



HEINRICH BÖLL STIFTUNG



Global Development Policy Center



Centre for  
Sustainable Finance

SOAS University of London

DEBT RELIEF FOR GREEN AND  
INCLUSIVE RECOVERY PROJECT

# Debt for Climate Opportunities in South Africa

Background Paper #5

December 2020

# Debt for Climate Opportunities in South Africa

## The Role of Concessional Finance in Unlocking the Country's Energy Transition

By Emily Tyler, Celeste Renaud, and Adam Roff

Published by Heinrich Böll Foundation, Center for Sustainable Finance (SOAS, University of London), and Global Development Policy Center (Boston University) as Background Paper to the Debt Relief for Green and Inclusive Recovery Project

### Contents

Abbreviations	3
Short Summary	4
Executive Summary	6
1 Introduction	10
2 South Africa in 2020, Post Covid-19	11
3 A Transition to Renewable Energy: The Most Attractive Techno-economic Option	16
4 Institutional, Political, and Regulatory Barriers	19
5 The Role of Debt-for-Climate Initiatives to Support a Just Transition in South Africa	21
6 How Would a DCI Support the Just Transition?	26
7 Insights from the South African Case and Issues for Further Exploration	30
8 Conclusion	34
References	36
Authors' Bio	39

# Abbreviations

CSIR	Centre for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DFI	development finance institution
DMRE	Department of Mineral Resources and Energy
DPE	Department of Public Enterprises
GDP	gross domestic product
Gt	gigaton
GW	gigawatt
IEEFA	Institute for Energy Economics and Financial Analysis
IMF	International Monetary Fund
IRP	Integrated Resource Plan
RMI	Rocky Mountain Institute
SOE	state-owned entity
UNFCCC	United Nations Framework Convention on Climate Change
WEF	World Economic Forum

Disclaimer: This background paper is a content contribution to the discussions of the Debt Relief for Green and Inclusive Recovery Project. The views expressed are those of the authors alone and do not reflect the views of the Debt Relief for Green and Inclusive Recovery Project: Heinrich-Böll-Stiftung, the Center for Sustainable Finance (SOAS, University of London), or the Global Development Policy Center (Boston University).  
Corresponding author: Emily Tyler, <https://meridianeconomics.co.za/>.

# Short Summary

South Africa's economy, which was already in a precarious state before Covid-2019, has been tipped into full blown crisis by the pandemic. Gross national government debt – at 63.5% of gross domestic product (GDP) in FY2019/20 – is expected to be upwards of 86% within two years. Eskom, which is the country's state-owned monopolistic and vertically integrated electricity utility, is a key driver of this escalating debt profile and lies at the heart of the economy's structural challenges.

Eskom is facing unprecedented financial, operational, and technological challenges, including: a failing coal fleet (which generates 85% of its electricity); a carbon and local pollutant profile that is rapidly becoming intolerable to society; an outdated sector model; constraining policy and regulatory environments; revenue shortfalls and the early stages of a utility death spiral; together with a ballooning debt burden of R480 billion (US\$27.9bn). In total, 77.2% of this debt is government-guaranteed, and a significant portion is stranded and cannot be serviced. Over the next three years, Eskom's projected debt maturity profile will total R224 billion (US\$13bn), but accessing funding to refinance maturing debt is increasingly difficult. South Africa's National Treasury has committed to a 10-year bailout programme totalling R230 billion (US\$13.4bn) to assist. If this is removed due to fiscal affordability, Eskom's debt will be immediately unserviceable. As shareholder and guarantor, Eskom's risk profile is automatically transferred to the sovereign, impacting the sovereign credit rating and increasing South Africa's borrowing costs.

Simultaneously, South Africa has a significant and immediate opportunity to pivot its carbon-intensive power sector towards low-carbon energy. Work by Meridian Economics and the Centre for Scientific and Industrial Research (CSIR, 2020; Roff et al., 2020) finds that cost is no longer a barrier to decreasing the carbon emissions of South Africa's electricity system by up to 1.5 gigatons (Gt) through an ambitious renewables rollout. A strategically managed, ambitious renewables rollout will trigger large-scale green industrialisation, providing a sustainable economic stimulus for South Africa's ailing economy. Although such a build programme is commercially financeable, given the country's superior renewables resources and mature financing sector, the lack of a credible and clear vision and policy commitment for the electricity sector – together with a stable market and system operator (product of an unbundled Eskom) – are constraining the realisation of this opportunity.

An important political aspect of the South African electricity crisis is the need for a just transition away from coal. Most of South Africa's coal mining and power-related activities are concentrated in Mpumalanga province, which hosts 12 of Eskom's 15 power stations and a large share of the country's coal mines. This has a severe impact on air quality and the health of local populations, but a transition from coal will result in significant disruption in Mpumalanga, putting livelihoods at stake. There is a need to support the retraining

and retiring of the coal workforce, together with the creation of alternative employment opportunities in the Mpumalanga area. An ambitious rollout of renewables creates the foundation for this just transition. The targeted localisation of renewable energy industrial activities and a portion of renewable energy build can feasibly be managed for Mpumalanga, supporting the absorption of workers from the declining coal industry and stimulating opportunities in value-chain activities related to a new, greener local economy. In addition, a just transition enhances the local environmental and health benefits of phasing out coal-fired power.

The Majuba Power Station operated by Eskom is South Africa's second largest coal-fired power plant.



# Executive Summary

South Africa's economy, which was already in a precarious state before Covid-19, has been tipped into full blown crisis by the pandemic. Gross national government debt – at 63.5% of gross domestic product (GDP) in FY2019/20 – is expected to be upwards of 86% within two years. Eskom, which is the country's state-owned monopolistic and vertically integrated electricity utility, is a key driver of this escalating debt profile and lies at the heart of the economy's structural challenges.

This South African case, which is based on Meridian Economics' «Just Transition Transaction» concept (Meridian Economics, 2020), argues that there is a clear role for Debt-for-Climate Initiatives (DCIs) – together with other innovative financing mechanisms in the green space – to enable and support a just transition and contribute towards overcoming political, institutional, and other barriers in such countries.

Eskom is facing unprecedented financial, operational, and technological challenges, including: a failing coal fleet (which generates 85% of its electricity); a carbon and local pollutant profile that is rapidly becoming intolerable to society; an outdated sector model; constraining policy and regulatory environments; revenue shortfalls and the early stages of a utility death spiral; together with a ballooning debt burden of R480bn (US\$27.9bn). In total, 77.2% of this debt is government-guaranteed, and a significant portion is stranded and cannot be serviced. Over the next three years, Eskom's projected debt maturity profile will total R224bn (US\$13bn), but accessing funding to refinance maturing debt is increasingly difficult. South Africa's National Treasury has committed to a 10-year bailout programme totalling R230bn (US\$13.4bn) to assist. If this is removed due to fiscal affordability, Eskom's debt will be immediately unserviceable. As shareholder and guarantor, Eskom's risk profile is automatically transferred to the sovereign, impacting the sovereign credit rating and increasing South Africa's borrowing costs.

Simultaneously, South Africa has a significant and immediate opportunity to pivot its carbon-intensive electricity sector towards low-carbon energy. Work by Meridian Economics and the Centre for Scientific and Industrial Research (CSIR, 2020; Roff et al., 2020) finds that cost is no longer a barrier to decreasing the carbon intensity of South Africa's electricity system, as lower emissions scenarios have lower overall system costs than the current policy trajectory. Furthermore, an ambitious renewables programme – ramping up to a sustained expansion rate of 5 gigawatts (GW) per year of renewable energy in 2025 and which removes all coal off the system by 2040 – increases the overall power system cost by little more than 2%. In addition to reducing more the 1.5 Gt of carbon emissions, this build offers more investment and job opportunities than the current policy trajectory. A strategically managed, ambitious renewables rollout will trigger large-scale green industrialisation, providing a sustainable economic stimulus for South Africa's ailing economy. Although such a build programme is commercially financeable, given the country's superior

renewables resources and mature financing sector, the lack of a credible and clear vision and policy commitment for the electricity sector – together with a stable market and system operator (product of an unbundled Eskom) – are constraining the realisation of this opportunity.

An important political aspect of the South African electricity crisis is the need for a just transition away from coal. Most of South Africa’s coal mining and power-related activities are concentrated in Mpumalanga province, which hosts 12 of Eskom’s 15 power stations and a large share of the country’s coal mines. This has a severe impact on air quality and the health of local populations, but a transition from coal will result in significant disruption in Mpumalanga, putting livelihoods at stake. There is a need to support the retraining and retiring of the coal workforce, together with the creation of alternative employment opportunities in the Mpumalanga area. An ambitious rollout of renewables creates the foundation for this just transition. The targeted localisation of renewable energy industrial activities and a portion of renewable energy build can feasibly be managed for Mpumalanga, supporting the absorption of workers from the declining coal industry and stimulating opportunities in value-chain activities related to a new, greener local economy. In addition, a just transition enhances the local environmental and health benefits of phasing out coal-fired power.

A DCI is a mechanism that aims to provide comprehensive debt relief, restructuring, or standstill for countries to generate fiscal space to pursue climate objectives with enduring impact (Volz et al., 2020). Although South Africa’s sovereign debt position is rapidly worsening, it is not yet facing liquidity or solvency issues. However, Eskom’s escalating debt burden poses an enormous risk to the national fiscus. A DCI could play a role in pivoting a dysfunctional, carbon-intensive electricity sector towards sustainability by unlocking some of the political, institutional, and regulatory barriers to South Africa’s energy transition, staving off an impending sovereign debt crisis and catalysing a just transition.

Over the past few years, Meridian Economics<sup>[1]</sup> has conceptualised and incubated a climate finance transaction – the Just Transition Transaction – for the South African electricity sector (Meridian Economics, 2020). This transaction has similarities with the concept of DCIs, and therefore it provides fertile ground for drawing implications and insights on the use of DCIs for energy transitions in emerging economies.

**1** See <http://www.meridianeconomics.co.za>.

Based on this experience, the authors argue that a DCI could credibly be employed in the South African context to do one or more of the following:

1. Assist Eskom financially, with corresponding positive impacts on the fiscus. This would enable Eskom to return to the capital markets at better rates, reduce the utility's current debt service costs, assist in addressing its legacy (and unserviceable) debt, and provide medium-term cash flow relief for Eskom.
2. Enable Eskom to participate in the renewables build by providing additional capital, therefore addressing labour's concerns.
3. Raise dedicated, secure financing for ensuring a just transition for communities and coal workers.
4. Use the «just transition» conditionalities of a DCI to form the basis of a credible and clear policy vision for the electricity sector.

