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Environmental Policy in South Africa: From 1994 to now

A Climate for Development

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ERSA Policy Papers typically address current issues pertinent to the national economic policy discourse. These papers aim to succinctly summarise a policy challenge and discuss its relevance, significance, and potential pathways forward for South African policymakers and researchers. They are primarily narrative-driven, drawing on existing research and descriptive analysis. We hope that, through this, ERSA can contribute to constructive and informed economic policy debate.

This paper is one of nine papers prepared for the 1994 to Now Policy Paper Series, prepared for the SALDRU, South Africa at 30 Years of Democracy Conference scheduled for 2-4 April 2025. The papers will be (were) presented at the conference with the aim of contributing to discussions and debates and fostering informed and constructive economic dialogue.

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Environmental Policy: From 1994 to now
A Climate for Development

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Abstract

South Africa's environmental policy has evolved significantly since 1994, reflecting shifts in global sustainable development frameworks and growing recognition of the interdependence between economic, social, and environmental objectives. Initially, policy efforts prioritized economic growth and social development, with environmental concerns viewed as secondary. However, as climate change and biodiversity loss emerged as critical threats, policy approaches expanded to integrate sustainability principles, culminating in the country's commitments under the Paris Agreement and the adoption of a Just Transition framework. Despite progress, South Africa remains highly vulnerable to both physical and transition risks associated with climate change, exacerbated by socio-economic inequalities, governance challenges, and a historically carbon-intensive growth model.

This paper argues that South Africa's existing policy trajectory—characterized by sectoral approaches and incremental reforms—is insufficient to address systemic risks and unlock the full potential of a green, inclusive economy. A more integrated, coherent strategy is needed, leveraging synergies between environmental sustainability, economic growth, and social development. Emerging evidence suggests that a transition to a low-carbon, climate-resilient growth model can drive investment, job creation, and economic inclusion while mitigating climate risks. However, realizing this potential requires targeted policy interventions, institutional reform, improved coordination across government and sectors, and robust investment in green infrastructure and nature-based solutions. By aligning policy and economic planning with sustainability imperatives, South Africa can build a more resilient and equitable future while enhancing its global competitiveness in an era of climate-aligned growth.

Keywords: South Africa, environmental policy, climate change, sustainable growth, adaptation and mitigation.

JEL classification: E60, E61, Q28, Q58

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Executive summary

Sustainable development requires environmental, economic, and social balance. Historically, however, policies in these domains were implemented independently. Initially, economic growth was prioritised based on the notion that higher incomes would make dealing with environmental and social issues easier. The realisation that human activity is pushing Earth beyond the limits where it can safely sustain human life, however, has challenged this narrative.

An evolution in international development goals accompanied a better understanding of sustainable development. Prior to 2000 progress was measured mostly in terms of GDP growth. From 2000 to 2015, the Millennium Development Goals broadened the focus to include a social dimension, specifically poverty, health, and education outcomes. The Sustainable Development Goals (SDGs) adopted in 2015 also included environmental issues, and 11 of the 17 goals relate to the environment, sustainability, or the climate. In 2015, both developed and developing countries committed to slowing climate change as part of the Paris Agreement, signed under the United Nations Convention on Climate Change (UNFCC).

Climate change was originally viewed as an environmental policy issue, but the negative impact of unconstrained climate change on poverty and economic development led to it overshadowing other environmental goals. A singular focus on environmental, climate, economic or social goals, however, even one as important as climate change, is unlikely to succeed given the complex interaction between these areas.

Interventions targeting only climate change mitigation, for example, can negatively impact biodiversity and ecosystems, which makes communities more vulnerable to the physical impacts of climate change and leads to worse health outcomes. Climate change adaptation projects that do not consider impacts on biodiversity can weaken long-term climate resilience. These interlinkages, and the massive scale of investment required to limit and adapt to climate change, call for increased reliance on nature-based solutions. Nature-based solutions are actions that protect, sustainably manage or restore natural ecosystems to address societal challenges (including climate change) while generating biodiversity and sustainable development benefits. They go beyond a desire to minimise the impact of economic activity on nature and use the natural functions of healthy ecosystems to benefit people, nature and the climate. They are more cost-effective than infrastructure interventions and enable a level of long-term resilience that is beyond human-made assets.

South Africa is rich in biodiversity, and agriculture, tourism, and mining are key economic sectors. Large parts of the country are also water-stressed. Consequently, it is vulnerable to the **physical impacts of climate change**. Over the period 1931 to 2015, most of South Africa has warmed by at least 2 degrees Celsius above pre-industrial levels, double the one-degree increase experienced globally. This has increased the number and severity of extreme weather events like heat waves, dry spells, droughts, and floods. Climate zones have started to shift across the country, veld fires are more frequent, and water availability is becoming more erratic. These impacts are exacerbating stress on terrestrial and marine habitats already struggling to come with overutilisation, unsustainable land use change, and invasive alien species. Half of **South Africa's economic output** relies directly on two or more ecosystem services. At the same time, 70% of final demand, 59% of profits, 46% of wages, 40% of employment, 52% of taxes, and 83% of net exports are **highly dependent on at least one ecosystem service.** Climate change reduced South African GDP per capita growth for 1961-2010 by 11%, and climate impacts have accelerated since then.

Furthermore, **climate change threatens to increase the already extreme levels of economic and gender inequality in South Africa.** Climate change disproportionately impacts the poor and powerless who do not have the resources, networks, or access to financial instruments to adapt to the physical impacts of climate change effectively. There is also a gender dimension to climate change, with women particularly affected,

given their traditional roles and responsibilities. The physical impacts of climate change will also disproportionately impact the poorer areas of South Africa and reduce already poor educational outcomes. Inequality, education outcomes, and innovation outcomes are not only negatively impacted by climate change but are also key to building resilience in society to deal with the impacts of climate change. South Africa's precarious social starting position thus risks creating a vicious circle where social stresses weaken climate resilience and climate impacts exacerbate social stresses.

Sub-Saharan Africa includes some of the country's most vulnerable to climate change's physical impacts. South Africa's location and the size of its economy thus make it especially **prone to climate-induced migration.** It already draws the most migrant workers in Africa and is attracting an increasing number of irregular migrants, refugees, and asylum-seekers from Sub-Saharan Africa. Migration will place more stress on South Africa's already stressed social systems. **The status of South Africa's natural systems also exacerbates its vulnerability to climate change**. South Africa ranks below average at 106 out of 180 countries in the aggregated 2024 Environmental Performance Index. Regarding ecosystems being able to adapt to climate change, South Africa is ranked slightly worse (110th). However, South Africa's air quality (152nd) and Sanitation and drinking water (144th) scores are significantly worse and increase the likelihood of negative social impacts because of climate change.

While South Africa's total, per capita and cumulative climate change-causing greenhouse gas (GHG) emissions are high compared to the global average, they pale compared to those of the worst emitters. The carbon intensity of South Africa's economy, however, is significantly worse than its main trading partners. Only five countries have more carbon-intensive economies (i.e. Venezuela, Libya, Turkmenistan, Mongolia, and North Korea). The carbon intensity of the South African economy has fallen since 1994, but it **remains significantly exposed to transition impacts linked to efforts to reduce climate change,** like border carbon adjustments. Not only is the economy very carbon intensive, but it is located far from its main trading partners. The present value of stranded assets in the South African sectors most exposed to transition impacts (coal, liquid fuels, and electricity generation) could be more than $120bn up to 2035. Transition impacts could also reduce the value of the largest companies on the JSE between five and eight percent at a minimum. The value of companies in specific sectors could fall by much more (up to 87% for Upstream Energy, 51% for Chemicals, Plastic and Rubber Materials, 26% for Mining and Mineral products, and 24% for Manufactured Products).

As a party to the Paris Agreement, South Africa is committed to keeping climate change well below 2 degrees Celsius above pre-industrial levels while aiming to limit climate change to 1.5 degrees Celsius. South Africa has committed to emissions targets for 2025 and 2030 and to adopting a net zero CO2 emissions by 2050 goal in future. These targets are conditional on developed countries providing concessional climate finance to developing countries. While local studies indicate that South Africa will meet its 2025 and 2030 targets if existing policies and measures are fully implemented, international studies question this. South Africa's mitigation efforts must increase significantly to achieve net zero emissions by 2050.

Since 1994, like most of the rest of the world, South Africa has attempted to deal with economic, social and environmental problems individually, and the initial focus was on growth and social outcomes. South Africa's recent development policy journey includes three distinct periods. South Africa prioritised socio-economic redress and growth during the first period (1994 – 2010). Environmental policies only entered the development debate in as far as pollution control moderates the negative environmental impact of growth. During the second policy period (2010-2019), climate concerns and the need for sustainable development gained greater prominence within national policy, and environmental sustainability started to appear within long-term economic planning. The 'green economy', however, was framed as a sector to grow within the broader economy rather than a desirable objective for the entire economy. Since 2020, climate action has been viewed as a driver of economic growth in South Africa, albeit one that is contingent on international

support and embedded within the energy sector. However, a coherent approach to jointly addressing economic, social, and environmental goals remains elusive.

South Africa's standard carbon-intensive growth model, built around protecting or localising capital-intensive industries (even low-carbon ones), **has not been successful**. This was before efforts to contain climate change in South Africa's key export markets made a carbon-intensive growth model untenable. Even if the old model had succeeded, the physical impacts of climate change, combined with South Africa's limited readiness to deal with these impacts, will place unsustainable pressure on an already stressed society, economy, and environment. Targeting poverty via fiscal transfers has not supported economic inclusion and led to little fiscal space to deal with the impacts of climate change. Social cohesion in South Africa will also not remain intact if the costs of adapting to climate change end up falling on individuals (through, for example, private water provision and higher food prices) in the way that a sizeable portion of the cost to address the electricity supply crisis has. It would further increase inequality and push yet more people into poverty. And, lastly, trying to build a net zero economy while ever more people feel they do not have a stake in the outcome is unrealistic.

Luckily, there is increasing evidence that a new growth model built around developing low-carbon climate-resilient economies will lead to faster growth and inclusive development. Key elements of this model include:

- generating efficiencies and returns to scale in new transformative green technologies that have long since been exhausted in mature carbon-intensive technologies.
- creating productivity-enhancing synergies between natural, social and economic systems;
- reducing negative externalities (like air pollution) that are a drag on growth;
- investing in infrastructure and natural and social resilience (via, for example, nature-based solutions) to reduce unproductive public expenditure to repair climate damage;
- using savings to invest in additional high-impact mitigation and adaptation activities;
- supporting a healthy environment that provides increased ecosystem services to support economic growth and reduce poverty; and
- increasing investment via a reduction in climate-linked economy-wide risks.

A climate change-driven growth model is well-suited to alleviating some of South Africa's main growth constraints, such as the lack of investment (linked to the loss of a sovereign investment grade rating and weak state capacity), electricity supply constraints, spatial exclusion, and economic exclusion. Reducing negative externalities will also boost growth.

The **rapid deployment of grid-scale renewable energy** in South Africa has shown how green technologies can **stimulate investment if a conducive regulatory environment is created**. The experience of the Renewable Energy Independent Power Producers Programme (REIPPP), furthermore, has shown how a large-scale roll-out of a technology supported by the public sector can reduce the cost of funding. Despite several false starts and significant uncertainty, the average cost of funding large-scale solar PV projects in South Africa is significantly lower than expected based on South Africa's country risk profile. This was achieved via government guarantees, efficient procurement methodologies, and increasing familiarity with the underlying technologies, allowing South Africa's sophisticated local financial markets to be tapped rather than costly international finance. The REIPPP also proved the value of public-private partnerships in enabling private sector implementation capacity to compensate for public sector capacity constraints.

A just urban transition focusing on mitigation and adaptation can support **spatial and economic inclusion**, particularly if combined with social ownership models. It is also now clear that a low carbon economy in South Africa will generate significant net employment gains. Employment creation and economic inclusion can be enhanced by public works programmes focused on building long-term resilience, which would also

generate cost savings by reducing future restoration and emergency response costs. Effective adaptation, and specifically nature-based solutions, which will generate the strongest synergies between social, economic, and natural systems, requires deep local knowledge and expertise to be successful – thus further creating opportunities for economic inclusion at the local level. Increased community participation and decision-making are key elements of a just transition and should increase accountability and governance - leading to better-targeted municipal spending and increased service delivery.

Reducing the substantial **negative externalities** linked to South Africa's carbon-intensive growth model from, for example, water use and air pollution, would free up resources to support development. The economic cost of delaying the decommissioning of old coal-fired power stations in South Africa to the 2030s will cause between R438 billion and R1.080 trillion in increased health costs and lost productivity.

For the new growth model to succeed, however, policies and measures to support the new growth model will have to be rooted in local economic, social, and environmental realities. Natural, social, economic and institutional systems influence what options are technically and economically feasible, their likelihood of success (i.e. what can be done), and the political economy enablers or barriers to specific policies and measures (i.e. what will be done). Local policymakers often ignored this reality check.

The frameworks and models used in macroeconomics to consider the costs and benefits of climate action do not capture all the elements of the new growth model well. There are several technical reasons why this is the case, but mostly, models reflect a lack of imagination on the part of economists steeped in a tradition of trade-offs. **Improving the number and quality of models available to interrogate the new growth model effectively will be crucial to proving** it is robust and desirable.

A clear link between social, economic, and environmental expenditure and outcomes is necessary to identify, quantify and prioritise synergies and cost savings. Currently, sufficiently detailed data is unavailable on environmental and climate-rated outcomes or expenditures. Generating this data will allow the relationships between seemingly disparate areas to become clear over time, thus preventing the prioritisation of short-term goals at the expense of invisible longer-term benefits. It will also prevent investments from being mislabelled as consumption spending because of unidentified future returns. Thus, **closing data gaps is key to proving and exploiting the synergies that underpin the new growth story**.

