last resort' – as was the case during the pre-2007 years – they have become 'bankers of first resort', in an environment where blended finance means appropriately allocating risk in ways that maximises the availability of capital from public and private sources to achieve publicly agreed and beneficial 'missions'.[96]

Domestic blended finance

Various new blended finance vehicles are becoming increasingly viable, including:

- green banks;
- national climate funds;
- sustainability-oriented sovereign wealth funds;
- national infrastructure funds (as in South Africa);
- special funding interventions by central banks to support infrastructure and climate resilience;
- regulations to force pension funds to invest in national infrastructure; and
- increasingly innovative blended finance initiatives led by private financial institutions and DFIs.

94 Bolton et al., *The Green Swan: Central Banking and Financial Stability in the Age of Climate Change*, Bank for International Settlements, 2020, https://www.researchgate.net/publication/340578881_The_green_swan_Central_banking_and_financial_stability_in_the_age_of_climate_change#fullTextFileContent.

95 African Development Bank Group, African Economic Outlook 2022, 107.

96 Mariana Mazzucato and Caetano Penna, The Rise of Mission-oriented State Investment Banks: The Cases of Germany's KfW and Brazil's BNDES, Working paper Series, SWPSA 2015–2016, https://core.ac.uk/download/pdf/42579564.pdf.

Domestic public finance

DFIs play a pivotal role as significant financial players in facilitating the shift from fossil fuel-based energy generation to renewable energy sources. Their contributions are essential in fostering technological advancements, promoting knowledge dissemination, and financing renewable energy and energy efficiency projects.[97] The JET IP highlights the importance of South African DFIs, both to leverage domestic private sector investment and to raise capital on international capital markets. The Development Bank of Southern Africa has invested approximately ZAR 80 million to establish the IPP Office and have invested a further ZAR 18 billion in 25 REIPPPP projects in South Africa as at the end of 2022.[98] The Industrial Development Corporation (IDC)'s investments (current and pipeline) are estimated at ZAR 36.8 billion.[99]

DFIs play a pivotal role as significant financial players in facilitating the shift from fossil fuel-based energy generation to renewable energy sources. The JET IP highlights the importance of South African DFIs, both to leverage domestic private sector investment and to raise capital on international capital markets

Domestic private finance

The JET IP notes that blended finance must be 'significantly expanded' and suggests a target of ZAR 500 billion (64% of funding targets) to be funded by the private sector specifically for investment in renewable energy (solar and wind), repurposing of coal plants, value chain investments in NEVs and project development and infrastructure in green hydrogen.[100] The Climate Policy Initiative and the Climate Finance Accelerator concur that private finance, including domestic private capital, must be catalysed to finance the just energy transition in South Africa.[101] Private capital accounts for about 50% of climate finance globally. In Africa, private capital accounts for only 14% of climate finance on the continent.

South Africa has a distinctive advantage in utilising private domestic resources to fund its equitable energy transition. The country possesses a substantial amount of approximately

97 Anna Geddes and Tobias Schmidt, "Integrating Finance into the Multi-level Perspective: Technology Niche-finance Regime Interactions and Financial Policy Interventions," Research policy, 49 (6), 2020, 103987.
98 "Energy," Development Bank of Southern Africa, https://www.dbsa.org/sectors/energy.
99 Government of South Africa, The Presidency, "South Africa's Just Energy Transition," 125.
100 Government of South Africa, The Presidency, "South Africa's Just Energy Transition Investment Plan," 123.
101 National Business Initiative, Climate Finance Accelerator South Africa, https://www.nbi.org.za/the-cfa-programme/#:~:text=The%20Climate%20Finance%20Accelerator%20(CFA)%20is%20a%20global%20technical%20assistance,climate%20projects%20to%20access%20finance.

ZAR 2.3 trillion managed within pension funds, with an estimated ZAR 2 trillion being overseen by the Public Investment Corporation. The growth of assets under management in pension funds has experienced a remarkable surge of 637% between 2002 and 2019.[102] There is an opportunity for a portion of pension funds' assets to be used to invest in energy and other infrastructure development by means of project bonds issued by either the public or private sector. Institutional investors are familiar with fixed income asset investment, such as bonds, and therefore may be more willing to invest in such financial instruments.[103]

If just 5% of South African pension fund assets were deployed to energy infrastructure, this would equate to approximately ZAR 130 billion. This is more or less equivalent to the political commitment of $8 billion made to South Africa at COP26. If 7.5% of pension fund assets were deployed for infrastructure investment, this would equate to an estimated ZAR 172,5 billion.