The overall objective of any DCI for the South African electricity sector would be to contribute towards a credible and clear policy vision for the sector. At the heart of any DCI would be a set of just transition commitments (decarbonisation and social) and remedies to ensure the delivery of these as the exchange for the relief/concession. In South Africa, commitments would likely include the sovereign or Eskom's commitment to a sizeable, achievable reduction of greenhouse gas emissions from the generation of grid-delivered power for the period of the funding programme; policy and regulatory reforms; the unbundling of Eskom; and provision for a just transition for the Mpumalanga coal workers and communities. Remedies to ensure delivery of the climate and social commitments and provide comfort to debtholders could comprise performance incentives such as conditions contingent on milestones that must be achieved before funds are released; punitive adjustments to terms such as interest rates and tenor if targets are missed; or beneficial adjustments if targets are exceeded. Carbon-based remedies could include guarantees on the DCI's effective abatement cost in US\$/ton, or of the mitigation itself.

The case yields insights and issues for further exploration. The value of DCIs in an emerging economics with legacy fossil fuel infrastructure and a state-owned monopoly utility is affirmed. The case suggests that either the sovereign or the state-owned entity could be the domestic counterparty for the DCI. The size and timing of the DCI are significant issues, so too the ability to cluster a number of DCIs and other «green» or climate financing instruments under one framework (the Just Transition Transaction uses blended finance to achieve this). Such an approach then raises the question of allocating the environmental and social benefits among debtholders. Commitment and remedy metrics are complex, each with its own advantages and disadvantages. The Just Transition Transaction is situated squarely in the United Nations Framework Convention on Climate Change's climate finance architecture, and the case suggests that there are significant synergies of this space for DCIs to explore.



Challenges to DCIs in the South Africa case include the country's sensitivity to anything perceived as sovereign interference, the practicalities of stepping outside a development finance institution's «use-of-proceeds» funding framework in the green space, avoiding triggering pari passu constraints when working at an entity level, and devising credible and robust governance structures.

Orlando Power Station is a decommissioned coal-fired power station in Soweto, South Africa.



# 1 Introduction

The pace of energy transitions in middle-income countries such as China, India, and Indonesia will determine whether the world meets its Paris Agreement target of limiting temperature rise to «well below two degrees». This South African case, which is based on Meridian Economics' Just Transition Transaction concept (Meridian Economics, 2020), suggests that Debt-for-Climate Initiatives (DCIs) are likely to play a valuable role in enabling and supporting a just transition by contributing towards overcoming political, institutional, and other barriers in such countries.

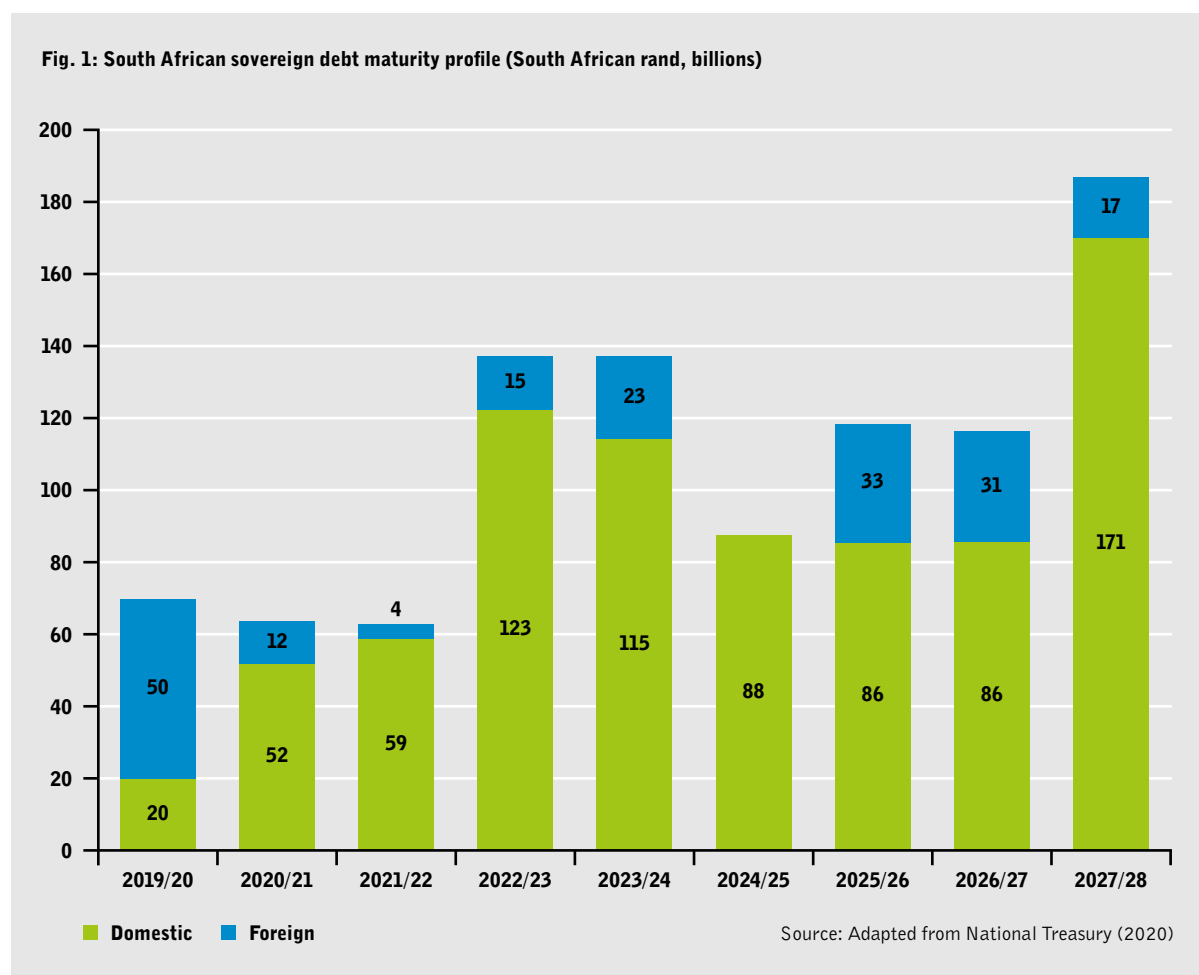
The paper proceeds by setting out pertinent aspects of the South African context and the key role of its electricity sector in contributing to the country's worsening debt profile. That an ambitious renewable energy build programme is the most attractive techno-economic trajectory for the sector going forward – with significant social benefits – is argued on the basis of system modelling. However, significant political, institutional, and regulatory barriers still remain for South Africa as it embarks on this path, regardless of pace.

Within this context, there is an opportunity for DCI-type transactions to enable and support the emergence of a credible and clear policy vision for the electricity sector that is aligned with a just transition. The second half of the paper explores what DCIs might look like in this space, offering insights and identifying challenges raised by Meridian's work on the Just Transition Transaction to date.

## 2 South Africa in 2020, Post Covid-19

### The sovereign debt position

South Africa is classified by the World Bank (n.d.) as a middle-income country with a well-developed infrastructure base but high levels of inequality and poverty. Today, the country is facing near unprecedented economic challenges. After years of stagnant growth, a deteriorating fiscal position, and the precarious finances of its state-owned entities (SOEs), Moody's joined other ratings agencies in downgrading South Africa to sub-investment grade in March 2020. Subsequently, the Covid-19 pandemic and its containment measures have had a devastating economic impact, leading to a forecasted domestic revenue shortfall of over R300 billion (US\$17.4bn)[2] (IMF, 2020). Unemployment levels, which reached a 17-year high just before the 2020 lockdown, have surged due to millions of additional jobs being lost this year.



2 Average exchange rate for August 2020 was 17.2315 ZAR/US\$ (Nedbank, 2020).

Fiscal debt levels have grown exponentially, and Covid-19 has tipped this into a full-blown debt crisis. Gross national government debt is projected to rise from 63.5% of GDP in FY2019/20 to 81.8% of GDP in FY2020/21. By the end of FY2022/23, gross loan debt is expected to be 86% of GDP; without containment measures, it may spiral beyond 140% (National Treasury, 2020). Debt-service costs are expected to reach 5.4% of GDP in FY2022/23. Over the next three years, roughly R200 billion (US\$11.6 bn) of sovereign debt is scheduled for redemption (Figure 1).

## Climate change and emissions

South Africa's energy generation infrastructure is predominantly coal-based, comprising 85% of the country's electricity generation (Eskom, 2019a). South Africa is now the world's 13th biggest greenhouse gas emitter, with per capita emissions of 9.8 tCO<sub>2</sub>e (DEA, 2019), and Eskom is responsible for 42% of South Africa's greenhouse gas emissions (Eskom, 2019a).

The country has committed to an absolute «peak, plateau, and decline» emissions trajectory in its Nationally Determined Contribution under the Paris Agreement. It has agreed to enhance this ambition, which at present is deemed largely inconsistent with Paris Agreement goals,<sup>[3]</sup> by COP26 in 2021 (Ramaphosa, 2019). Most of South Africa's coal mining and power-related activities are concentrated in Mpumalanga province, which hosts 12 of Eskom's 15 power stations and a large share of the country's coal mines. This has severe impacts on air quality and the health of local populations (Gray, 2019).

## The critical role and current dysfunction of the electricity sector

South Africa's electricity sector is at the heart of the country's current economic and fiscal crisis. Eskom is facing unprecedented financial, operational, and technological challenges. Its business model is unsustainable, evidenced by the necessity for a 10-year R230 billion (US\$13.4 bn) fiscal bailout.

Revenue growth potential is limited, as falling demand and grid defection are being accelerated by increased tariffs – the classic «utility death spiral». Eskom has a ballooning debt burden of R480 billion (US\$27.9 bn) – 77.2% of which is government-guaranteed (National Treasury, 2020) – and a portion of which is stranded and cannot be serviced. Eskom has

**3** South Africa's NDC is classified «highly insufficient» by Climate Action Tracker: <https://climateactiontracker.org/countries/south-africa/>.

been forced to fund its long-term assets with increasingly short-term debt. This escalating debt burden poses a significant risk to the economy. Over the next three years, Eskom’s projected debt maturity profile will total R224 billion (US\$13 bn), but accessing funding to refinance maturing debt is increasingly difficult (Eskom, 2019b). The Treasury has committed to a 10-year bailout programme to assist Eskom’s ability to service its debt. If this is removed due to fiscal affordability, Eskom’s debt will be immediately unserviceable.