The cost of mitigation increases significantly when limited flexibility and structural rigidities within the economy are considered. Also, without changes to institutional frameworks, structural adjustments may simply not happen. Understanding and addressing structural rigidities and adjustment costs will be key to translating **the new growth story from theory to practice.**

In conclusion, climate change is a systemic problem that requires a systemic solution. This stands in sharp contrast to pollution control, where the emphasis is typically on controlling the impact of one or a small number of processes. Stabilising climate change, in contrast, requires a complete reorganisation of how and where economic activity happens. Furthermore, climate change also changes the very relationships policymakers rely on to effect this change. It worsens ecosystem, health, and education outcomes, but these factors are crucial in building resilience to climate change. A similar feedback loop exists with respect to social cohesion, public finances, innovation and so forth. Therefore, an integrated, coherent approach is needed where strategies, policies and measures are developed jointly. **A new growth model that uses the interlinkages between environmental, climate, economic and social systems to generate stronger growth, greater equality, deeper economic inclusion, and environmental sustainability could provide such an approach**.

1. Introduction

Sustainable development requires environmental, economic, and social balance. Historically, these policy areas were considered independently. Initially, economic growth was prioritised based on the notion that higher incomes would make dealing with environmental and social issues easier. The environmental Kuznets Curve hypothesis held that deteriorating environmental and social indicators were part of the industrialisation process, and populations only started to value environmental outcomes beyond a minimum level of economic development (Leal and Marques, 2022; Want et al., 2024). Furthermore, the concept of 'weak' sustainability, which holds that, at least up to a point, human-made assets can substitute for environmental assets, was favoured over 'strong' sustainability, which saw little or no substitutability between environmental and manufactured assets. Some countries emphasised environmental and/or social considerations, but overall, the narrative prevailed that a country must become rich before it could become green or just (Leal and Marques, 2022).

The realisation that human activity is pushing Earth beyond the limits where it can safely sustain human life, however, has challenged this narrative. Scientists have defined 9 planetary boundaries to ensure a safe environment for humans (Stockholm Resilience Centre, Undated). These boundaries are interrelated, and breaching some boundaries increases the likelihood that others will be breached. Operating outside these boundaries creates a risk that large-scale or irreversible environmental impacts will disrupt the ecosystems, and the physical processes that human life depends on (Stockholm Resilience Centre, Undated). Returning to operating within boundaries is not impossible, but it is hard. Ozone depletion is one of the 9 boundaries, and phasing out ozone-depleting substances via international agreement returned it to a safe level (Richardson and Bai, 2023). The outlook, currently, is not promising. The earth has moved from breaching 3 of the 9 boundaries in 2009 to breaching 6 of the 9 boundaries in 2024. Breaching a 7th is imminent (Caesar *et al.*, 2024). This deterioration in natural systems drives energy, food, and water insecurity and increases the risk of disease, disaster, displacement, and conflict (Rockström *et al.*, 2023; Gupta *et al.*, 2024).

An evolution in international development goals accompanied a better understanding of sustainable development (Stern, 2024). Prior to 2000, progress was measured mostly in terms of GDP growth. From 2000 to 2015, the Millennium Development Goals broadened the focus to include a social dimension, specifically poverty, health, and education outcomes. The Sustainable Development Goals (SDGs) adopted in 2015 also included environmental issues, and 11 of the 17 goals relate to the environment, sustainability, or the climate. In 2015, the first major agreement to address climate change that places responsibilities on both developed and developing countries, the Paris Agreement, was signed under the United Nations Convention on Climate Change (UNFCC). Climate change was originally viewed as an environmental policy issue. As the extent to which unconstrained climate change would exacerbate existing economic, environmental, and social stresses became better understood, it became clear that, at best, climate change will increase the cost and complexity of addressing poverty and generating economic development, and at worst, make it untenable. This led to climate change being viewed as arguably the greatest policy challenge of our time.

Climate change, however, is only one of the 9 planetary boundaries – albeit one that could have a disproportionate impact on the others. The limitations of focusing on environmental, climate, economic and social goals in isolation have become clearer as the interactions between these goals have become better understood (IPBES, 2024a; Baldwin-Cantello *et al.*, 2023; Alexianu, 2019). Addressing these goals individually increases costs by foregoing synergies and risking negative feedback. Interventions targeting only climate change mitigation, like tree-planting schemes, for example, can negatively impact biodiversity and ecosystems, making communities more vulnerable to climate change's physical impacts and leading to worse health outcomes. Climate change adaptation projects (like flood defences or dams) that do not consider impacts on biodiversity can also weaken long-term climate resilience. These interlinkages and the massive

scale of investment required to limit and adapt to climate change have led to increased interest in nature-based solutions. Nature-based solutions are actions that protect, sustainably manage or restore natural ecosystems to address societal challenges (including climate change) while generating biodiversity and sustainable development benefits (Seddon *et al.*, 2020; World Bank, 2022). Nature-based solutions go beyond a desire to minimise the impact of economic activity on nature (like preventing pollution) and use the natural functions of healthy ecosystems to benefit people, nature and the climate (WWF, undated; Choi, Rao and Czebiniak, 2023). They are more cost-effective than infrastructure interventions and enable a level of long-term resilience that is beyond human-made assets.

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES secretariat, 2024), based on the findings of the *Assessment Report on the Interlinkages Among Biodiversity, Water, Food and Health* (IPBES, 2024a), highlights that environmental, climate, economic and social goals "interact, cascade and compound … in ways that make separate efforts to address them *ineffective and counterproductive* [emphasis added]." It emphasises that only through bridging the silos between these policy domains can coherent and coordinated policies and actions be crafted that will enable sustainability goals to be met.

In 1994, South Africa was ahead of the curve with respect to thinking about sustainable development. The Constitution states that "[e]veryone has the right …to an environment that is not harmful to their health or wellbeing; and …to have the environment protected, for the benefit of present and future generations" (Republic of South Africa, 1996). It further adds that one of the mechanisms through which this is to be achieved is through "secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." In terms of implementation, however, South Africa followed international trends, and until recently, the development debate focused primarily on growth and social outcomes. But like the debate internationally, the South Africa approach has also evolved to include environmental and climate considerations. This is illustrated by three of South Africa's four policy objectives for its presidency of the G20 in 2025 relating to climate change, namely: preparing for climate disasters; mobilising funding to support a just transition to low carbon energy systems; and using green industrialisation, particularly around the beneficiation of critical minerals, to support inclusive growth and sustainable development (Moodley, 2025).

The current paper questions whether climate change goals are compatible with South Africa's development aspirations. It provides the global and local climate change context and considers how South Africa's socio-economic, environmental and climate policy journey has developed across three distinct paradigms since 1994. It then considers the move to a fourth development paradigm built around a more coherent approach to jointly addressing environmental, climate, economic and social goals to move beyond South Africa's current development deadlock. The paper ends with a short conclusion.

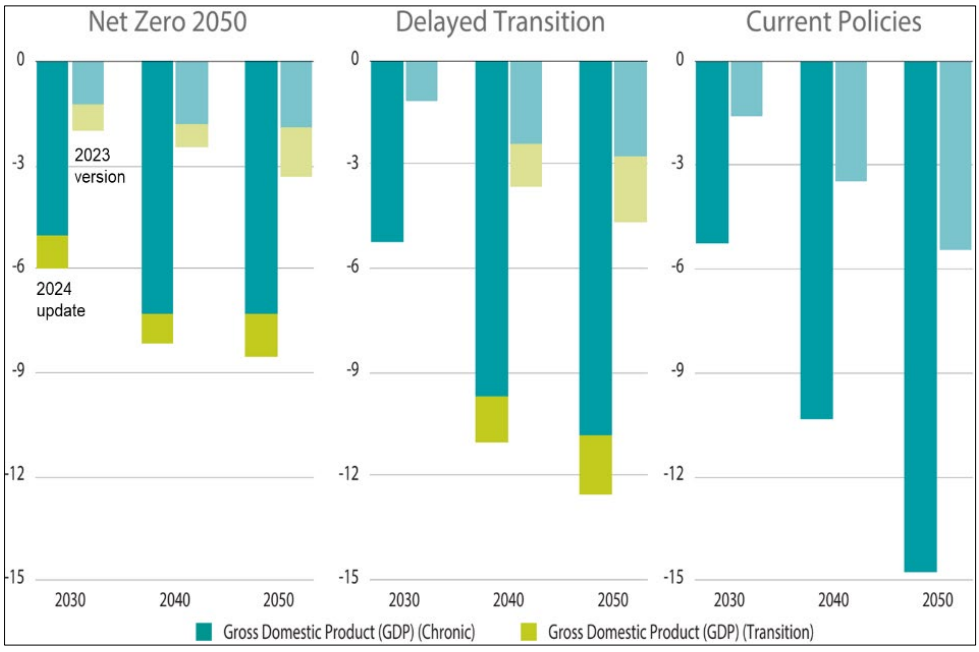
2. The changing climate

The world is expected to warm to between 2.6 and 3.1 degrees Celsius above pre-industrial levels by the end of the century (UNEP, 2024). This is a risky endeavour as humanity has no experience in dealing with climatic changes at this scale or speed. Previous periods of less rapid climate change often triggered mass extinction events (Bressan, 2024; Le Page, 2024; Stern, 2024). Current levels of climate change will significantly disrupt how, where, and how well most people will live by the end of the century.

Climate change impacts economies in two ways. **Physical impacts** originate from the observable changes in climate. These can be acute (extreme events) or chronic (gradual and longer-term changes that impact environmental, physical, and human systems). **Transition impacts** stem from the actions taken to move away from fossil-fuel-based energy and production systems to limit the release of climate change-inducing greenhouse gas (GHG) emissions. Transition and physical impacts are inversely related in that a faster transition to low-carbon economies causes great economic disruption but leads to significantly less costly physical impacts. Efforts to limit climate change are known as '*mitigation'*, whereas efforts to prepare and deal with the physical effects of climate change are known as '*adaptation.'*

Modelling the physical climate impacts is challenging because natural systems are complex, interlinked, and subject to non-linear dynamics (tipping points, cascading impacts, lags between cause and effect, etc). The economic models used to translate the physical and transition impacts of climate change into economic outcomes are not yet up to the task and tend to overestimate the costs and underestimate the benefits of mitigation and adaptation policy (Stern and Stiglitz, 2023). The 2024 update of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS)'s long-term climate scenarios, for example, showed roughly a tripling of the expected economic impact of climate change by 2050 compared to the 2023 version (NGFS, 2024a). Furthermore, Trust et al. (2025) question the way risk is dealt with in climate impact modelling and believe planning for a 50% contraction in global GDP between 2070 and 2090 is prudent unless mitigation efforts are significantly increased.

Figure 1: Impact on global GDP by NGFS scenario and climate risk (% deviation from baseline, per year)



Source: NGFS (2024b)

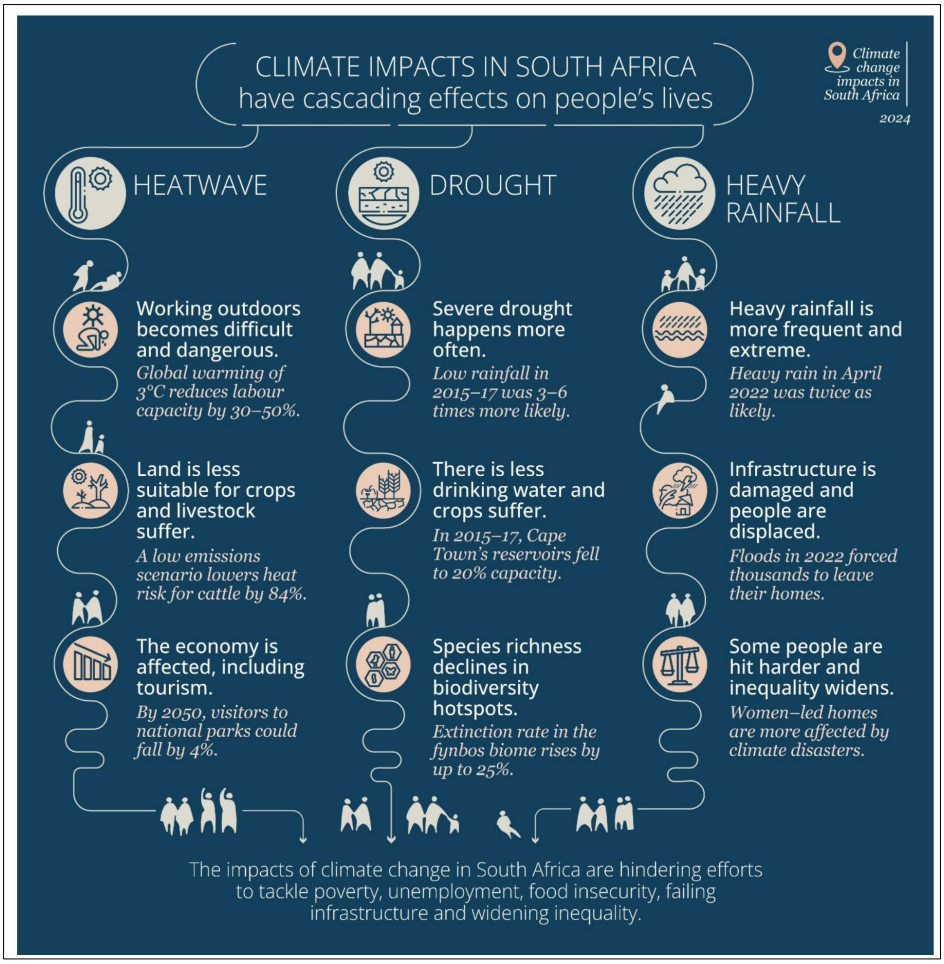
The IPCC (2019) special report considering the impact of a rise of 1.5 degrees Celsius in global temperature showed that the cost of adapting to climate change will significantly exceed the cost of limiting it even below the previously considered 'safe' level of 2 degrees Celsius. The report showed that climate impacts will increase exponentially as temperatures increase beyond 1.5 degrees Celsius, and vulnerable countries and communities will struggle to adjust to a changing climate above this level (IPCC, 2023; Cloete, 2023). To keep global temperature increases to 1.5 degrees Celsius, global CO_2 emissions need to reach net zero[3] by 2050, and other GHGs need to reach net zero by around 2070 (IPCC, 2023). The last ten years have been the warmest ten years on record. 2024 was the first full year that was 1.5 degrees Celsius warmer than the pre-industrial average. The long-term trend, which forms the aspirational goal underpinning the Paris Agreement, will likely exceed the 1.5-degree threshold within 5 to 10 years (Copernicus Climate Change Service, 2025; Rohde, 2025; WMO, 2025). The physical impacts of climate change are also materialising faster than predicted, and attribution science is increasingly able to identify a direct link between human-made climate change and extreme events. **Thus, efforts to contain climate change must now be undertaken while dealing with the increasingly severe physical impacts of climate change**.