Such a solution would require pension fund reforms both in terms of what may be invested in by institutional investors, defined in terms of Regulation 28[104] in South Africa, and governance reforms, as are cited by asset managers. Asset managers generally agree that pension fund assets may be invested in productive assets in respect of energy and other infrastructure development. A nationally respected asset manager has noted that the utilisation of a portion of pension fund assets to fund infrastructure is 'better than going to the [IMF] for a bailout' but must be implemented in such a way to provide for 'risk controlling mechanisms and independent monitoring.'[105] Good governance is a non-negotiable enabler of this type of financing model.

A further mechanism is the Green Outcomes Fund, which was developed in collaboration between the Jobs Fund, Rand Merchant Bank, WWF, the Bertha Centre and GreenCape. Innovation is a key for finding solutions to climate challenges, and this requires finance. The Green Outcomes Fund is 'a first of its kind climate finance structure, designed to incentivise local South African fund managers to use new approaches and financing models to target high potential and fast-growing [small, medium and micro enterprises] operating in South Africa's green economy.'[106]

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102 'Assets of Pension Funds in South Africa 2020', Statista, accessed July 21, 2023, https://www.statista.com/statistics/421641/pension-funds-assets-south-africa/.

103 Katja Juvonen, Arun Kumar, Hassen Ben Ayed and Antonie Ocaña Marin, Unleashing the Potential of Institutional Investors in Africa, Working Paper Series N° 325, African Development Bank, Abidjan, Côte d'Ivoire, 2019, https://www.afdb.org/sites/default/files/documents/publications/wps_no_325_unleashing_the_potential_of_institutional_investors_in_africa_c_rv1.pdf.

104 Government of South Africa, National Treasury, Final Amendments to Regulation 28 of the Pension Funds Act, (Pretoria: National Treasury 2022), https://www.gov.za/speeches/treasury-publishes-final-amendments-regulation-28-pension-funds-act-5-jul-2022-0000.

105 Aiphus Kgosana and Asha Speckman, "ANC Eyes R6 trillion Controlled by Asset Managers as a Better Option than a Bailout," *Business Live*, August 2019, https://www.businesslive.co.za/bt/business-and-economy/2019-08-18-divert-pensions-to-stave-off-imf/.

106 GOF, 'Pioneering a Climate Finance Instrument in Africa: Lessons from Two Years of the Green Outcomes Fund' (South Africa: The Green Outcomes Fund, January 2022), 9, https://thegreenoutcomesfund.co.za/pioneering-a-climate-finance-instrument-in-africa-lessons-from-two-years-of-the-green-outcomes-fund/. GOF, 9.

CHAPTER 6

Conclusion and recommendations

South Africa's entangled energy crisis stems from a range of factors, including ill-advised policy choices, governance failures, increased corruption and criminality, as well as changing contextual factors in the global energy markets and regulatory environment. The country faces significant systemic challenges – and achieving socio-economic and ecological change requires bold political, economic, technological and cultural transformations.

The interconnections that exist between the natural environment, society and deeply rooted systems of inequality, provide the view that the geopolitical energy nexus can be described as a complex adaptive system. This allows global and local policymakers to anticipate and respond to the complexities of the transitioning world, through strategic actions that capture the emerging benefits of the multipolar world. Systemic risks are not contained by geographic boundaries; therefore, the international dynamics at play in the JT, the state of energy on the African continent, and how the South African JET IP emerged, necessitates the need for a strategic and balanced approach. The South African energy context highlights multifaceted issues cutting over economic, environmental and geopolitical dimensions. The research accentuates a series of implications that require action today, shaping the energy transition for current and future generations.

Undoubtedly, the recent intertwined global crises have highlighted the need for policymakers to embrace both uncertainty and complexity to navigate the changing landscapes of energy, geopolitics and the geopolitical-energy nexus. African countries must navigate this uncertainty critically. The research suggests that policymakers should consider alternative framings to inform the geopolitical energy future to shape a stable, resilient and inclusive domestic energy-economy that is competitive and provides energy security in the global context. The culmination of these research findings ushers in a call to action that resonates with urgency and promise. This report recommends a multi-faceted strategy that embraces the tenets of a JET:

1 Invest, mitigate and coordinate grid planning capacities and infrastructure to cater for renewable energy sources and variations in energy mixes. The grid expansion should be flexible to include multiple energy exchanges to balance demand and supply.

2 Increase and invest in state-facilitated processes to ensure that benefits of the growing renewable energy sector are distributed more evenly through the stimulation of more industries and job creation, in support of renewable energy industrialisation expansion.

3 Leverage technology advancements to transition from centralised energy generation and distribution capacities through municipalities to include the roles and choices of citizens and businesses at the individual, community and sectoral levels.

4 Enable pension fund reforms so that fund assets may be invested in productive assets in respect of energy and other infrastructure development.

These priorities hold central that South Africa – a key player in the energy transition – should assert its interests, promote energy democracy, and leverage regional partnerships to drive transformative change. Addressing power imbalances, embracing diverse perspectives and prioritising intergenerational fairness are crucial in shaping just and equitable energy futures.

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