The key sources of Eskom’s debt are bonds in both domestic and foreign markets. They are held by the private sector, local and international development finance institutions (DFIs) – including the World Bank and the New Development Bank – and export credit agencies (Eskom, 2020; Resare, 2020); see table in Figure 2. Figure 2 below is publicly available information on Eskom’s debt composition drawn from the utility’s 2020/21 annual financial statements (Eskom, 2020: 85). Around 40% of borrowings are denominated in foreign currency (Eskom, 2020, 86–87). Although there is no full clarity on the individual terms in Figure 2, Eskom bonds, commercial paper, coupon bonds, floating rate notes, and other loans are denominated in South African rand, whereas foreign bonds, export credit facilities, and 55% of DFI borrowings are denominated in foreign currencies, including euros and US dollars.

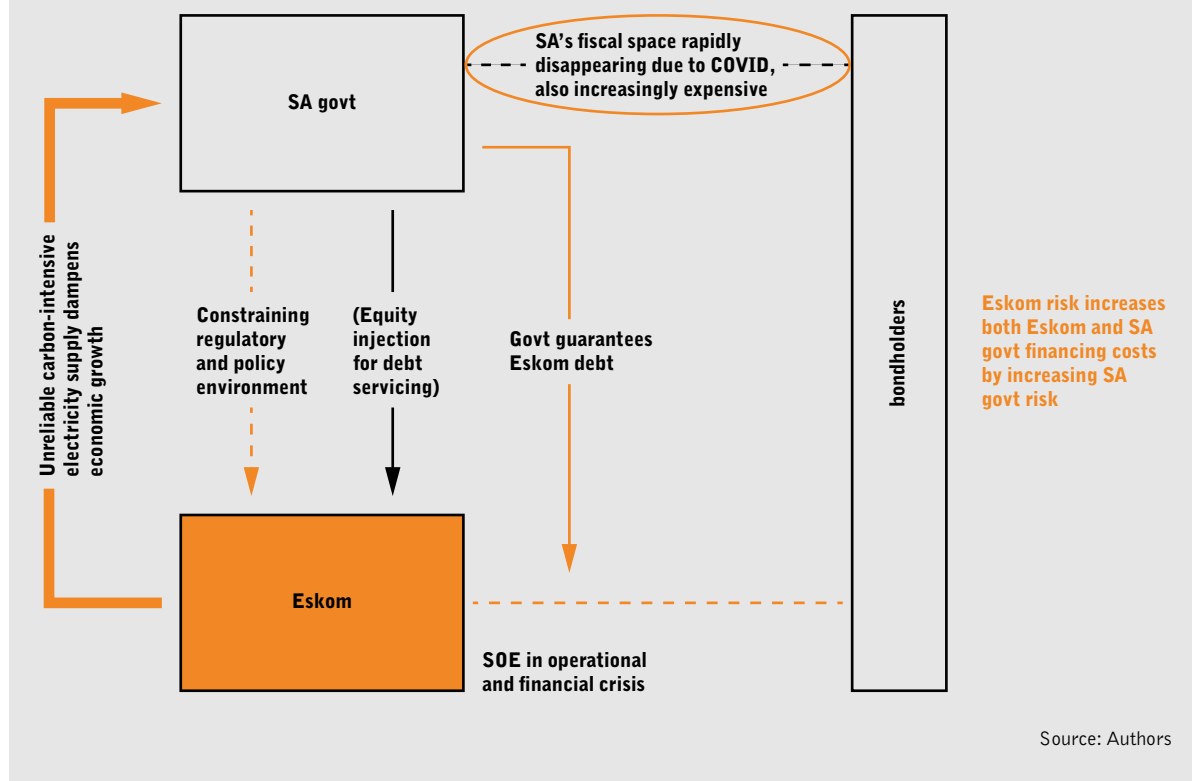
Figure 2: The composition of Eskom’s debt (South African rand, millions)

<b>Debt securities and borrowings</b>	<b>2020 Rm</b>
Eskom bonds	157037 Rm
Commercial paper	5444 Rm
Eurorand zero coupon bonds	4964 Rm
Foreign bonds	98563 Rm
Development financing institutions	154489 Rm
Export credit facilities	32746 Rm
Floating rate notes	4046 Rm
Other loans	26393 Rm
<b>Total</b>	<b>483682 Rm</b>

Source: Eskom (2020: 85)

As shareholder and guarantor, the sovereign is exposed to both Eskom’s current operational and financial risk. Eskom’s risk profile is thus automatically transferred to the government, impacting the sovereign credit rating and, in turn, increasing South Africa’s borrowing costs (see Figure 3).

**Fig. 3: Eskom is a sovereign credit risk, increasing the cost of sovereign debt**  
 Eskom risk increases both Eskom and SA gov't financing costs by increasing SA gov't risk



In addition to Eskom’s financial woes, operationally, the coal fleet requires expensive refurbishment and environmental retrofitting to comply with South Africa’s Air Quality Act (2004). Coal fuel costs are escalating, and the cost of running power stations is becoming more expensive. An ageing fleet and inadequate maintenance mean lower than expected energy availability factor, with coal units frequently going offline for emergency maintenance. This has resulted in an energy supply deficit and chronic load-shedding – even as the economy remains suppressed under the Covid-19 lockdown. Furthermore, the National Energy Regulator of South Africa has exacerbated Eskom’s financial predicament with irrational regulatory decisions that are driving the revenue shortfalls (Creamer, 2020).

As a regulated monopoly, Eskom is unable to respond to the disruptive changes that the global electricity supply is undergoing. The Department of Public Enterprise’s 2019 Eskom Roadmap provides for the unbundling of the utility with an independent transmission entity to provide generators with non-discriminatory access to the grid and new market rules to facilitate rapid investment in least-cost power. However, indecision in the relevant government departments and strong opposition from coal-related interest groups (including labour and capital) have delayed these reforms.

External drivers and complexities of domestic problems render the country a poor 106 out of 115 in the World Economic Forum’s Energy Transition index 2020 (WEF, 2020). Without intervention, South Africa’s energy transition will likely be unmanaged – with

negative implications for development, equality, and the climate. The collapse of an unviable fossil fuel utility will negatively impact the sovereign, making financing more expensive – an increasing portion of the national budget will be allocated to debt servicing and bailouts, and little will remain for a just green transition that supports equitable economic growth.

Eskom and South Africa are not alone in this predicament. The strategies and business models of vertically integrated coal-fired power utilities with heavy state involvement have been fundamentally disrupted by the new market realities of a global energy transition to cheaper, decentralised renewables. This reality – often in combination with years of poor management and a sharp fall in energy demand during the pandemic – has resulted in similar utilities battling to meet operational costs and service debt. For example, Indonesia's Perusahaan Listrik Negara, a state-owned power utility, faces a deepening debt hole of US\$34 billion after years of poor planning, sunk investments, and an aggressive build-up of inflexible payment obligations to independent coal power plants (IEEFA, 2020). India's coal sector, which continues to have heavy state involvement, faces similar difficulties with disruptive cost deflation in renewables and storage, rendering 17% of India's existing coal fleet uncompetitive (RMI, 2020).

### 3 A Transition to Renewable Energy: The Most Attractive Techno-economic Option

South Africa has a significant and immediate opportunity to pivot its carbon-intensive power sector towards low-carbon energy. A recent study by Meridian Economics and the CSIR (Rolf et al., 2020) confirms that cost is no longer a barrier to decreasing the carbon intensity of South Africa's electricity system, and that lower emissions scenarios have lower overall system costs than the current policy trajectory (based on the 2019 Integrated Resource Plan, IRP) (DMRE, 2019). For example, an ambitious renewables programme – ramping up to a sustained expansion rate of 5 GW per year of renewable energy in 2025 (see Figure 4) and which removes all coal off the system by 2040 – increases the overall power system cost by little more than 2% relative to the country's current policy trajectory. Conservative assumptions mean that, in reality, these costs are more likely to be savings. In addition to reducing carbon emissions by more than 1.5 Gt, this build offers more investment and job opportunities than the base case (Meridian Economics, forthcoming). A strategically managed, ambitious renewables rollout will trigger large-scale green industrialisation, providing a substantial and sustained economic stimulus for South Africa's ailing economy.