2.1 Physical impacts

South Africa, as a country rich in biodiversity where agriculture, tourism and mining are key economic sectors, and where large parts of the country are already water-stressed, is vulnerable to the physical impacts of climate change. Climate change will have significant negative social and economic impacts via mechanisms like increased periods of extreme temperatures and heat stress, reduced water availability, reduced agricultural yields and shifting growing regions, increased incidence of water- and vector-borne diseases (like malaria, dengue fever and yellow fever), increased severity of non-communicable diseases (e.g. cardiovascular diseases, cancer, violence and injuries), increased air pollution, increased extreme weather events (which damages infrastructure and disrupts economic activity), disrupted social and biophysical support systems (via destroyed homes, displaced communities, reduced ecosystem services), negative impacts on mental and occupational health, and reduced productivity (DEA, 2013, 2018; DFFE, 2020; Scholes and Engelbrecht, 2021). These impacts will negatively impact the lives and livelihoods of South Africa, as illustrated in Figure 2.

[3] Net zero emissions mean that humans emit no more emissions than can be absorbed by natural or other processes. The flow of GHG emissions into the atmosphere is thus balanced by the amount of emissions removed from the atmosphere – leaving the concentration of emissions in the atmosphere unchanged.

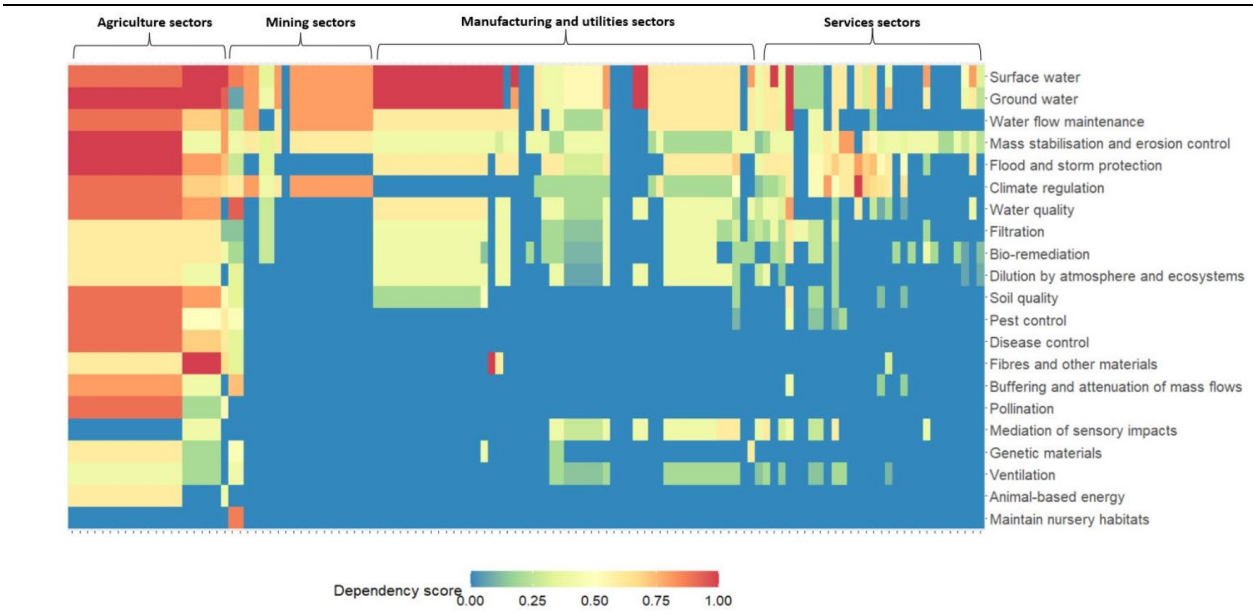
Figure 2: How climate change affects the lives of South Africans



Source: Johnston et al (2024)

Over the period 1931 to 2015, most of South Africa has warmed by at least 2 degrees Celsius above pre-industrial levels, roughly double the one-degree increase experienced globally (DEA, 2018). This has increased the number and severity of extreme weather events in South Africa. Climate zones have started to shift across the country, veld fires are more frequent, and water availability is becoming more erratic. These impacts are increasing the stress on terrestrial and marine habitats already under pressure from overutilisation, unsustainable land use change, and invasive alien species. At least 6 of the 9 biomes in South Africa are at significant risk from changing climatic conditions (SANBI, DEA and GIZ, 2018). Diffenbaugh and Burke (2019) estimate that climate change reduced South African GDP per capita growth for 1961-2010 by 11%. This is to be expected given that half of **South Africa's economic output** relies on two or more ecosystem services, and 70% of final demand, 59% of profits, 46% of wages, 40% of employment, 52% of taxes, and 83% of net exports are **highly dependent on at least one ecosystems service** (Hadji-Lazaro *et al.*, 2023). **Error! Reference source not found.** shows the direct dependency of 120 economic sectors on 21 ecosystem services. The authors point out that once indirect (first round) impacts are considered, all sectors become at least somewhat dependent on all ecosystem services. Thus, shocks to ecosystem services propagate widely throughout the economy.

Figure 3: Heatmap of direct dependency of economic sectors on ecosystem services



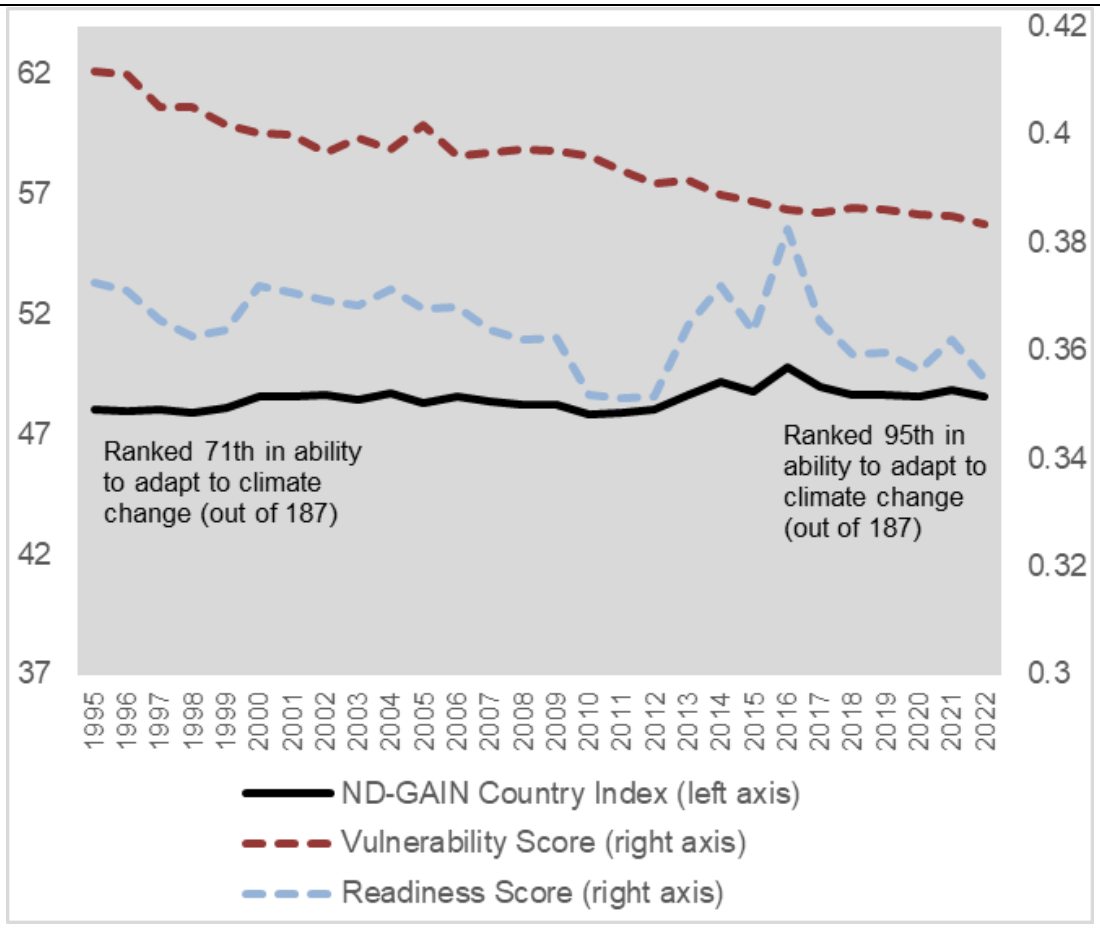
Source: (Hadji-Lazaro et al., 2023)

> **Climate change [could]** reverse the gains made toward achieving [South Africa's] Millennium Development Goals (MDGs) and **impede the country's ability to achieve the Sustainable Development Goals (SDGs)** [emphasis added].
>
> National Adaptation Strategy (DFFE, 2020).

Climate change threatens to increase the already extreme levels of economic and gender inequality in South Africa (Johnston et al, 2024). Climate change disproportionately impacts the poor and powerless who do not have the resources, networks, or access to financial instruments to effectively adapt to either the acute or chronic impacts of climate change. There is also a gender dimension to climate change, with women particularly affected given their traditional roles and responsibilities. The physical impacts of climate change will disproportionately impact the poorer areas of South Africa (World Bank Group (2022) and will weaken educational outcomes – which are already a source of poverty, inequality, and a drag on growth in South Africa (Mlachila and Moeletsi, 2019; Marin, Schwarz and Sabarwal, 2024).

South Africa will find it difficult to deal with these increased social pressures given Apartheid's legacy of poverty, low social capital and skewed spatial development patterns (DEA, 2018; DFFE, 2020). South Africa is already the most unequal country in the world with respect to the distribution of income and the third worst with respect to the distribution of net wealth (after the United States and Brazil) (Sulla et al, 2022).

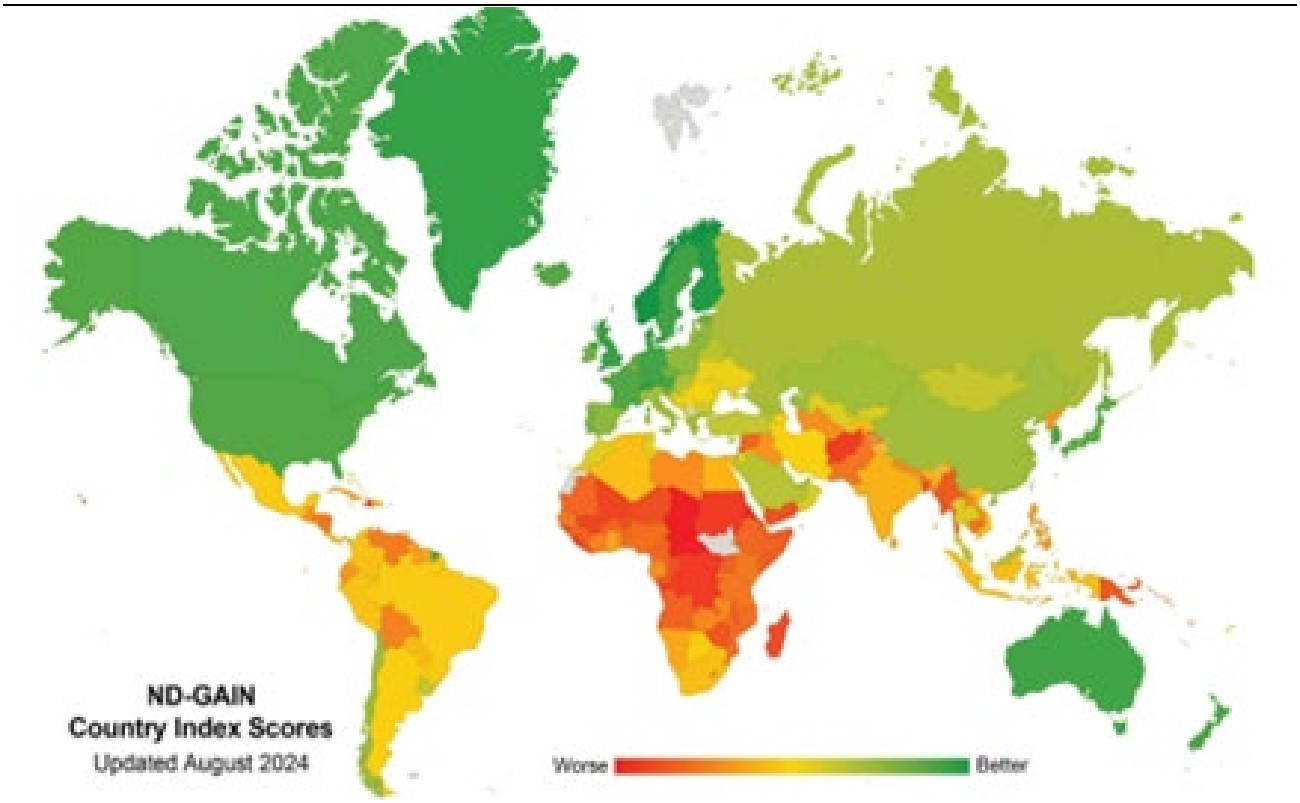
Figure 4: South Africa's ability to adapt to climate change over time



Source: ND-GAIN (2024)

South Africa's precarious starting position risks creating a vicious circle where social stresses weaken climate resilience and climate impacts exacerbate social stresses. The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index measures the ability of countries to adapt to climate change by considering vulnerability to the physical impacts of climate change and readiness to respond to these impacts. The evolution of South Africa's ND-GAIN Country index value is shown in **Error! Reference source not found.**. The decline of South Africa's Vulnerability Score over time shows that its perceived vulnerability to physical climate change has declined since 1995. The decline in the Readiness Score, however, shows that so has its resilience to climate change. Three sets of indicators comprise the Readiness Score (economic, governance and social). South Africa scores worst in social inequality, education outcomes, and innovation outcomes – indicating social stresses impede its ability to adapt to climate change. Despite a steady decline in physical vulnerability, South Africa's ability to adapt to climate change has barely increased, and its position relative to other countries has deteriorated.

Figure 5: Vulnerability of countries to climate change



Source: ND-GAIN (2024

Considering the ND-GAIN Country Index scores of countries across the globe show that South Africa's geographic position makes it vulnerable to climate-induced migration, further increasing social stresses. While South Africa's exposure is relatively average, Sub-Saharan Africa is disproportionately vulnerable and includes some of the most vulnerable countries globally[4].

Should temperatures rise to more than 2.5 degrees Celsius above pre-industrial levels, there could be up to 86 million climate migrants within Sub-Saharan Africa (World Bank, 2018). More than half of international migration within Africa occurs to other African countries, and most refugees in Africa are hosted in neighbouring countries (IOM, 2024; McAuliffe and Oucho, 2024). The latter fact, however, may change as climate change affects multiple countries simultaneously. South Africa, as the most developed economy on the continent, already draws the most migrant workers in Africa and is attracting an increasing number of irregular migrants, refugees, and asylum-seekers from both within and outside of Southern Africa (IOM, 2024). The other less-exposed countries in the region, Namibia and Botswana, both have very small populations, much smaller economies, and inequality rates not far from that of South Africa (Sulla et al, 2022). Thus, they will unlikely be able to accommodate significant numbers of climate migrants easily.

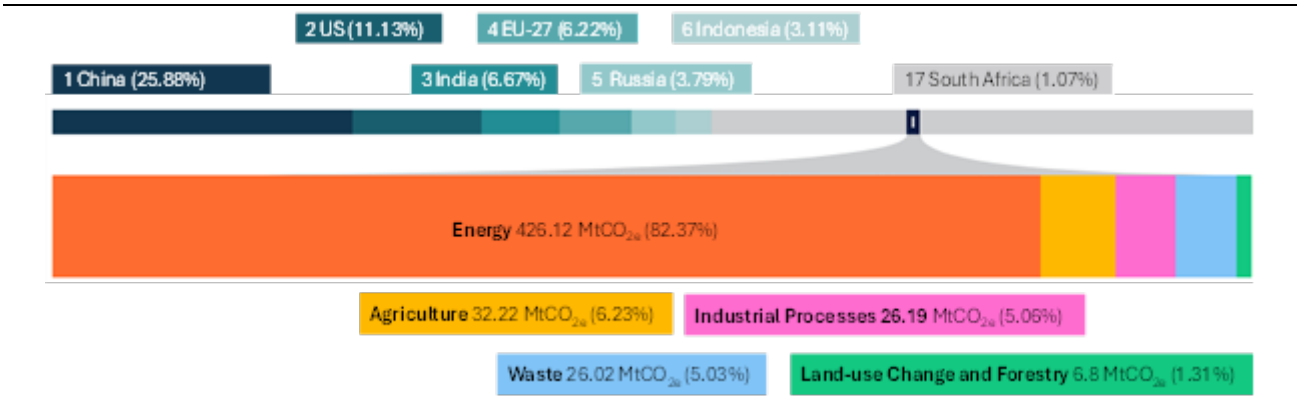
The status of South Africa's natural systems also exacerbates its vulnerability to climate change. South Africa ranks below average at 106 out of 180 countries in the aggregated 2024 Environmental Performance Index (Block et al., 2024). Regarding ecosystems' ability to adapt to climate change, South Africa is ranked slightly worse (110th). South Africa's scores for air quality (152nd) and Sanitation and drinking water (144th), however, are significantly worse and increase the likelihood of negative social impacts because of climate change.

[4] Cloete (2024) found a similar result using the Global Data Lab (GDL) Vulnerability Index for 2020.

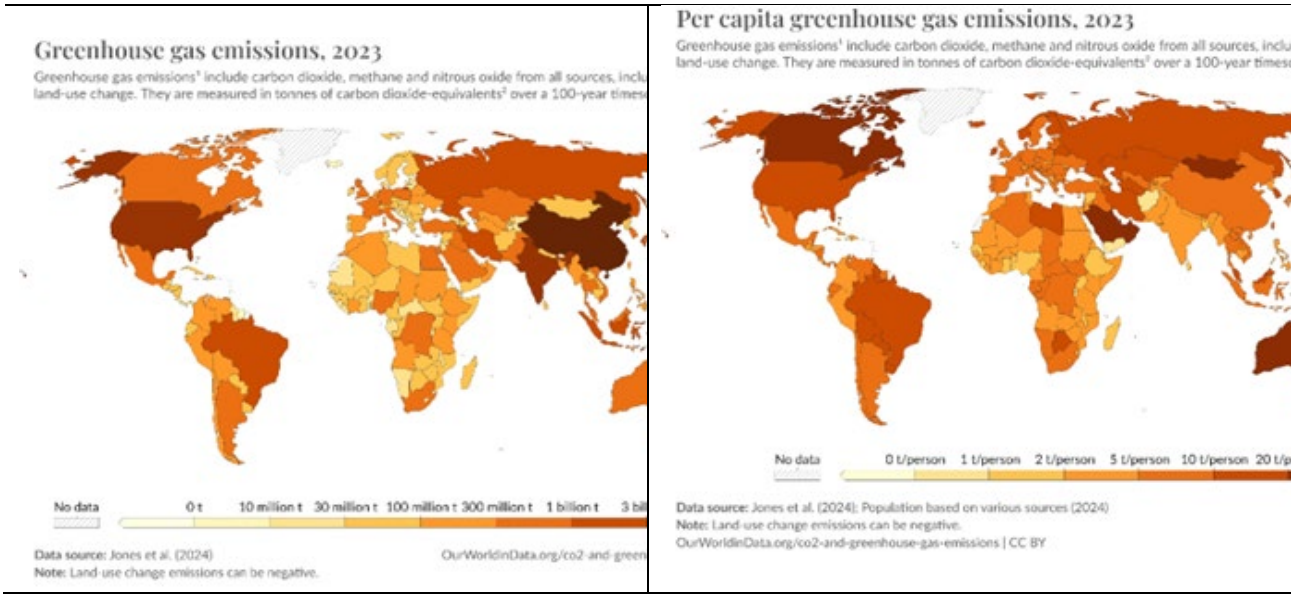
2.2 Transition risks

South Africa is a relatively large emitter of the greenhouse gasses (GHGs) that cause climate change. **Error! Reference source not found.** shows South Africa's annual emissions by GHG emissions by source and relative to the largest emitters globally.

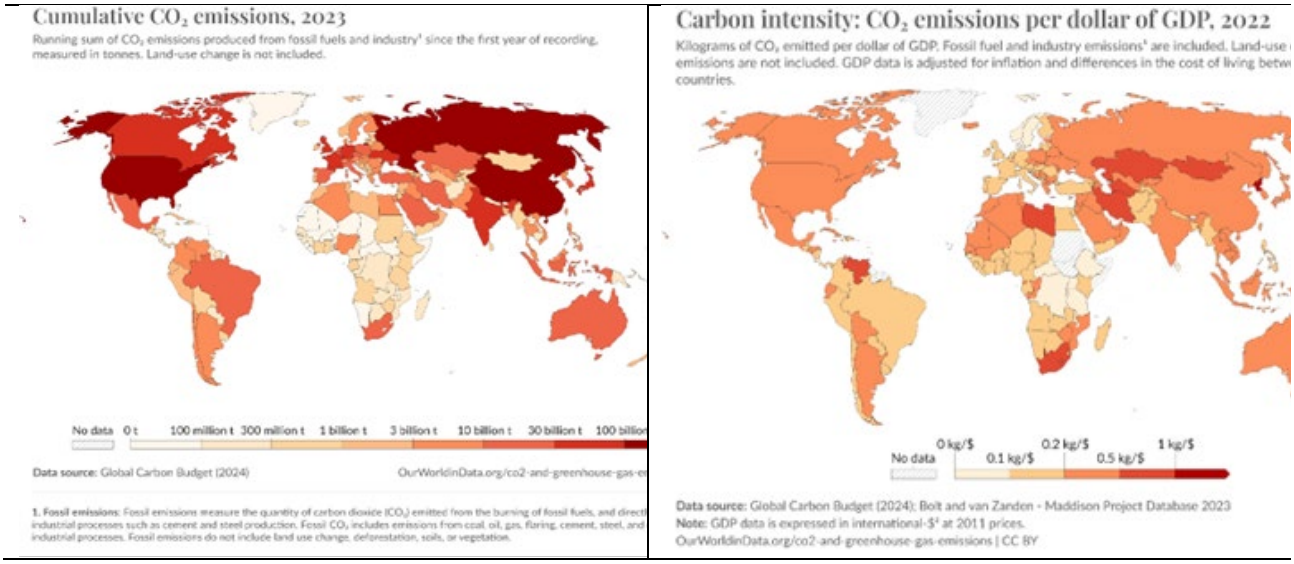
Figure 6: South Africa's GHG emissions



Source: Adapted from Climate Watch (Undated) and other Climate Watch data[5]

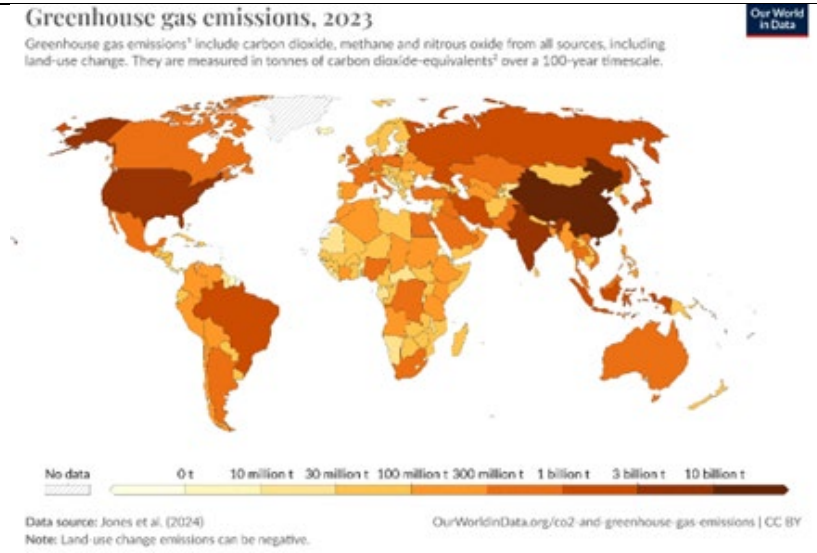


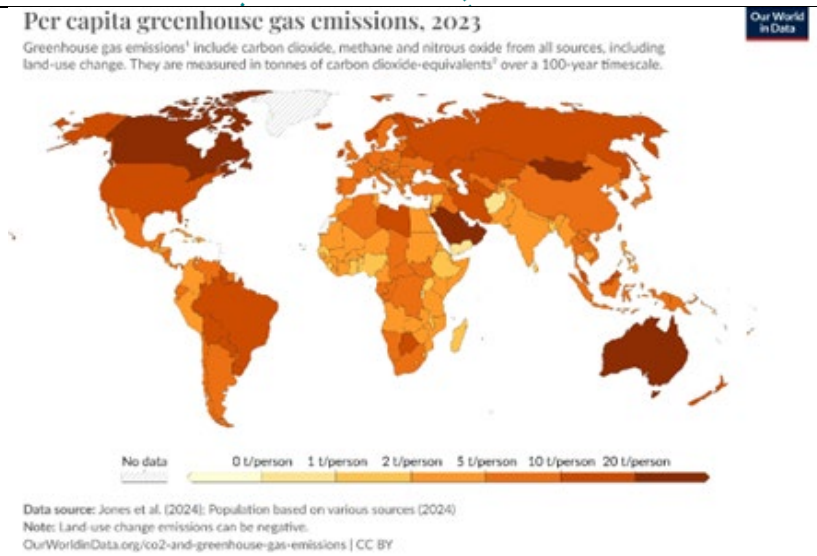
[5] Individual emissions differ marginally when compared to other sources. South Africa's draft 9th National Greenhouse Gas Inventory Report released for comment on the 2nd of May 2024, for example, shows that when land use is included with land use change and forestry (LULUCF), it becomes a small net sink of emissions rather than a source of emissions. PCC (2024) state that South Africa is the 15th largest emitter internationally. The overall picture, however, is consistent with other sources.