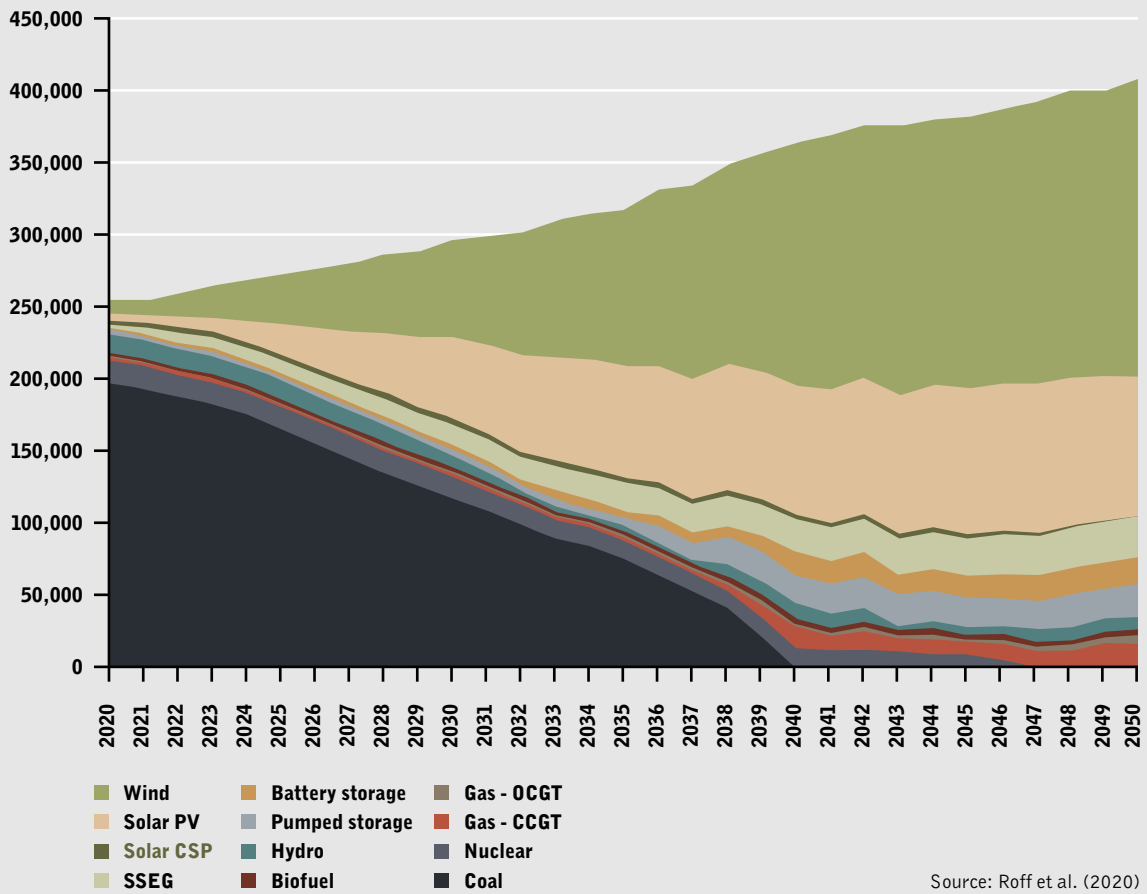
The Meridian/CSIR study explored the relationship between cost and emissions reductions in the South African electricity system. To do this, it modelled the country's least-cost power system scenario for the period 2030–2050 using the current electricity policy trajectory as a baseline for comparison.[4] The study then imposed a series of decreasing carbon budgets (maximum allowable CO<sub>2</sub> emissions) on the least-cost scenario to determine the cost of lowering the power system's carbon emissions. Importantly, the carbon budgets imposed were informed by work to identify an estimated Paris-aligned carbon budget range for South Africa's power sector (Tyler et al., 2020). The cost curve for these decreasing carbon budgets is shown in Figure 5, relative to the cost of the current policy trajectory.

However, these scenarios remained theoretical modelling outcomes. The study then adjusted them for real world constraints to ascertain whether the findings held. Three cost-optimised power system scenarios with specific carbon budgets were developed, taking into account realistic industry build rates and availability of grid transmission infrastructure. The findings held, largely driven by continued cost reductions in renewable energy technologies and South Africa's favourable solar and wind resources.

**4** South Africa's least-cost power system includes no new coal and no new nuclear.



**Fig. 4: Renewable energy build scenario to achieve coal phase down by 2040**  
Annual electricity production (GWh)



**Fig. 5: System cost vs CO<sub>2</sub> emissions for different modelled scenarios**  
The y-axis shows the cost relative to current policy (2020–2050), while the x-axis shows the emissions (Mt) (2020–2050)

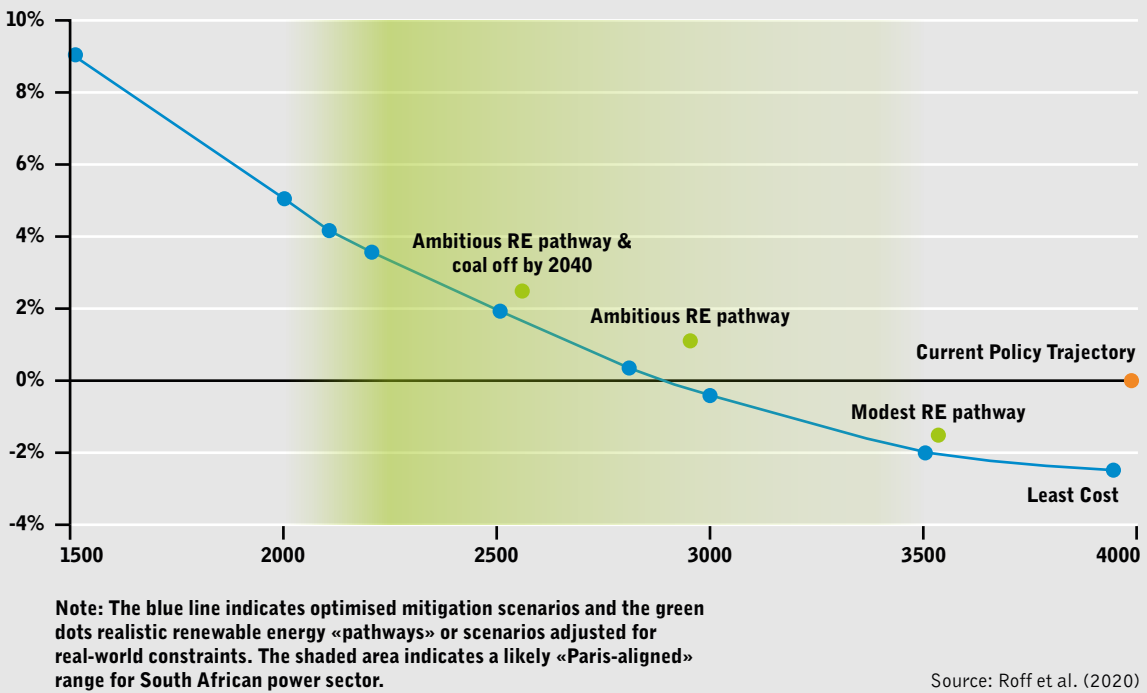
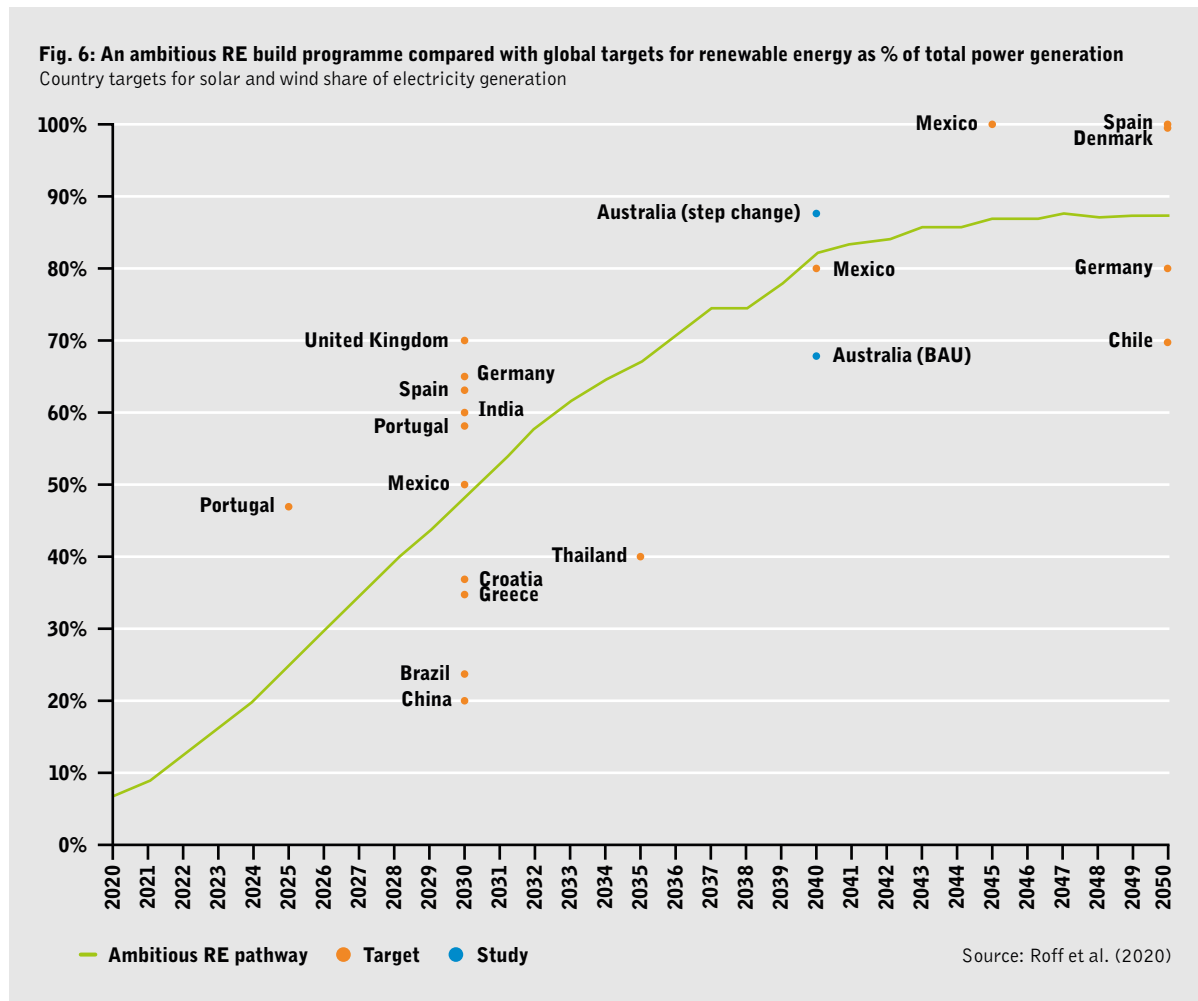


Figure 6 below shows the renewables build rate in the «Ambitious RE pathway & coal off by 2040» as being ambitious, even from a global perspective. Nevertheless, according to a parallel study (Renaud et al., 2020), the South African renewable industry is capable of achieving this rate with policy certainty, an enabling regulatory regime, and an alignment of planning efforts with regard to grid expansion. An ambitious energy transition in South Africa is therefore economically and technically feasible – all technologies used in the model are available today, and every scenario had to produce equally reliable power systems to meet consumer demand on a consistent basis throughout the time period.



## 4 Institutional, Political, and Regulatory Barriers

If the techno-economics are favourable towards an ambitious renewables programme that would enable South Africa to achieve its Paris Agreement goals, why is this not prompting the policy certainty required to enable it? Key barriers remain within the institutional, political, and regulatory realms of South Africa's fossil fuel and nuclear dominated political economy of energy.

Despite being a severely weakened coal-fired power utility, Eskom has a critical role to play in South Africa's transition from coal. Power systems will take time to reorient to clean energy. The power systems of the future will look very different to those of the 20th century. A radical alteration is underway, and the lights must be kept on throughout this process to avoid economic and social disruptions on a large scale. In the South African context, even in a highly accelerated transition of removing all coal off the system by 2040 will require a period of two decades. The operational and financial sustainability of coal legacy assets is thus required in South Africa's accelerated transition. Eskom needs to be stabilised to play its part in a way that ensures a rapid and managed phase-down of its coal fleet.