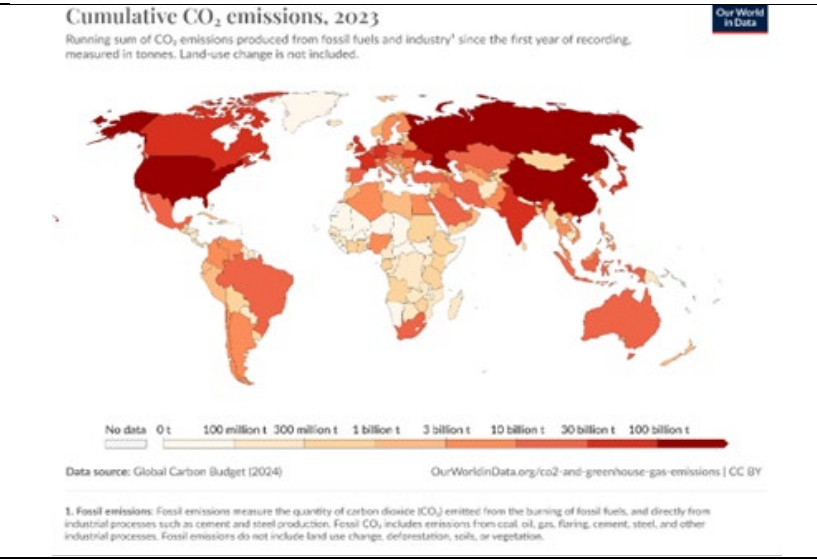


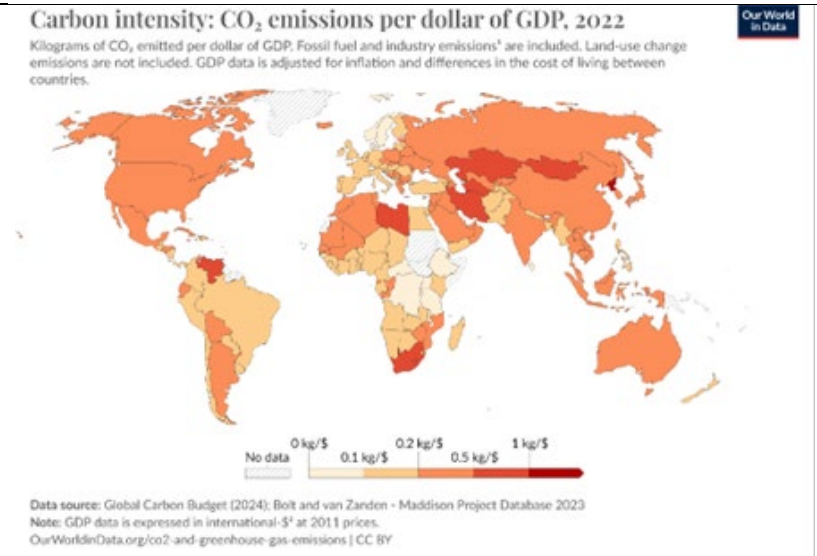
provides more context of South Africa's emissions from a global perspective. While South Africa's total, per capita and cumulative historical emissions are high compared to the worldwide average, they are significantly smaller than those of the worst emitters. Where South Africa does stand out, however, is the carbon intensity of its economy – which is significantly worse than its main trading partners. Only five countries have more carbon-intensive economies (i.e. Venezuela, Libya, Turkmenistan, Mongolia, and North Korea). South Africa is thus very exposed to transition impacts linked to efforts to reduce climate change. This is particularly true for trade measures like carbon border adjustment measures, since the economy is not only very carbon intensive, but it is also located far from its main trading partners.

Figure 7: South Africa's GHG emissions within a global context





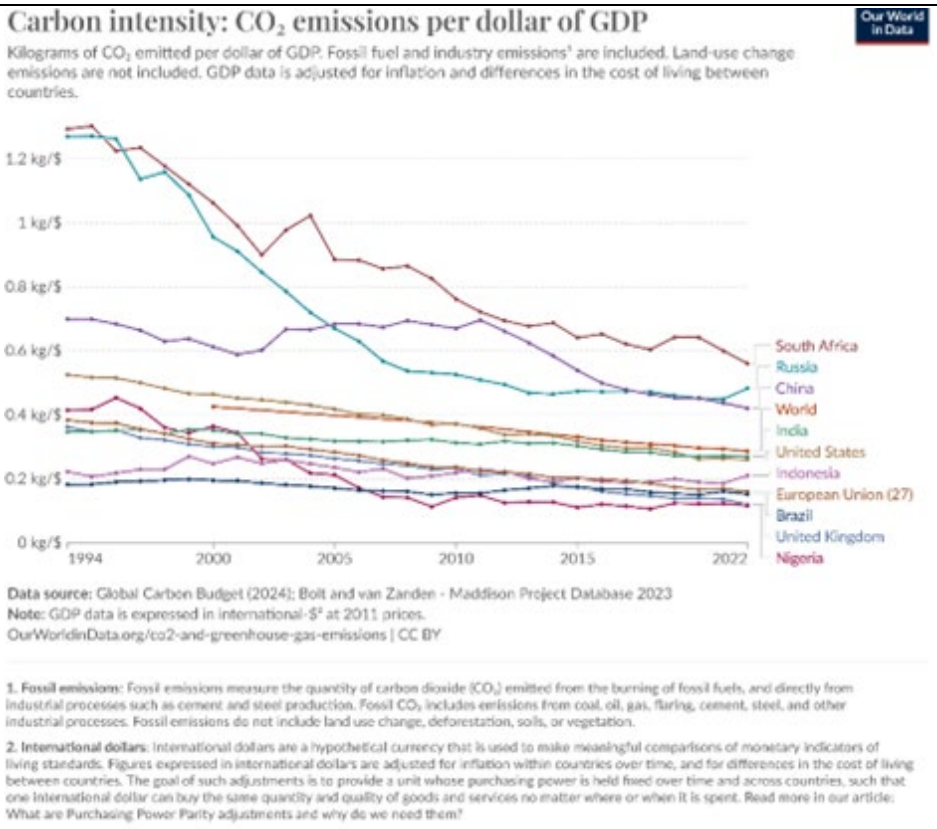




Considering only the local sectors most exposed to transition risk (coal, liquid fuels, and electricity generation), Huxman et al (2019) find that the present value of stranded assets in South Africa up to 2035 could be more than $120bn (Huxman, et al., 2019). Vivid Economics (2021) find that transition risk to 2050 reduces the net present value of a portfolio of the largest companies on the JSE (covering 80% of the JSE's market cap) by between five and eight percent – with the value of companies in some sectors falling by significantly more (up to 87% for Upstream Energy, 51% for Chemicals, Plastic and Rubber Materials, 26% for Mining and Mineral products, and 24% for Manufactured Products). This is likely an underestimation. Estimates of local mitigation requirements increased significantly in later updates of the NGFS scenarios on which the modelling was based.

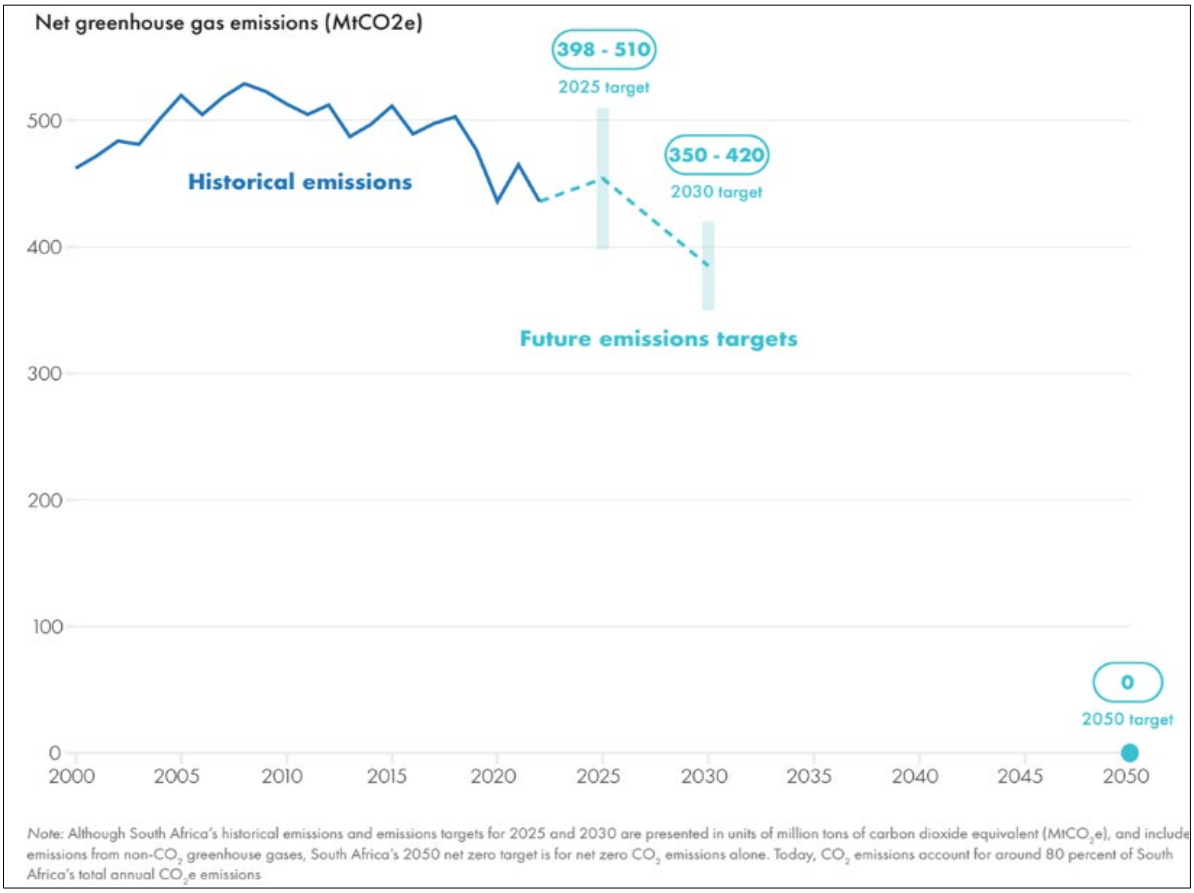
The carbon intensity of the South African economy fell since 1994. This is probably not due to mitigation policy. **Error! Reference source not found.** shows that the pace of decarbonisation slowed after 2005, many years before South Africa's climate change policy was fully formed. The National Climate Change Response Policy was only published in 2011. It is also not linked to the deindustrialisation of the South African economy. Hausmann et al (2023) shows that South Africa deindustrialisation accelerated significantly after 2008. A significant adjustment of the decarbonisation trend, however, is not visible in **Error! Reference source not found.**. Hausmann et al (2023), however, finds a significant deterioration in South Africa's growth trajectory after 2005. Stern (2024) mentions that the expected benefits from investment in new green technologies depend on the expected size of the market for these technologies, which is affected by economic growth. It is thus possible that the reduction in carbon intensity of the South African economy since 1994 was driven by investment in newer and more efficient technologies, and that investment in these technologies fell as growth prospects deteriorated after 2005.

Figure 8: Carbon intensity of the South African economy since 1994



Given South Africa's vulnerability to both physical and transition risk, it is not surprising that the country has taken a prominent role in trying to advance global actions to limit climate change while recognising the special needs of developing countries. In 2009 South Africa was one of the first developing countries to acknowledge the need for all countries to accept quantitative emissions targets and unveiled its first international climate mitigation commitment in the runup to the 15th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP15) in Copenhagen. Together with Brazil, India, and China (as the BASIC negotiating group) South Africa also played an important role in facilitating the Paris Agreement at COP21 in 2015.

Figure 9: South Africa's international GHG emissions reduction targets



Source: PCC (2024)

As a party to the Paris Agreement, South Africa is committed to keeping climate change to well below 2 degrees Celsius, while aiming to limiting climate change to 1.5 degrees Celsius. South Africa has committed to emissions targets for 2025 and 2030, and to adopting a net zero CO_2 emissions by 2050 goal in future (see Figure 9) (PCC, 2024). These targets are conditional on developed countries providing support to developing countries to meet their mitigation and adaptation objectives (RSA, 2021). While local studies indicate that South Africa will meet its 2025 and 2030 targets if all existing polices and measures are implemented, some international studies question this (PCC, 2024). Figure 9 shows that South Africa's mitigation efforts will have to be significantly increased if it is to achieve net zero emissions by 2050.

3. South Africa's post-Apartheid policy journey

The "triple global challenge" of environmental degradation, climate change and equitable development" (WWF, undated) has long been areas of focus in South Africa. Since 1994, however, like the rest of the world, South Africa attempted to deal with these challenges individually, and the initial focus was primarily on growth and social outcomes. South Africa's development policy journey since 1994 is described as three distinct periods below.

3.1 Period 1: Growth and Development (1994 – 2009)

The initial post-apartheid period prioritised socio-economic redress and growth. Environmental policies only entered the development debate in as far as pollution control moderate the negative environmental impact of growth.