A second institutional barrier is the monopolistic structure of the power sector. Vertically integrated power utility monopolies are in decline globally, as they are ill-suited for the demands of electricity sectors dominated by renewables and storage, where typically plants are far smaller and quicker to come on line than traditional coal, gas, and nuclear plants. Without the benefits of competitive procurement processes, the techno-economic benefits of renewables remain less visible, and the power of the incumbent fossil and nuclear regime holds sway. In South Africa, the intention to move towards an unbundled monopoly at the very least (splitting Eskom into its generation, transmission, and distribution functions) has been official policy since 1998 (DMRE, 1998). There have been recent signs of progress on this in the Department of Public Enterprise's Eskom Roadmap document (DPE, 2019), and with Eskom's compliance and initial «divisionalisation» approach towards a full unbundling.

The regulatory regime is similarly outdated and geared to regulate a coal- and nuclear-based, vertically integrated monopoly. In addition, the regulator – the National Energy Regulator of South Africa – is weak and has made irrational decisions in past years that have contributed to Eskom's financial crisis (Creamer, 2020).

The politics of energy in South Africa are steeped in what is described as the country's «minerals and energy complex» (Fine and Rustomjee, 1996), where coal, nuclear, and gas are long-standing incumbents with strong interests to remain so, and therefore there is resistance towards a transition to renewables. Organised labour is a strong and important

stakeholder in South Africa, and it too is deeply entrenched in the minerals and energy complex. It perceives the public-sector employment offered by Eskom as being preferable to jobs in the emerging private renewables sector.

This picture is further complicated by South Africa's decade of state capture (2008–2018), presided over by President Jacob Zuma (State Capacity Research Project, 2017). In this time, segments of capital and labour were co-opted to enable rent extraction across the economy, but in the electricity sector in particular, it was the key state-owned entity Eskom that was targeted (Eberhard and Godinho, 2017). Vestiges of these corrupt networks remain and are actively resisting a transition to renewables, which are inherently more difficult to extract illegal rents from.

Another potent political factor is the fate of the coal communities in Mpumalanga province. Although these communities do not have a strong voice, their interests are augmented and at times exploited by labour and environmental interests in civil society. A transition from coal will result in significant disruption in Mpumalanga, putting livelihoods at stake.

Clearly, such a complex situation requires multiple responses. The rest of the paper sets out how a DCI can play a significant role in addressing many of the key institutional and political barriers that are preventing the emergence of a vision for a new electricity sector.

## 5 The Role of Debt-for-Climate Initiatives to Support a Just Transition in South Africa

A DCI is a mechanism for providing comprehensive debt relief, restructuring, or standstill to eligible countries to generate fiscal space to pursue climate objectives – the core principles of a DCI are (Viterbo et al., 2020):

1. To provide real debt relief
2. To catalyse real climate action with enduring impact
3. To ensure «no one is left behind»

Under the proposed DCI framework, all International Development Association-listed countries and least-developed countries may be eligible for a DCI if they are facing unsustainable debt burdens, liquidity problems, and/or other fiscal space constraints (Viterbo et al., 2020). There may be further participation by countries that are not yet facing insolvency or liquidity issues, but that remain locked in legacy carbon-intensive systems and need support in accelerating their commitments to pursue climate objectives.

For South Africa, a DCI related to the electricity sector could take a number of forms. Full debt relief is unlikely, given that South Africa is classified as a middle-income country. However, various concessions are likely to be made available if the existing loans held by the sovereign or Eskom as a state-owned entity are addressed:

1. For a period of time, interest and/or principal repayments are waived or accrue (a debt standstill);
2. The loan is converted to domestic currency (debt swap);
3. The loan is converted into an equity fund with a specified use of proceeds, and the governance of the fund and its conditions can be variously determined;
4. The debt is converted into equity, enabling the new equity-holder to have a say in the management of the entity (debt-for-equity);
5. Other material change in the terms of the loan (restructuring).

# How a Debt-for-Climate Initiative might work in South Africa

Although South Africa's sovereign debt position is rapidly worsening, it is not yet facing liquidity or solvency issues. Rather, a DCI would be a voluntary platform to stave off a future in which liquidity and solvency are immediate concerns.

Given that the barriers to an accelerated energy transition are political, institutional, and regulatory rather than techno-economic in nature, a DCI would usefully focus on overcoming these barriers. An ambitious renewables build-out by the private sector is commercially financeable in South Africa – given the country's superior renewables resources and mature financing sector – subject to a credible and clear vision as well as a policy commitment to the electricity sector. Therefore, financing renewables through a DCI would not be appropriate in the South African case, although there may be a role for a DFI to play a role in providing renewables power purchase agreement guarantees in response to constraints on both Eskom and the sovereign in this regard.

A DCI can address the political, institutional, and regulatory barriers in a number of ways, one or more of which could be combined in any particular transaction to:

1. Assist Eskom financially, with corresponding positive impacts on the fiscus. This would:
  - enable Eskom to return to the capital markets at better rates,
  - reduce Eskom's current debt-service costs,
  - assist in addressing Eskom's legacy (and unserviceable) debt,
  - provide medium-term cash flow relief for Eskom.
2. Enable Eskom to participate in the renewables build by providing additional capital, thereby addressing labour's concerns.
3. Replace sovereign guarantees for renewables power purchase agreements.
4. Raise dedicated, secure financing to ensure a just transition for communities and coal workers.
5. Use the «just transition» conditionalities of a DCI to form the basis of a credible and clear policy vision for the electricity sector.

## Just transition commitments required by debtholders

In all cases, the «climate» contribution of the DCI will need to be described and quantified. Generally, a DCI for the South African electricity sector can be expected to focus on enabling a «just transition». Although this term is broad and contested, it clearly has both social and climate aspects. Here, it is assumed that «just transition» implies that specific measures are adopted to ensure that no one is left behind, and that the transition is fast and substantive enough to respond to climate concerns.

What will be required from South Africa and Eskom in order to qualify for the initiative will depend on the form of such an initiative; what is feasible, given the political economy of South Africa; and also the counterparties' requirements. However, a number of general comments can be made.

The government's current plan for the electricity sector to 2030 – the 2019 IRP – envisages a significant renewable build programme. However, the IRP does not constitute a credible and clear vision, largely because it is not being implemented at the pace required and lags the IRP timeline by a year, nor is it supported by corresponding regulatory and institutional developments. Furthermore, the government has not made any provisions for supporting coal workers and communities, and the extent of the renewables build programme considered in the 2019 IRP is insufficient to enable South Africa to make a fair contribution to the temperature goals of the Paris Agreement (Tyler et al., 2020), or meet its long-term target of net zero carbon by 2050 (Republic of South Africa, 2020).

To ensure a just transition that meets the requirements of DCI counterparties, the South African government will be required to make a number of pledges in relation to the electricity sector. These include:

- Commitment to a sizeable, achievable reduction of greenhouse gas emissions from the generation of grid-delivered power for the period of the funding programme (20–30 years). The quantification of this commitment could come in a number of forms, each with advantages and disadvantages, and a combination may prove optimal. Options include a carbon budget for the period, annual grid emissions caps, caps for longer periods (five years),<sup>5</sup> a grid emissions-intensity target, specific coal plants coming off-line, or build rate of renewables. The depth and pace of decarbonisation could also be defined in a number of ways. Emissions reductions can be quantified relative to an agreed baseline representing the likely emissions if the current policy (2019 IRP) is not adjusted and implemented, resulting in insufficient decarbonisation (Roff et al., 2020). Alignment to South African climate policies such as

**5** The South African company-level carbon budget policy instrument is proposed for rolling five-year periods (Republic of South Africa, 2018).

the Nationally Determined Contribution and Low Emissions Development Strategy could provide reference points (Republic of South Africa, 2020), as could an assessment of a fair contribution to the Paris temperature targets (see Tyler et al., 2020). It would be important to take account of the country's development priorities in setting an achievable and sufficiently ambitious commitment (Caliari, 2020). Determining this commitment amounts to ascertaining an appropriate sectoral target for the South African power system. This is no simple task, with very little work having been done internationally or in South Africa to provide guidance. The commitment must be backed by credible power system planning to demonstrate how the trajectory can be achieved while meeting anticipated demand and without compromising system adequacy or adding significant cost, together with macro-economic analyses of the mitigation effort. The primary metrics of success for concessional funders are expected to be the tons of carbon abatement achieved, and the effective cost of this abatement (value of the concession divided by tons of carbon emissions mitigated).

- Policy reform to operationalise the commitment and enable the rapid rollout of renewable energy, including an update of the 2019 IRP that is consonant with the power system expansion plan to achieve the decarbonisation commitment.
- Structural reforms to Eskom's business model, including the unbundling of the transmission and system operator function into an independent entity to promote access to the grid for renewables.
- A commitment by the government to implement a just transition that ensures that all affected workers and communities are accommodated in new renewables-based local and regional economies.

These commitments, together with mechanisms to enforce them, will lie at the heart of any DCI transacted in the South African just transition space, and it will supply a credible and clear policy vision for the sector.

## Remedies for adherence to the DCI terms

There need to be credible remedies to ensure delivery of the climate and social commitments and provide comfort to debtholders. These may take the form of performance incentives such as conditions contingent on milestones that must be achieved before funds are released; punitive adjustments to terms such as interest rates and tenor if targets are missed; or beneficial adjustments if targets are exceeded (Viterbo et al., 2020). Milestones could include the passage of enabling legislation, policy changes, the cumulative rollout of renewable capacity, or structuring milestones achieved by Eskom as it transitions to a new business model. A further possible remedy could be a guarantee on the DCI's effective abatement cost in US\$/ton. Under this mechanism, a failure to deliver the committed abatement in a period would trigger the requirement to repay a portion of the loan, bringing the funders' exposure down and in line with the reduced performance level.



More genuinely remedial provisions may be considered that would oblige the South African counterparty to «deliver» the carbon abatement trajectory by other means if the power sector's emissions exceed the target in each period. This may be more attractive to climate-conscious investors, as the carbon performance of the transaction would then be guaranteed. This could be achieved by mitigation elsewhere in the economy, or through the purchase and cancellation of carbon-emission instruments on the open market. Carbon credits are therefore, in a sense, used as collateral to reduce the cost of debt servicing (Viterbo et al., 2020). Although a significant goal of the transaction is to unburden the sovereign from Eskom's associated risks, a sovereign guarantee on performance in respect of carbon delivery may be in the interests of all parties.