The **Reconstruction and Development Programme (RDP)** framework, launched by the African National Congress (ANC) in 1994, was South Africa's first comprehensive development policy post-apartheid. It aimed to address the socio-economic disparities created by apartheid, focusing on critical areas like housing, healthcare, and job creation. The framework acknowledged the extent which Apartheid led to very unequal access to natural resources and ecosystems services and noted that "poverty and environmental degradation [are] closely linked" (ANC, 1994). Consequently, it dedicated a section to environmental policy and addressed issues like water and energy access, sanitation, and conservation. Though the term "sustainable development" was not explicitly used, the RDP framework aimed to balance ecological integrity with socio-economic upliftment.

The RDP white paper that formalised the new democratic government's policy agenda, however, while still envisioning a "sustainable and environmentally friendly growth and development path" and calling for the "[effective] protection and sustainable use of the environment for the benefit of all", deprioritised environmental concerns relative to economic and social considerations (RSA, 1994). This revealed the difficulties in reconciling economic growth with environmental justice within the 'growth first' paradigm.

The **Growth, Employment, and Redistribution (GEAR**) policy, adopted in 1996, marked a significant shift in South Africa's economic approach, adopting a neoliberal framework that prioritised fiscal responsibility, economic growth, and the attraction of foreign investment. While GEAR helped to stabilise the economy and brought inflation under control, it sidelined environmental considerations. The emphasis on industrial growth and a lack of environmental safeguards led to increased environmental degradation, especially in the mining sector, which expanded significantly during this period. While economically beneficial, the mining sector's growth contributed to pollution, unsustainable land use change, and soil degradation, which would require future policies to address. A notable example is the acid mine drainage (AMD), a legacy of mining operations predating the National Environmental Management Act (NEMA) of 1998. AMD refers to acidic water from old mine shafts contaminating surrounding ecosystems. AMD and other long-term liabilities linked to mine closure that ended up vesting in the state serve as a stark example of how historical regulatory failures and siloed thinking can impose ongoing environmental and financial burdens on future generations (McCarthy, 2011).

The enactment of the **National Environmental Management Act (NEMA) (1998)** represented a landmark moment for environmental legislation in South Africa. NEMA introduced environmental

assessments as mandatory prerequisites for development projects, emphasizing the need to balance economic activities with environmental sustainability. This Act marked a shift in South African policy, acknowledging environmental concerns within the legislative framework of economic growth. The emphasis, however, was still very much on reducing the impact of growth on the environment rather than acknowledging the role that environmental protection and sustainable use could play in supporting sustainable development. The impact of NEMA was also limited by inconsistent enforcement and the lack of integration with broader economic policies like GEAR.

The 2006 draft policy paper on **Environmental Fiscal Reform (EFR)** in South Africa considered how fiscal policies could advance sustainable development. It proposed environmental taxes, market-based interventions, and subsidy reforms to address climate change, biodiversity loss, and environmental degradation. The EFR suggested incrementally replacing distortionary taxes on income and expenditure with environmental and economic efficiency-enhancing Pigouvian taxes (National Treasury, 2006). A carbon tax was central to this by addressing the externality costs of greenhouse gas (GHG) emissions (i.e. climate damage) and shifting the burden to polluters. A relatively broad-based carbon tax levied at a relatively low rate was proposed that would increase over time to strengthen incentives to reduce GHG emissions while avoiding significant economic disruption. At the time, support for carbon pricing amongst developing countries was almost non-existent, and South Africa was viewed as progressive. When eventually implemented in June 2019, however, the carbon tax was significantly more complex than envisioned in the EFR and deviated from the proposed uniform broad-based carbon price. The carbon price signal was diluted by arrangements that prevented the carbon tax from impacting the price of electricity, and the tax has increased much slower than expected and all indications are that this is set to continue for the foreseeable future.

The EFR proposed earmarking tax revenues for environmental initiatives, drawing on international experience. The evolution of instruments like the plastic bag and tyre recycling levies, however, highlighted the challenges in spending environmental revenues without strong institutions to channel the funds – leading to issues with transparency, effectiveness, and underspending (Dikgang, Leiman, and Visser, 2010). This created a general hesitancy within the National Treasury for on-budget earmarking and led to a preference for 'soft earmarking' where environmental taxes and fees are absorbed into the general budget and partially offset by other environmentally friendly subsidies. This weakened the link between the tax instruments and expenditure and reduced public support for environmental taxes. The EFR also supported reforming perverse subsidies with environmentally harmful outcomes, like the diesel refund for primary production and VAT zero-rating for pesticides and fertilizers (National Treasury, 2006; Blignaut et al., 2008). These subsidies, however, persist, driven by concerns around increased operational costs and potential impacts on food security and employment.

Many of the ideas in the EFR eventually filtered into fiscal policy, but only many years later and its intentions were not fully realised. It remains in draft form and was never updated or formally adopted

The release of the **Accelerated and Shared Growth Initiative of South Africa (ASGISA)** in 2006 signalled a shift away from an emphasis on creating a favourable investment to support economic growth, as exemplified by GEAR, towards a more interventionist approach via industrial policy. AsgiSA set ambitious targets to accelerate economic growth and reduce poverty, targeting a 6% annual growth rate by 2010 to meet (and exceed) South Africa's MDGs. It aimed to foster an inclusive economy by supporting job creation and investing in infrastructure, skills development, and small and medium-sized enterprises (SMEs). It advocated for identifying and addressing cross-cutting and

sector-specific constraints on growth in high-potential sectors through strategic programmes (The Presidency, 2006; The dti, 2007). Although the program encouraged sustainable practices in sectors like tourism and agriculture, it did not holistically address environmental concerns. The focus remained heavily on economic growth rather than environmental stewardship, and, notably, it did not define any ecosystem resources as binding constraints on economic growth (Swilling, 2006).

The **National Industrial Policy Framework NIPF** and **Industrial Policy Action Plans (IPAPs)** were instruments to achieve the ambitious ASGISA development goals. The NIPF advocated alleviating constraints to growth in specific high-potential sectors (The dti, 2007). The IPAPs set out to do this to increase industrial capacity in high value-added and highly labour-intensive industries like agro processing, the automotive industry and business process outsourcing. It set out to do this via sector-specific support, public procurement, localising value chains and trade measures. Zalk (2014) notes that the NIPF was designed to address structural economic issues, such as dependence on the Minerals-Energy Complex (MEC) and low-value commodity production. Post-2007, the IPAPs began incorporating "green industrialisation" in line with increased global interest in a 'Green New Deal' post the global financial crisis. Updated annually, it increasingly emphasised green sectors like renewable energy and waste management (Rivett-Carnac, 2008). Green industries, however, were treated as a single 'sector', with the emphasis on creating green manufacturing component value chains, rather than using technologies or applications to 'green' the economy. While the NIPF and the IPAPs initially focused on expanding economic activity in new or growing sectors, the focus over time shifted to import replacement (localisation) in existing markets. A lack of coordination between policy areas also led to disappointing outcomes. Significant early success in creating local industrial capacity to supply the local renewable energy industry was undone by efforts by the DMRE and Eskom to effectively pause the highly successful Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

3.2 Period 2: Climate-Conscious Growth (2010 – 2019)

By the late 2000s, climate concerns and the need for sustainable development gained greater prominence within national policy and environmental sustainability started to be embedded within South Africa's long-term economic planning. The 'green economy,' however, was framed as a sector within the wider economy rather than a desirable objective for the entire economy

The New Growth Path (NGP), introduced in 2010, included efforts to increase employment in the 'green economy' in addition to more traditional focus areas like infrastructure investment, agricultural and mining value chains, manufacturing, tourism and service industries. The plan included goals for renewable energy projects and sustainable agricultural practices. The Green Economy Accord, flowing from the NGP, represented a collaborative effort between the government, labour unions, business, and civil society to drive the country's transition to a green economy. Signed in 2011, the Accord outlined commitments to create green jobs, expand renewable energy infrastructure, and promote energy efficiency across industries. It also emphasized skills development and capacity building to ensure that the workforce could adapt to the demands of a greener economy. This initiative underscored South Africa's commitment to addressing climate change while leveraging the associated economic opportunities (Department of Economic Development, 2011).

The NGP faced criticism for setting overly ambitious targets, such as creating five million jobs by 2020, without the structural reforms needed to achieve them. The main shortcoming of the NGP from a sustainable development perspective was that it continued to frame the 'green economy' as a sector

rather than a desirable objective for the entire economy. Thus, it did not consider the complexities inherent in driving a cross-cutting transformation to a low-carbon and resilient economy (UNEP, 2020).

The **National Strategy for Sustainable Development (NSSD),** launched in 2011, outlines how sustainable development could be supported by integrating economic, social, and environmental priorities. It builds on the 2008 National Framework for Sustainable Development (DEA, 2008). The NSSD recognises the role of South Africa's rich biodiversity as a driver of socio-economic development and advocates for addressing environmental risks like climate change, biodiversity loss, and water scarcity to ensure sectors like agriculture, mining, and tourism can continue to generate economic growth (DEA, 2011). Five strategic priorities underpin the NSSD, namely 1) integrate planning and implementation across government and sectors to ensure cohesive, sustainable approaches to land use and resource management; 2) conserve ecosystems and efficiently use natural resources to generate long-term benefits; 3) transition to a low-carbon economy through renewable energy, energy efficiency, and green technology; 4) build sustainable communities to address social inequality and enhance resilience via improved access to services; and 5) build resilience to climate change impacts through adaptation measures like disaster risk management and climate-smart agriculture. Despite its development objectives, the NSSD failed to gain traction beyond the realm of environmental policy, and unlike the National Climate Change Response Policy discussed below, it did not meaningfully influence economic planning.

South Africa's climate change response strategy addressed the nation's vulnerability to climate variability and extreme weather events. The **National Climate Change Response Policy** established a framework for building resilience across key sectors, ensuring sustainable development, and safeguarding the most vulnerable communities (DEA, 2011). The Policy built on the extensive work undertaken to develop the National Climate Change Response Green Paper in 2010 and incorporated comments received during a broad-based consultation process. The Response Policy covered both mitigation and adaptation, and biodiversity and ecosystem services played a central role in adaptation, emphasizing the conservation and rehabilitation of natural systems to buffer climate impacts. Urban settlements were guided by policies promoting water-sensitive designs, thermal-efficient housing, and sustainable land-use practices, while rural communities were empowered through education and economic diversification initiatives. Disaster risk reduction was strengthened by early warning systems, regional collaboration, and tools like the South African Risk and Vulnerability Atlas, which improved resilience to extreme weather events. The policy is implemented through coordinated, cross-sectoral efforts and will be reviewed every five years to align with scientific advances and socio-economic priorities. This iterative process ensured that South Africa remained responsive to emerging climate challenges and opportunities for sustainable development. The Response Policy reflected a commitment to building a climate-resilient society while contributing to global climate goals. By integrating adaptation measures across sectors, the nation aimed to safeguard its people and ecosystems against the impacts of climate change, ensuring a just and sustainable future. The National Climate Change Response Policy did influence the broader development debate and was extensively quoted in the National Development Plan.

The National Development Plan (NDP) 2030 heralded a paradigm shift in South Africa's approach to sustainable development by emphasising the interconnectedness of environmental health, socio-economic development, and long-term national resilience. It framed environmental stewardship and sustainable resource use as critical to reducing poverty and inequality and ensuring intergenerational equity. It stressed the necessity of balancing economic development with environmental preservation

and positive social outcomes. In doing so, it aimed to create a vision of a resilient, inclusive, and sustainable future. To realise this vision, it advocated for policy coherence and the alignment of governance and planning across sectors, and favoured partnerships between government, the private sector, and civil society. It included strategies for transitioning to a low-carbon economy while emphasising the importance of adaptation. It called for a just transition to ensure the shift to a low-carbon economy did not disproportionately burden vulnerable populations. This included the creation of green jobs, reskilling of workers in carbon-intensive industries, and addressing energy poverty to reduce inequality.

Despite stressing the need for sustainable land-use practices, effective water resource management, and ecosystem protection to ensure ecological resilience, the NDP's recommendations elevated climate above other environmental issues (NPC, 2012). It also included shortcomings that reduced its ability to support green industrialisation (UNEP, 2020). These include environmental objectives not receiving equal attention, embedded support for fossil fuels and other carbon-intensive sectors, no clear indication of the actions needed to achieve its goals, and insufficient attention being paid to socioeconomic and development trade-offs.

The **Reimagined Industrial Policy (RIS)** strategy was announced in the 2019 State of the Nation Address. It reintroduces GEAR's focus on stable macroeconomic conditions as a driver of industrial development and expands the mostly informal consultation processes that underpinned the development of IPAPs into masterplans to create a system where government, the private sector, and labour collectively developed and implemented plans at the industry level (The dtic, 2024). But, while attempting to increase the effectiveness of industrial policy implementation, the RIS essentially doubled down on the economic development approaches followed since 1994. Issues like deteriorating state capacity, crumbling infrastructure and the electricity crisis were positioned as "emerging constraints" on growth to be addressed jointly with South Africa's existing structural issues. Furthermore, in addition to providing basic services and infrastructure, regulating economic activity, and reducing inequality, the RIS envisaged an increasingly weak state playing a more "entrepreneurial role and taking ... risks to enable the economy to grow" (Ramaphosa, 2019).

The RIS continues the existing approach of framing the green economy as a 'sector' or set of value chains to be grown rather than a large-scale structural transformation of the South African economy. Mitigation and adaptation are not considered at the national level, and no coherent framework for dealing with green industrialisation is proposed. Instead, masterplans like the Renewable Energy Masterplan, the Automobile Masterplan, the Steel and Metal Fabrication Masterplan and the Mining and Beneficiation Masterplan are developed in isolation (Collier et al, 2024).

3.3 Period 3: Climate action as growth driver (2020 – 2025)

The COVID-19 pandemic, combined with the increasing understanding of the impact of the climate and biodiversity crisis on economic growth, has reignited interest in green growth as a form of fiscal stimulus and led to, for example, the European Green Deal policy package and the US Inflation Reduction Act. These ideas are also visible in South African policy. Climate action is thus increasingly viewed as a driver of economic growth, albeit one that is contingent on international support and embedded within the energy sector. However, a coherent approach to jointly addressing economic, social and environmental goals remains elusive.

South Africa's Low-Emission Development Strategy (LEDS) 2050 emphasizes the country's commitment to achieving a low-carbon and climate-resilient economy, rooted in its obligations under international agreements like the Paris Agreement. The strategy built on decades of policy development, including the National Climate Change Response Policy and the National Development Plan, to define a long-term vision for mitigating and adapting to climate change while advancing socio-economic objectives. The urgency of reducing greenhouse gas emissions across key sectors, including energy, industry, agriculture, and waste management, is emphasised. (DFFE, 2020). The LEDS also emphasises climate adaptation, particularly in vulnerable sectors like Agriculture, Forestry, and Other Land Use (AFOLU), which has a dual role in emissions reduction (via carbon sequestration) and building climate resilience. The LEDS reiterates support for a just transition and acknowledges the socio-economic complexities of transitioning away from coal, particularly the displacement of workers in coal-dependent regions, while ensuring the benefits of low-carbon development are broadly shared, including amongst marginalized groups. It also flags the importance of mobilizing financial resources, enhancing research and development, and fostering international cooperation to ensure a just transition. Particular attention is paid to the challenge of policy silos across national departments and different levels of government. It stressed that overcoming policy silos required robust institutional arrangements, enhanced interdepartmental collaboration, cross-sectoral frameworks, strong governance mechanisms, and inclusive stakeholder engagement.

The **National Climate Change Adaptation Strategy (NCCAS)** articulates South Africa's approach to adapting to the impacts of climate change. It provides a framework for domestic policies and strategies, incorporating climate adaptation as a key component of sustainable development (DFFE, 2020). This strategy emphasises addressing vulnerabilities in critical sectors such as water, agriculture, health, biodiversity, and infrastructure while building societal resilience (DFFE, 2020). It prioritises the mainstreaming of adaptation into economic planning. Notably, it incorporates gender-responsive measures and focuses on empowering marginalized and vulnerable populations, including women, children, and the elderly, to enhance climate resilience. The strategy includes interventions to improve early warning systems, strengthen governance, develop new financing mechanisms, and provide a roadmap for policy coherence across national departments, provinces, and municipalities. It also supports public-private partnerships and calls for international funding support. Regular reviews and updates should capture advancements in scientific research and changing climate change scenarios.

The Economic Reconstruction and Recovery Plan (ERRP) was introduced in 2020 in response to the economic disruptions caused by the COVID-19 pandemic, aiming to stimulate growth, create jobs, and stabilize public finances. It includes a wide-ranging policy response that covers most areas of the economy and economic policy. This includes the 'green economy' and support for water and energy efficiency. The green economy framework emphasizes the needs of historically marginalized groups, including women, youth, and persons with disabilities, and prioritises their access to financing, training, and green business opportunities. The plan recognizes the importance of aligning with global climate commitments and leveraging international green finance, including issuing green infrastructure bonds and accessing global climate funds. But, as with previous policy documents, the focus is on developing green value chains and green industrialisation to generate co-benefits from green industries rather than generating a more sustainable wider South African economy. A rapid evaluation of the ERRP by the DPME in 2023 found that the green economy objectives had not yet been achieved and mentioned that a lack of a coherent theory of change and measurable outcomes complicated monitoring and evaluation efforts. It also stated that implementation of the ERRP is hampered by a lack of representation for Provincial Government, State-Owned Enterprises, Metros

and private sector firms in the Economic Sectors, Investment, Employment, and Infrastructure Development (ESIEID) Cluster overseeing the ERRP (DPME, 2023).

Around the time the ERRP was launched, **Operation Vulindlela** was established in October 2020 by the Presidency and the National Treasury to fast-track the delivery of reforms in key network industries by addressing obstacles and delays to ensure the execution of policy commitments. One of its most significant contributions was in the electricity sector, where it facilitated regulatory changes to allow greater private sector participation in renewable energy generation. While Operation Vulindlela could address blockages to sustainable development policies, longer-term efforts should focus on initiatives to increase public sector capacity and ensure coherent policymaking and better coordination across government.

At the COP26 in Glasgow in 2021, a first-of-a-kind Just Energy Transition Partnership (JETP) was launched between South Africa and France, Germany, the United Kingdom, the European Union, and the United States (forming the International Partners Group (IPG). The IPG undertook to mobilise US$8.5 billion over five years to support South Africa's just energy transition (The Presidency, 2022a, 2022b). **South Africa's Just Energy Transition Investment Plan (JET IP)** (**2023-2027),** released in 2022 and approved by the cabinet in 2023, facilitates the JETP. It outlined a strategy to transition towards a low-carbon, climate-resilient economy while maintaining energy security and economic growth. It calculated that this would require ZAR 1.5 trillion (US$98.7 billion) in funding over five years. The plan emphasized renewable energy expansion, coal plant decommissioning, and economic diversification to reduce South Africa's fossil fuel dependence and create new opportunities. It also emphasised investment in electricity transmission, new energy vehicles (NEVs), green hydrogen activities, skills development, and municipal capacity building. The JET IP emphasises that "a just energy transition can attract investment, create new industries and jobs, and help us to achieve energy security and climate resilience", thus making it clear that "*there is no trade-off between tackling climate change and supporting economic growth* [emphasis added]" (The Presidency, 2022a). While this message is encouraging, the fact that the JET IP is positioned as reliant on international finance to be successful undermines this message.

In 2020, the Presidential Climate Commission (PCC) was created to oversee South Africa's just transition (PCC, 2024). In 2022, it published the **Just Transition Framework**, which provides a comprehensive approach to South Africa's transition to a low-carbon, climate-resilient economy. The Framework emphasizes the role of labour in achieving a just transition, noting that the shift from fossil fuels, particularly coal, to cleaner energy sources would profoundly affect workers and communities dependent on the coal value chain. It highlights the need for active labour market policies, public and private sector collaboration, and investments in education systems to create pathways for workers to transition to green jobs. It also emphasises the urgency of addressing spatial disparities, as coal production was geographically concentrated, exacerbating the risk of localized economic collapse. A phased and inclusive approach is proposed that includes social protection mechanisms and community-focused economic diversification plans. It also calls for systemic changes to governance, financing, and workforce planning to ensure a just transition for the benefit of all South Africans. The just transition is largely still framed as an energy transition in South Africa. The energy transition on its own, however, will not significantly increase resilience or economic inclusion, and the impacts of the transition will be felt in sectors outside the coal value chain (Collier et al, 2024). Encouragingly, the focus of the just transition in the Framework and other PCC publications has broadened to include other sectors (like agriculture, tourism, and the auto industry), issues (like water access and

urbanisation) and adaptation (including using nature-based solutions) (PCC, 2022; PCC and NCE, 2022; Cartwright et al, 2022).

The **Climate Change Act** promulgated in 2024 supplements the National Environmental Management Act (NEMA) and provides a legislative framework for achieving a low-carbon, climate-resilient economy and society (Climate Change Act, 2024). The Act emphasizes coordinated responses across all levels of government, facilitated through Provincial and Municipal Climate Change Forums, to ensure climate risks are also factored into local and regional planning. It also provides clear objectives for enhancing resilience in vulnerable sectors, including agriculture, water, and biodiversity. Moreover, the Act formally established the Presidential Climate Commission to guide and monitor climate actions. The Climate Change Act introduced sector-specific emissions targets (to be enforced by the government) and carbon budgets (imposed on large public and private sector emitters) as key mechanisms to reduce greenhouse gas (GHG) emissions in South Africa. Carbon budgets, defined as the total allowable GHG emissions allocated to specific sectors or entities over a set period, aim to align entity-level actions with national climate commitments. Initially implemented as a voluntary measure under the National Environmental Management: Air Quality Act (NEMA), the carbon budgets evolved into mandatory instruments under the Climate Change Act. In addition to carbon budgets, the Act emphasises stakeholder and public participation in shaping climate policies, reinforces the principle of a just transition, and prioritises evidence-based decision-making informed by the latest climate science.

Establishing South Africa's **Government of National Unity (GNU)** in 2024 marked a critical juncture for climate and environmental policy. A diverse coalition of political entities now governs and shapes policy. The GNU's emphasis on inclusivity has facilitated broader collaboration, yet the diversity of views within this coalition also demands rigorous consensus-building to implement cohesive strategies. The GNU's multiparty nature introduces a mix of ideologies, which can enrich policy debates but also risks delays if consensus is lacking. Each coalition partner brings unique priorities, influencing areas like renewable energy investment, industrial decarbonization, and just transition frameworks. (PCC, 2024). This creates opportunities for exploring new approaches to sustainable development.

The **Draft National Biodiversity Economy Strategy (NBES)** promotes sustainable use, equitable access, and conservation of South Africa's natural resources. It builds on the White Paper on Conservation and Sustainable Use of South Africa's Biodiversity and aligns with global commitments such as the Kunming-Montreal Global Biodiversity Framework. It aims to enhance biodiversity-based economic activities, ensure ecological and climate resilience, and drive carbon sequestration. It also emphasises the regeneration of ecological infrastructure. Importantly, programs focused on restoring degraded landscapes and cultivating indigenous plants contribute to both biodiversity conservation and climate adaptation. It emphasises activities like biodiversity-based ecotourism, formalizing the bioprospecting and biotrade sectors, and the sustainable consumption of biodiversity assets (e.g. game meat and marine products) that support ecosystem restoration while addressing rural poverty, creating employment and building climate resilience. These activities also create equitable access and benefit-sharing to benefit previously disadvantaged individuals and communities. Efforts by StatsSA (2024) (see section 0) will support the NBES by quantifying biodiversity's contribution to GDP and employment, allowing alignment between biodiversity and socio-economic development policies.

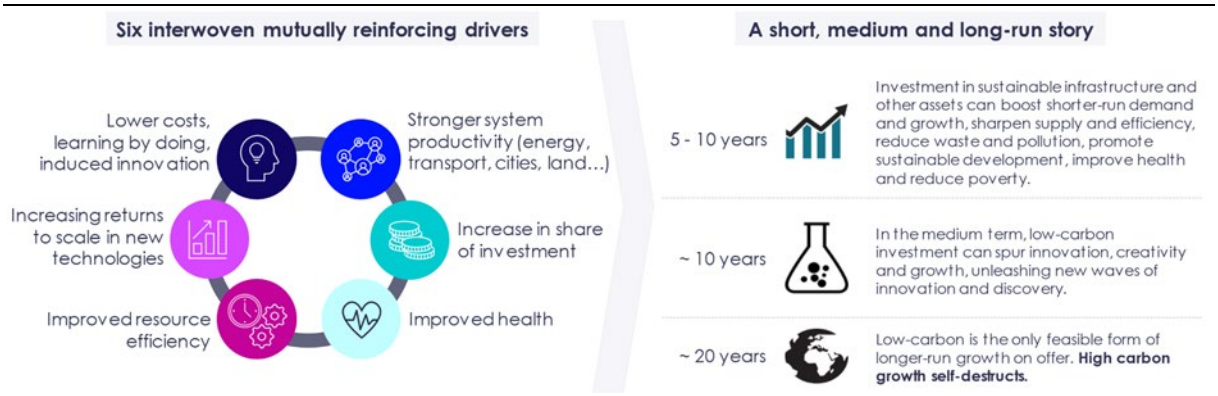
4. A new South Africa growth story for the future

South Africa's standard carbon-intensive growth model, built around protecting or localising capital-intensive industries (even low-carbon ones), has not been successful. This was before efforts to contain climate change in South Africa's key export markets made a carbon-intensive growth model untenable. Even if the old model had succeeded, the physical impacts of climate change combined with South Africa's limited readiness to deal with these impacts would place unsustainable pressure on an already stressed society, economy, and environment. Targeting poverty via fiscal transfers has not supported economic inclusion and led to a lack of fiscal space to deal with the impacts of climate change (Hausmann *et al.*, 2023). Social cohesion in South Africa will also not remain intact if the costs of adapting to climate change end up falling on individuals (through, for example, private water provision and higher food prices) in the way that a significant portion of the cost to address the electricity supply crisis has (which, as a co-benefit, had significant mitigation benefits). This will increase inequality further and push yet more people into poverty. And, lastly, trying to build a net zero economy while ever more people feel they do not have a stake in the outcome is unrealistic.

Luckily, there is increasing evidence that a new growth model built around developing low-carbon climate-resilient economies will lead to faster growth and inclusive development (Stern and Stiglitz, 2024; CISL, 2024). Stern (2024) calls this "a growth story for the 21st century". An example of what this new growth model can look like, including its impacts over different time horizons, is shown in **Error! Reference source not found.**. Key elements of this model include:

- generating efficiencies and returns to scale in new transformative green technologies that have long since been exhausted in mature carbon-intensive technologies;
- creating productivity-enhancing synergies between natural, social and economic systems;
- reducing negative externalities (like air pollution) that are a drag on growth;
- investing in infrastructure and natural and social resilience (via, for example, nature-based solutions) to reduce unproductive public expenditure to repair the impacts of climate change;
- using savings to invest in additional high-impact mitigation and adaptation activities;
- supporting healthy ecosystems that provide increased ecosystem services to support economic growth and poverty reduction; and
- supporting investment via a reduction in climate-linked economy-wide risks.