## 6 How Would a DCI Support the Just Transition?

### Supporting the emergence of a credible policy vision for the South African electricity sector

The just transition commitments of a DCI support the emergence of a clear and coherent policy vision for South Africa's electricity sector. This has two main effects. The first is that these commitments support Eskom's quest to achieve a viable and fundable business model by initiating a virtuous circle of improving the business, reducing the risk and cost of capital, and addressing balance sheet fundamentals. An accelerated coal phase-down contains the operational risk inherent in an old coal fleet, whose fuel costs have soared in recent years. A long-term plan and sustainable framework allows Eskom to increase the tenor of its debt and reverse the trend of sourcing ever more expensive, shorter-term debt from increasingly reluctant investors. Caliri (2020) notes that one of the main benefits of debt-for-nature swaps is that they trigger beneficial institutional developments in the host country.

Secondly, policy certainty enables investment in a large renewable energy build programme to begin immediately. If supported by appropriate localisation policies and initiatives, the industrialisation potential of such a programme is significant. Over the next 10 years, a rapid transition to renewable energy and storage technologies could crowd in total capital investment of R554 billion (US\$32 bn) – almost R200 billion (US\$11.6 bn) more than South Africa's current policy pathway – without placing any pressure on the national fiscus (Roff et al., 2020). This provides a significant post Covid-19 green economic stimulus and restores power system reliability by increasing new, decentralised energy-generation capacity. Conservative estimates suggest a net employment increase in an accelerated rollout of 1.2 million job years by 2040, more than double South Africa's current policy pathway. This only includes operation and construction job years, not those created in industry value-chain activities such as manufacturing.

### Restoring Eskom's access to finance and addressing legacy debt

A global divestment movement and falling demand for coal is placing financial pressure on South Africa's vulnerable coal export market through decarbonisation movements and shifting coal import policies in key importing countries, such as India (Huxham et al., 2019). Public and private financiers are abandoning coal. Earlier this year, the world's largest asset manager, BlackRock, committed to divest actively managed funds by the

mid-2020s from investments that derive more than 25% of their revenue from thermal coal. Large DFIs (including the World Bank), sovereign wealth funds, asset managers, and international and domestic commercial banks have adopted similar policies. At a country level, many of Eskom's lenders are increasingly unable to finance large CO2 emitters. Given the utility's central role in South Africa's economy, this is rapidly increasing Eskom's and the country's climate risk. Sovereign debt with high carbon risk is becoming less attractive (The Guardian, 2019). Disruptive technological change, driven by rapidly declining costs for renewable energy generation and storage, is also influencing power system planning globally. Unless managed, these trends will have a profound effect on the economy of Mpumalanga, compounding poverty and unemployment (Strambo et al., 2019).

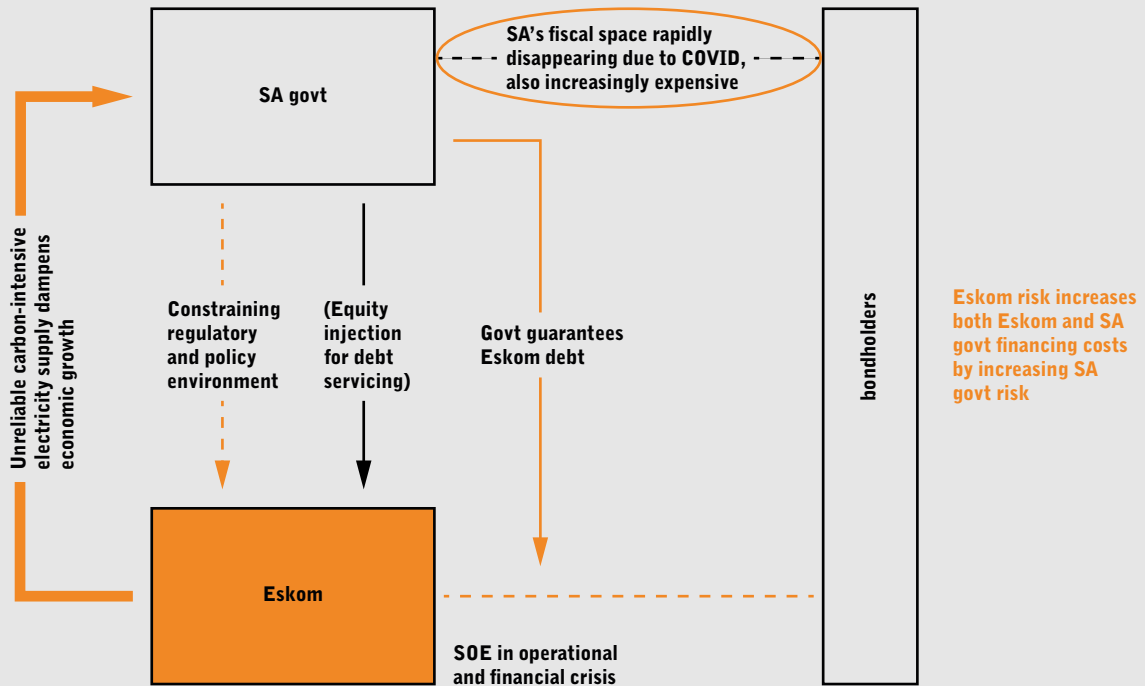
The risk reduction for Eskom and the sovereign achieved by a DCI is demonstrated in the second part of Figure 7 below.

Fossil fuel divestment can happen much faster than power systems can be reconfigured to clean energy. Rapid and indiscriminate divestment of systemically critical, but carbon-intensive legacy assets in transition could cause unprecedented economic damage at sectoral and national scales. A DCI supports the rapid movement from a legacy carbon-intensive system to a self-sustaining, low-carbon future. In the South African context, ongoing financing of coal legacy assets is an operational requirement in South Africa's just transition – under indiscriminate divestment, there are increasingly fewer entities that will fund this.

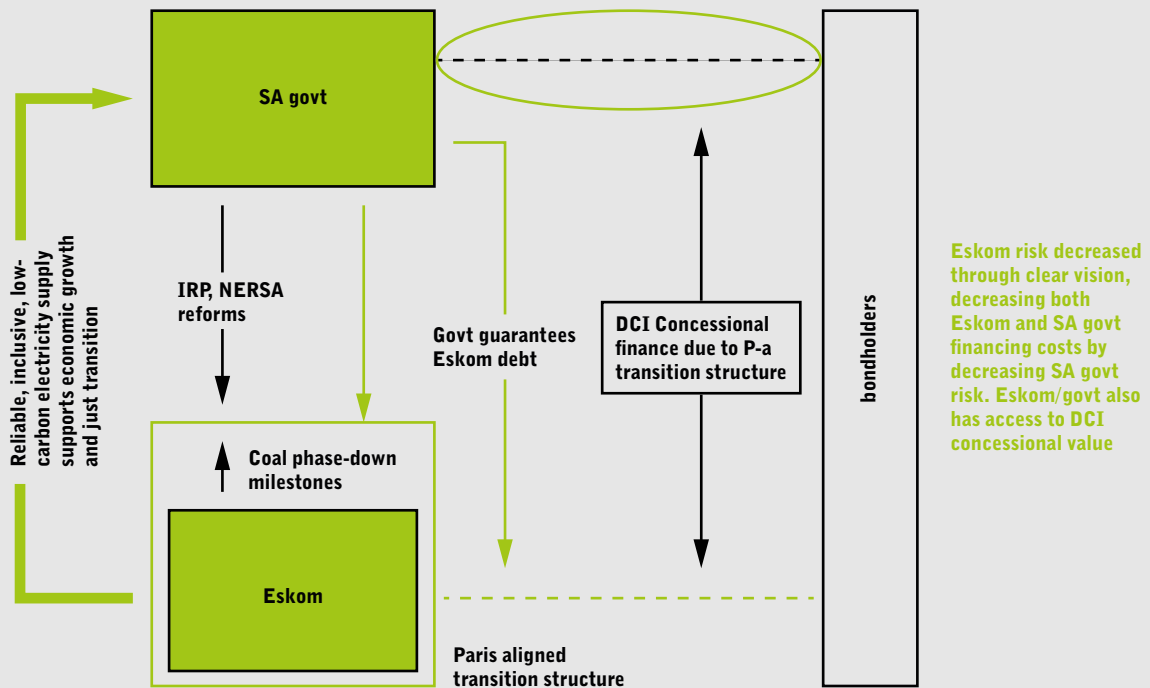
In addition to providing access to finance (and therefore reducing refinancing risk), a DCI would specifically assist in the reduction of Eskom's existing debt and its escape from the debt trap. A reduction in existing debt will be realised through concessional terms from funders, allowing an increasing proportion of future cash flows to settle debt as it matures. By shoring up Eskom's finances and business model, a DCI would reduce Eskom's risk to the sovereign, thereby reducing the country's borrowing costs and freeing up budget assets for domestic policy priorities.

Fig. 7: A Paris-aligned energy transition for Eskom supported by a Debt-for-Climate Initiative

a) Status quo



b) Debt-for-Climate Initiative scenario



Source: Authors

## Providing catalytic financing for Mpumalanga's transition

Accelerating the transition will likely exacerbate the costs of moving away from coal for workers and communities in Mpumalanga. In the short term, a DCI type transaction in SA could, in addition to assisting with Eskom's debt, provide catalytic financing for a «Just Transition Fund» to support coal workers and affected communities and to develop an alternative economy for Mpumalanga in the long term. There is no current plan for financing even the slower transition, as outlined in the 2019 IRP. The governance of such a fund will require careful consideration.

With the targeted localisation of industrial activities relating to renewable energy and a portion of the renewable energy build in Mpumalanga – favourable due to its proximity to existing grid capacity and large-scale transmission infrastructure – an accelerated rollout could support the absorption of workers in a declining coal industry and stimulate a wealth of opportunities in value-chain activities related to a new, greener economy. In addition to providing financing, a just transition enhances the local environmental and health benefits of phasing out coal-fired power.

## Crowding in commercial green finance

The just transition commitments and associated remedies in a DCI will build the opportunity for additional public and commercial green finance issues, both within the electricity sector and beyond, with incrementally deepening transition credentials. This will provide liquidity to the green finance market in South Africa. Eskom may also be able to return to the vanilla bond markets as a result.

A just transition in the electricity sector will also reduce the carbon intensity of South African exports faster and create the potential for green economic opportunities such as electric vehicle and green hydrogen production by scaling the renewable energy supply.

## 7 Insights from the South African Case and Issues for Further Exploration

This paper has set out the background to, and some fundamentals of, a DCI for the South African just energy transition. This section highlights issues that require further exploration and arose during Meridian Economics' experience of incubating the Just Transition Transaction.

### DCIs support energy transitions in emerging markets

The potentially significant role of a DCI in supporting and enabling a just transition in South Africa – which is a middle-income country and therefore excluded from DCI eligibility – motivates for broadening the DCI-eligibility criteria. There may be other middle-income countries in similar circumstances that need to transition from legacy fossil fuel infrastructure, which could benefit from DCIs. The South African case motivates for avoiding a blanket exclusion of middle-income countries in terms of eligibility.

### Domestic counterparties: SOE vs sovereign

The just transition commitments required by any DCI place benefits and obligations upon both the sovereign and Eskom. The current South African political economy suggests that Eskom, rather than the sovereign, is the optimal primary counterparty for a financing intervention, as the government remains more deeply constrained by the politics. Under the current leadership, Eskom appears to have the best chance of driving through the necessary reforms and enablers of a just coal phase-down, including a DCI.

### Size and timing

The Just Transition Transaction envisages a large multi-stakeholder transaction and intends to raise at least US\$12 billion through a combination of concessionary funding and commercial green finance – an amount equivalent to Eskom's sustainable debt burden. This is both because of the attractiveness of a large deal in the climate finance markets on which it is focused, but also because the amount is sufficiently significant to motivate the political decisions required. Such a large, complex transaction is likely to take years to conclude. However, the disruption in the international energy market and the domestic pressure of load-shedding will prompt a quicker response. Bilateral initiatives are negotiated more quickly, pointing to a series of transactions in which DCIs could play a key catalytic role.

The challenge of such an approach would be to establish an overarching framework to ensure a just transition, and to allocate concessionality and benefits fairly across financiers.

## Allocating debtholder benefits

A credible commitment and remedy framework is critical to the success of DCIs. Arguably though, once such a framework is in place for the first transaction, it will confer benefits to all debtholders interested in just transition aspects. This presents both challenges and opportunities for structuring successive DCIs and associated transactions in the South African electricity sector. The framework could be conceptualised as comprising various components (or sets of commitments and remedies), which different initiatives and transactions could address incrementally, gradually strengthening South Africa's policy vision. However, a core set will need to be defined and implemented up front to ensure critical path elements are met (such as investor confidence for an initial tranche of renewables).

Establishing protocols and modalities for acceptable and rigorous just transition commitments will be necessary to access different pools of finance. As the framework is established, it can be used to renegotiate sovereign or Eskom debt portfolios held by bi- or multilateral debtors, swap existing vanilla debt to green debt, reschedule debt, and issue commercial green bonds. Although there is a double-counting risk in both the climate finance and official development aid spheres, given the involvement of multiple financial jurisdictions (official finance from the United Nations Framework Convention on Climate Change (UNFCCC), DCIs, Sustainable Development Goal impact investment, the green/climate bond market), it is anticipated that this will be manageable.

## Leveraging support from the climate finance ecosystem

Particularly in middle-income, voluntary DCIs, it may be beneficial to align DCIs with the climate finance obligations of the DFI community. Here, developed-country DFIs (many already heavily invested in middle-income fossil fuel utilities such as Eskom) seek to meet their climate finance obligations under the Paris Agreement by allocating concessional finance to mitigation opportunities. The climate finance process, for all its bureaucracy and complications, imparts a credibility and rigor to its mechanisms. It provides thorough political cover and weight and invokes the UNFCCC's long history of elaboration of the principles of sustainable development – that climate mitigation action must support the development of developing countries. The UNFCCC prioritisation of sustainable development is very important in motivating for transition finance to continue to fund (declining) coal to avoid poor socio-economic outcomes.

The value of any DCI from a climate finance perspective can be measured by determining the effective carbon price of the transaction (based on the net present value of the differential between the cost and terms of the concessional debt versus commercial debt options over the period divided by the contracted mitigation). Initial calculations for the Just Transition Transaction underscore the highly efficient use of climate finance in the South African case.

## Sovereignty

The South African government and society place a high value on sovereign independence. This has implications for the approach, governance, and terms of any Debt-for-Climate Initiative. Foreign control over funds realised is unlikely to be tolerated, nor the sense that any constraints have been imposed upon the country. Policy-based funding mechanisms would need to be utilised with caution. Options to engage this may include temporary commitments (West, 2020) and opt-out clauses in the structures.

## Pros and cons of different commitment metrics

The very brief overview of options for commitment metrics in Section 5 suggests that much work is required to ascertain the most appropriate use of these in various initiatives. Work is ongoing in this area for the Just Transition Transaction.

## Use-of-proceeds challenges

Most DFIs and multinational development banks are geared towards funding climate initiatives at a project level and generally have specific use-of-proceeds requirements. More recently, some have started exploring more flexible policy-based finance approaches. A significant benefit of DCIs in the South African case, however, is that they can raise corporate-level finance for Eskom to implement a turnaround plan and viable business model that will deliver substantial additional mitigation, rather than being aimed at financing for specific projects only. Appropriate solutions must be found that navigate between funders' use-of-proceeds requirements and the risk of sovereignty infringements of policy-based approaches (highly pertinent in the South African context), while also supporting utilities as they transition. Different categories of transaction type may be appropriate to support different aspects of the just transition financing challenge (including the use-of-proceeds/project-based, policy-based, outcomes/performance-based initiatives).



## Avoiding triggering pari passu constraints

The development of any just transition financing initiatives for Eskom and the sovereign must tread extremely carefully to ensure that no «restructuring» clauses or pari passu principles are triggered. A restructuring of Eskom's debt and a triggering of associated cross-default or acceleration provisions may prove catastrophic for the utility's solvency. It is likely that these considerations restrict the debt eligible for DCIs to the DFI and multilateral portions, as opposed to listed debt, which is more restricted in pari passu terms. The World Bank 2008 loan for the coal-fired Medupi power station is an obvious candidate. As discussed, the commitment/remedy structure extends the benefits of an initiative to all financiers, now and in the future.

## Opportunities in blended finance

Concessional finance, including that which is raised through DCIs, can potentially be incorporated into a blended finance structure to optimise its value to a country or SOE, as in the Just Transition Transaction (Meridian Economics, 2020). Securitisation models can also be used to enhance the value of existing revenue streams, such as South Africa's carbon tax, and to navigate policy and regulatory constraints.

## Governance structures

The governance structures of any DCI, together with an associated Just Transition Fund, are particularly important in the context of South Africa's recent history of state capture and corruption concentrated on Eskom (Eberhard and Godinho, 2017). A balance would need to be struck between the need for top-class governance and sovereignty.

## 8 Conclusion

The South African case set out in this paper and based on Meridian Economics' Just Transition Transaction concept demonstrates a clear role for Debt-for-Climate Initiatives – together with other innovative green financing mechanisms – to enable and support a just transition in South Africa and possibly other emerging middle-income countries with legacy fossil fuel infrastructures.

The paper has suggested that the overall objective and value of any DCI in South Africa would be to contribute towards a credible and clear policy vision for the electricity sector. The case raises a number of specific insights. Either the sovereign or the state-owned entity, Eskom, could be the domestic counterparty for the DCI. The size and timing of the DCI are significant issues, so too the ability to cluster a number of DCIs and other «green» or climate financing instruments under one framework (the Just Transition Transaction uses blended finance to achieve this). Such an approach then raises the question of allocating the environmental and social benefits among debtholders. Commitment and remedy metrics are complex, each with its own advantages and disadvantages. The Just Transition Transaction is situated squarely in the UNFCCC's climate finance architecture, and the case suggests that there are significant synergies of this space for DCIs to explore.

The case study also raises challenges concerning the development of DCIs. These include the country's sensitivity to anything perceived as sovereign interference, the practicalities of stepping outside a DFI «use-of-proceeds» funding framework in the green space, avoiding triggering pari passu constraints when working at an entity level, and devising credible and robust governance structures.

Darling National Demonstration Wind Farm in Cape Town, South Africa.



## References

- Caliari, A. (2020). «Linking debt relief and sustainable development: Lessons from experience». Background Paper #2. Debt Relief for Green and Inclusive Recovery project. <https://drgr.org/files/2020/11/BackgroundPaper2-Lessons-from-Experience.pdf>.
- Creamer, T. (2020, June 30). «Tariff implications not yet clear as Nersa loses another court battle with Eskom». Engineering News. <https://www.engineeringnews.co.za/print-version/tariff-implications-not-yet-clear-as-nersa-loses-another-court-battle-with-eskom-2020-06-30>.
- CSIR (2020, July). Systems analysis to support increasingly ambitious CO2 emissions scenarios in the South African electricity. Technical Report. [http://researchspace.csir.co.za/dspace/bitstream/handle/10204/11483/Wright\\_2020\\_edited.pdf?sequence=7&isAllowed=y](http://researchspace.csir.co.za/dspace/bitstream/handle/10204/11483/Wright_2020_edited.pdf?sequence=7&isAllowed=y).
- DEA (2018). Climate change bill. Draft for comment gazetted 8 June 2018, no. 41689. Pretoria: Department of Environmental Affairs.
- DEA (2019). South Africa's 3rd biennial update report to the United Nations Framework Convention on Climate Change. Pretoria: Department of Environmental Affairs.
- DMRE (1998). «White paper on the energy policy of the Republic of South Africa». Pretoria: Department of Minerals and Energy.
- DMRE (2019). Integrated Resource Plan (IRP 2019). <http://www.energy.gov.za/IRP/2019/IRP2019.pdf>.
- DPE (2019, October). Roadmap for Eskom in a reformed electricity supply industry. [https://www.gov.za/sites/default/files/gcis\\_document/201910/roadmap-eskom.pdf](https://www.gov.za/sites/default/files/gcis_document/201910/roadmap-eskom.pdf).
- Eberhard, A., and Godinho, C. (2017, September). «Eskom enquiry reference booklet. A resource for Parliament's public enterprises inquiry. Civil society, journalists and engaged citizens». Cape Town: University of Cape Town.
- Eskom (2019a, March 31). Integrated report. [http://www.eskom.co.za/IR2019/Documents/Eskom\\_2019\\_integrated\\_report.pdf](http://www.eskom.co.za/IR2019/Documents/Eskom_2019_integrated_report.pdf).
- Eskom (2019b). Eskom group interim results. Presentation on 28 November 2020. <https://www.eskom.co.za/IR2019/Interim/Documents/2020IRpresentation.pdf>.
- Eskom (2020, October). Annual financial statements. [https://www.eskom.co.za/IR2020/Documents/0005\\_Eskom%20AFS%202020%20web%20\(P\).pdf](https://www.eskom.co.za/IR2020/Documents/0005_Eskom%20AFS%202020%20web%20(P).pdf).
- Fine, B., and Rustomjee, Z. (1996). The political economy of South Africa: From minerals-energy complex to industrialisation. London: Hurst.
- Gray, A. (2019, June). Air quality impacts and health effects due to large stationary source emissions in and around South Africa's Mpumalanga Highveld Priority Area (HPA). <https://cer.org.za/wp-content/uploads/2019/06/Andy-Gray-Report.pdf>.
- Huxham, M., Anwar, M., and Nelson, D. (2019, March). Understanding the impact of a low carbon transition on South Africa. Climate Policy Initiative Energy Finance Report. <https://www.climatepolicyinitiative.org/wp-content/uploads/2019/03/CPI-Energy-Finance-Understanding-the-impact-of-a-low-carbon-transition-on-South-Africa-March-2019.pdf>.

- IEEFA (2019, September). South Africa coal exports outlook. [https://ieefa.org/wp-content/uploads/2019/09/South\\_Africa\\_Coal\\_Exports\\_Outlook\\_Sept-2019.pdf](https://ieefa.org/wp-content/uploads/2019/09/South_Africa_Coal_Exports_Outlook_Sept-2019.pdf).
- IMF (2020, July). Request for purchase under the rapid financing instrument. IMF Country Report No. 20/226. <https://www.imf.org/en/Publications/CR/Issues/2020/07/28/South-Africa-Request-for-Purchase-Under-the-Rapid-Financing-Instrument-Press-Release-Staff-49612>.
- Meridian Economics (2020). The role of transition finance for climate mitigation: A just climate transaction for South Africa. [https://meridianeconomics.co.za/wp-content/uploads/2020/06/SA-Just-Transition-Transaction-proof-of-concept\\_Meridian-Economics\\_18062020.pdf](https://meridianeconomics.co.za/wp-content/uploads/2020/06/SA-Just-Transition-Transaction-proof-of-concept_Meridian-Economics_18062020.pdf).
- Meridian Economics (forthcoming). «Costs and benefits of Mpumalanga’s economic transition». Working Paper.
- National Treasury (Republic of South Africa) (2020). Supplementary budget review 2020. Pretoria: National Treasury.
- Nedbank (2020). Monthly average exchange rates. [https://www.nedbank.co.za/content/dam/nedbank/site-assets/AboutUs/Economics\\_Unit/Forecast\\_and\\_data/Daily\\_Rates/Monthly\\_Average\\_Exchange\\_Rates.pdf](https://www.nedbank.co.za/content/dam/nedbank/site-assets/AboutUs/Economics_Unit/Forecast_and_data/Daily_Rates/Monthly_Average_Exchange_Rates.pdf).
- Ramaphosa, C. (2019). (2019, September 23). Statement by H.E. President Cyril Ramaphosa of South Africa to the United Nations Secretary-General’s climate summit. <http://www.dirco.gov.za/docs/speeches/2019/cram0923.htm>.
- Renaud, C., Tyler, E., Roff, A., and Steyn, G. (2020). Accelerating the industrialisation of renewable energy in South Africa: What’s stopping us? Meridian Economics. <https://meridianeconomics.co.za/wp-content/uploads/2020/07/Accelerating-renewable-energy-industrialisation-in-South-Africa-July2020.pdf>.
- Republic of South Africa (2018). Carbon tax bill. [http://www.treasury.gov.za/comm\\_media/press/2018/2018112101%20Carbon%20Tax%20Bill%202018-B46-2018.pdf](http://www.treasury.gov.za/comm_media/press/2018/2018112101%20Carbon%20Tax%20Bill%202018-B46-2018.pdf).
- Republic of South Africa (2020). South Africa’s low emissions development strategy 2050. [https://www.environment.gov.za/sites/default/files/docs/2020lowemission\\_developmentstrategy.pdf](https://www.environment.gov.za/sites/default/files/docs/2020lowemission_developmentstrategy.pdf).
- Resare, N. (2020). Up in smoke: Human rights and environmental impacts of export credits to coal. The case of South Africa. [https://swedwatch.org/wpcontent/uploads/2020/09/99\\_Kol-i-Sydafrika\\_200921.pdf](https://swedwatch.org/wpcontent/uploads/2020/09/99_Kol-i-Sydafrika_200921.pdf).
- RMI (2020). How to retire early: Making accelerated coal phaseout feasible and just. <https://rmi.org/how-to-retire-early-making-accelerated-coal-phaseout-feasible-and-just/>.
- Roff, A., Steyn, G., Tyler, E., Renaud, C., Brand, R., and Burton, J. (2020). A vital ambition: Determining the cost of additional CO2 mitigation in the South African Electricity System. Meridian Economics. <https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf>.
- State Capacity Research Project (2017). Betrayal of the promise: How South Africa is being stolen. <https://pari.org.za/wp-content/uploads/2017/05/Betrayal-of-the-Promise-25052017.pdf>

- Strambo, C., Burton, J., and Atteridge, A. (2019). The end of coal? Planning a «just transition» in South Africa. [https://www.researchgate.net/profile/Jesse\\_Burton3/publication/335518171\\_The\\_end\\_of\\_coal\\_Planning\\_a\\_just\\_transition\\_in\\_South\\_Africa/links/5d6a5b6392851c853880ae3f/The-end-of-coal-Planning-a-just-transition-in-South-Africa.pdf](https://www.researchgate.net/profile/Jesse_Burton3/publication/335518171_The_end_of_coal_Planning_a_just_transition_in_South_Africa/links/5d6a5b6392851c853880ae3f/The-end-of-coal-Planning-a-just-transition-in-South-Africa.pdf).
- The Guardian (2019, November 14). «Sweden’s central bank dumps Australian bonds over high emissions». <https://www.theguardian.com/environment/2019/nov/15/swedens-central-bank-dumps-australian-bonds-over-high-emissions>.
- Tyler, E., Renaud, C., and Roff, A. (2020, July). «What might a Paris-aligned emissions profile look like for the South African power sector?» Meridian Economics Policy Brief 2020/03. <https://meridianeconomics.co.za/wp-content/uploads/2020/08/Power-sector-carbon-budgets-2020-v1.1.pdf>.
- Viterbo, A., Bhandary, R., and Gallagher, K. (2020). «The architecture for a debt for climate initiative». Debt Relief for Green and Inclusive Recovery project. <https://drgr.org/documents/>.
- Volz, U., Akthar, S., Gallagher, K., Griffith-Jones, S., and Jörg Haas, J. (2020). Debt Relief for a Green and Inclusive Recovery. Debt Relief for Green and Inclusive Recovery project. <https://drgr.org/2020/11/16/report-debt-relief-for-a-green-and-inclusive-recovery/>.
- WEF (2020). Fostering effective energy transition: Global Energy Transition Index 2020. Insight Report. [http://www3.weforum.org/docs/WEF\\_Fostering\\_Effective\\_Energy\\_Transition\\_2020\\_Edition.pdf](http://www3.weforum.org/docs/WEF_Fostering_Effective_Energy_Transition_2020_Edition.pdf).
- West, J. (2020). «Compensating indebted countries for keeping fossil fuels in the ground: A proposal». Debt Relief for Green and Inclusive Recovery project. <https://drgr.org/documents/>.
- World Bank (n.d.). Data: South Africa. <https://data.worldbank.org/country/south-africa>.

## Authors' Bio

**Dr Emily Tyler** (B.Comm(Hons) Ecos, M.FinMan, PhD in complexity studies) has focused her career on climate mitigation in a development context, bringing both an economics and complex systems perspective to the policy and practical challenges she encounters in this space. She brings more than 18 years of experience across a wide range of energy- and mitigation-related issues, including carbon footprinting, corporate strategies, climate finance, UNFCCC mechanisms applied to developing countries, South African carbon-pricing policies, low-carbon transition planning, energy policy, carbon budgeting, and power-sector employment. Emily is engaged in transdisciplinary research initiatives relating to climate mitigation, publishing regularly in international journals. Emily brings a deep understanding of mitigation policy and energy transition challenges to Meridian's work.

**Celeste Renaud** holds a BSc (Hons) in Environmental Science from the University of Cape Town and an MSc in Environmental Policy from the University of Oxford. She is an analyst at Meridian Economics and holds an interest in the complexities associated with low-carbon energy transitions, climate justice imperatives, and innovative transition finance mechanisms in developing countries. Celeste's interdisciplinary background enables her to work across both technical modelling and policy-based writing spheres of Meridian's work.

**Adam Roff** holds a BSc (Eng) (Mech) from the University of Cape Town, and an MS (Applied Mechanics) from Caltech. Adam has more than 20 years of experience in solving complex analytical problems in the realm of investments and infrastructure. His ability to create innovative models, methodologies, and financial tools has been key to the success of projects in asset management, insurance, energy, and engineering disciplines. His rigorous approach underpins the integrity of Meridian's modelling capability.

## Imprint

Editors: Heinrich-Böll-Stiftung e.V., Schumannstraße 8, 10117 Berlin, [www.boell.de](http://www.boell.de)  
Center for Sustainable Finance, SOAS, University of London, Thornhaugh Street, Russell Square, London WC1H 0XG, UK, [www.soas.ac.uk/centre-for-sustainable-finance/](http://www.soas.ac.uk/centre-for-sustainable-finance/)  
Global Development Policy Center, Boston University, 53 Bay State Road, Boston, MA 02215, USA, [www.bu.edu/gdp/](http://www.bu.edu/gdp/)

Place of publication: [www.drgr.org](http://www.drgr.org)

Release date: December 2020

Cover: [http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img\\_id=16643](http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=16643) (Wikimedia)

Licence: Creative Commons (CC BY-NC-ND 4.0)

<https://creativecommons.org/licenses/by-nc-nd/4.0>