Figure 10: An investment model for the 21st century: How climate polices can accelerate growth



Source: Stern (2024)

A climate change-driven growth model is well-suited to alleviating some of South Africa's main growth constraints, such as the lack of investment (linked to the loss of a sovereign investment grade rating and weak state capacity), electricity supply constraints, spatial exclusion, and economic exclusion (Hausmann et al., 2022; Hausmann et al., 2023; Hausmann and Bernstein, 2024; World Bank, 2024). **Reducing negative externalities will also help free up public resources** to deal with these issues.

Increasing investment and reducing electricity supply constraints. The rapid deployment of grid-scale renewable energy in South Africa has shown how green technologies can stimulate investment if a conducive regulatory environment is created. Increasing investment would be an important driver of growth in South Africa. The NDP includes a target for fixed capital formation of 30% of GDP per annum (NPC, 2024). Investment has, however, been trending downward since 2008, and gross fixed capital formation in 2023 was half the NDP target. In fact, the last time South Africa even came close to this target was in 1976, when annual gross fixed capital formation was 29% of GDP (World Bank, undated). A key reason developing countries underinvest, particularly in new green technologies, is relatively high interest rates driven by country risk factors and weak sovereign debt ratings (Hausmann et al., 2023; Stern, 2024). The experience of the Renewable Energy Independent Power Producers Programme (REIPPP) has shown how a large-scale roll-out of a technology supported by the public sector can reduce the cost of funding. Despite several false starts and significant uncertainty, the real after-tax weighted average cost of capital for funding large-scale solar PV projects in South Africa was 5.2%. This is not only low by developing country standards but also significantly lower than would have been expected based on South Africa's country risk profile (IEA, 2021; Montague, Raiser and Lee, 2024; IRENA, 2023). This was made possible by government guarantees, efficient procurement methodologies, and increasing familiarity with the underlying technologies, allowing South Africa's sophisticated local financial markets to be tapped rather than having to rely on international finance – the cost of which is negatively impacted by South Africa's lack of investment grade rating. The REIPPP also proved the value of public-private partnerships to enable private sector implementation capacity to compensate for public sector capacity gaps. This model is set to be extended to allow private sector roll-out of electricity grid investment (Bulbulia, 2025) and could also be used for funding adaptation interventions.

Spatial and economic inclusion. Spatial exclusion can be addressed by a just urban transition focusing on both mitigation and adaptation, both of which increase economic inclusion, particularly if combined with social ownership models (PCC and NCE, 2022; Cherry et al, 2023). It is also now clear that a low carbon economy in South Africa will generate significant net employment gains, and it will do this immediately – with impacts increasing over time (Bischof-Niemz and Creamer, 2018; World Bank 2022b). Employment creation and economic inclusion can be further enhanced by developing public works programmes focused on building long-term resilience. Existing initiatives like the Extended Public Works Programme already include several programmes that impact resilience. Coordinating these efforts to develop a coherent climate resilience programme would generate significant economic benefits via reduced future restoration and emergency response costs – potentially yielding additional funding to grow and evolve such programmes. Effective adaptation, and specifically nature-based solutions, which will generate the strongest synergies between social, economic, and natural systems, requires deep local knowledge and expertise to be successful – thus further creating opportunities for economic inclusion at the local level. Increased community participation and decision-making are key elements of a just transition and should increase accountability and address governance issues at the local government level, which, in turn, should lead to better-targeted and implemented municipal spending and increased service delivery.

Reducing negative externalities. Avoiding the significant negative externalities linked to South Africa's carbon-intensive growth model, such as water use and air pollution, would free up resources to support development (Inglesi-Lotz and Blignaut, 2012). The economic cost of delaying the decommissioning of old coal-fired power stations in South Africa to the 2030s, for example, is expected to cause between R438 billion and R1.080 trillion in increased health costs and lost productivity (Myllyvirta and Kelly, 2023).

The new growth model will have to go beyond identifying and enhancing co-benefits and instead use coherent and coordinated policies to generate virtuous circles that use South Africa's limited resources to generate outsized sustainable development benefits. **A new growth model that uses the interlinkages between environmental, climate, economic and social systems to generate stronger growth, greater equality, economic inclusion, and environmental sustainability could provide a credible development narrative to underpin a common sustainable development vision for South Africans to unite behind**. Although signalling a crucial step forward in sustainable development thinking, the NDP never managed to do this – largely because it was not clear how its lofty aims were to be achieved. Developing the new development model will be a multi-disciplinary endeavour, but **crafting the growth narrative will fall to economists**. Several areas of research to start crafting this narrative are proposed below.

4.1 Root policies in local realities to ensure success

Political priorities frequently shift, and environmental policies are often deprioritized in favour of short-term economic gains, particularly in sectors like mining and industrial development, where vested interests have considerable influence. Political instability, the electricity crisis, and state capture (and less coordinated forms of corruption) have also diverted attention and resources away from environmental priorities, leading to a lack of continuity in policy enforcement. Many environmental policies require strong regulatory oversight and enforcement, but government entities often lack the resources and trained personnel needed to carry out these responsibilities effectively, and this problem worsens as responsibilities move from the central government to provinces and local governments. The South African Constitution, however, specifies environmental management as a concurrent function, meaning that all three levels of government, including the national, provincial, and local levels, share responsibilities in this domain. This shared mandate has led to significant disparities in resources and capacity among the various levels of government. Many economic development and climate resilience responsibilities also vest at the municipal level via integrated development plans. Furthermore, coordination gaps between national, provincial, and local entities negatively impact effective policy rollout.

Furthermore, without robust natural, social, and economic systems, both the cost of adapting to climate change and the risk of catastrophic outcomes increase significantly (IPCC, 2023; IPBES, 2024a, 2024b; Sarkodie, Ahmed and Owusu, 2022). These systems influence both what options are technically and economically feasible and their likelihood of success (i.e. what can be done) and political economy enablers or barriers to specific policies and measures (i.e. what will be done). They also influence the stringency of policies that are implemented. The carbon tax, for example, is being implemented much slower than expected and is out of line with international carbon pricing expectations. Furthermore, while the carbon tax was implemented in 2019, local fossil fuel subsidies tripled between 2017 and 2023 – with carbon tax exemptions contributing about 40% of the total subsidy in 2023 (Geddes and Schmidt, 2024).

How all this complexity influences the policy design is an area that warrants more research to understand which policies and measures are best suited to the local context, at what level of government they should be deployed, and what enabling conditions are required for them to succeed.

4.2 Use the right tools to promote the new growth model

The general equilibrium frameworks and models typically used in macroeconomics to consider the costs and benefits of climate action do not capture all the elements of the new growth model well (Stern and Stiglitz, 2024). The models typically focus only on one (climate) or a small number of externalities and miss growth impacts from, for example, enhanced health outcomes. They cannot fully capture synergies between social, economic, and natural systems, do not account for risk properly, struggle with multiple possible equilibria, apply inappropriate discounting, and/or assume that the economy is on the production frontier. Furthermore, models typically underestimate the exponential efficiency improvements and roll-out rates observed in new sectors like renewable energy and battery storage. Standard models also tend to assume a first-best world where policies and measures are fully implemented – ignoring local context and market failures (beyond some basic structural adjustment rigidities). Mostly, however, they reflect a lack of imagination on the part of economists steeped in a tradition of trade-offs.

While the complexities of the new growth model are not yet adequately captured in economic modelling, efforts to model the likely impact of climate change on the South African economy are advancing (see, for example, Arndt, Loewald and Makrelov, 2020; Vafa Anvari *et al (*2022), Monnin, Sikhosana and Singh, 2024; and Arndt *et al.* (2024)). Cambridge Econometrics (2024), for example, using a non-equilibrium macroeconomic simulation model, shows that South Africa grows faster and generates more employment when undertaking actions to reach net zero by 2050, **irrespective of whether the rest of the world follows suit.** Improving both the number and quality of models that can be used to interrogate the new growth model will be required to prove that the model is robust.

The PCC has identified and started to support a community of practice of energy and economic modellers and is also attempting to create a community of practice for mitigation planning (PCC, 2022). It will be important that these communities regularly interact and that innovative growth and micro- and macroeconomic economic thinking outside of the energy or environmental economics fields are included in these endeavours.

4.3 Close data gaps to show synergies

One of the most significant obstacles to effective environmental policymaking in South Africa is the lack of accurate and accessible data. South Africa's data infrastructure is often inadequate, particularly in rural and underserved areas where environmental risks are highest. Without reliable data on issues like pollution levels, biodiversity loss, and climate vulnerabilities, it remains a challenge to formulate policies to meet the country's environmental needs accurately. It is also not possible to investigate the types of synergies that underpin the new growth story.

Efforts to tackle water scarcity and protect biodiversity, for example, are hampered by insufficient data on water usage patterns, ecosystem health, and climate impacts. This forces policy responses to be reactive rather than proactive. Additionally, the scarcity of data precludes the development of evidence-based policies. An attempt at undertaking a public environmental expenditure in 2016 found that it was impossible to match public expenditure with South Africa's main environmental priorities

(GTAC, 2016). Public sector responsibilities for different environmental issues straddled different spheres of government and different national government departments. A lack of consistency in allocating functions and naming conventions made it impossible to reconcile the data. Two reviews of provincial nature reserves in South Africa found that they are mostly underfunded and cannot successfully implement both their tourism and conservation mandates (Cloete, Venter and Munro, 2018; Patel *et al.*, 2023). Sufficiently detailed expenditure, revenue, input, and characteristic information at the reserve level were unavailable, and detailed outcome-based metrics to assess conservation objectives were lacking. The presence of endangered or high-value fauna and flora, or marine protected areas, however, increased operating costs, and all stakeholders agreed that reserves were underfunded.

Statistics South Africa currently provides relatively limited data on natural capital. However, it is busy developing a broader suite of ecosystem and species accounts via the System of Environmental-Economic Accounting (SEEA) Ecosystem Accounting (Driver *et al.*, 2021). A Biodiversity Economy Satellite Account, which will focus on economic and social statistics and indicators, is being developed to complement the SEEA data, which focuses on environmental statistics and indicators. Combining these two data sets will highlight the interlinkages between the environmental, economic, and social domains.

The IMF conducted a technical assistance visit to South Africa in 2012 to evaluate the state of macro-relevant climate change statistics and emphasised the fact that "meeting South Africa's climate change mitigation and adaptation goals would require large amounts of granular, relevant, and reliable data for evidence-based planning and ensuring a just transition." (IMF Statistics Dept, 2024). It concluded that the data was not available, or at least not with a sufficiently short lag to be policy-relevant, recommending the creation of a centralized and harmonised environment and climate change database. The IMF also confirmed the lack of public expenditure markers to enable climate-related public expenditures, investments, and transfers to be tracked across the entire national budget process (national departments to provinces, municipalities, and state-owned enterprises).

A clear link between social, economic, and environmental expenditure and outcomes will be required to track the success of the new growth model. This will enable synergies and cost savings to be identified, quantified and prioritised. Increased investment in climate resilience, for example, should be correlated with reduced expenditure on emergency response and recovery activities linked to natural disasters. Ideally, this relationship will be informed by clear metrics on how economic, social, and/or natural systems have been strengthened in the affected areas. This information will allow tracking of and motivating for international support to mitigation and adaptation initiatives, identifying duplicate and/or counter-productive expenditures (e.g. fossil-fuel subsidies that counteract green policies).

Furthermore, this information will highlight linkages between areas that have historically operated within silos (e.g. water, agriculture, energy, biodiversity, and urban development), and will allow integrated and coherent policymaking. **As the relationships between seemingly disparate areas become clear over time, it will help to prevent the prioritisation of short-term goals at the expense of longer-term benefits** – either by showing that the short-term benefits often don't persist or by making the future gains being sacrificed more tangible.

Having good quantitative data that captures the complex interactions that underpin climate change policy will help to prevent investments (expenditures that either generate income or reduce a series

of future costs) from being mistaken for costs (expenditures with a once-off benefit). Borrowing to fund the former is responsible fiscal policy, while borrowing for the latter is not. **Mislabelling investments as consumption will lead to a suboptimal level of current expenditure and, ironically, a higher debt burden in future**.

4.4 Make it easier to transition

Most economic models still assume that some, or even all, adjustments between different factors of production or sectors are frictionless. Research by the World Bank, the National Treasury, SARB, the PCC, and others has shown that mitigation costs increase **significantly when limited flexibility and structural rigidities within the economy are considered. Also, without changes to institutional frameworks, structural adjustments may not happen**. Or not in the desired way. For example, Collier et al. (2024) show that significant changes to the regulatory environment linked to labour law and supporting instruments (like social protection) will be required to ensure a just transition in South Africa.

A lack of policy alignment also increases adjustment costs. While the South African government is using industrial policy to try and overcome structural rigidities and speed up the low carbon transition, a coherent approach to doing so is lacking. Interventions are framed in masterplans within individual sectors or value chains rather than thinking more broadly about the changes needed to create a just, resilient, and low-carbon economy (Collier et al, 2024). The tension between localising renewable energy component manufacturing (via the SAREM) and developing green hydrogen value chains in South Africa (via the Green Hydrogen Commercialisation Strategy) is instructive. The cost of renewable energy is one of the main cost drivers of green hydrogen and central to its cost competitiveness. Green hydrogen is mentioned in the SAREM as another demand driver for renewable energy. However, in line with the recommendation of the SAREM, a 10% import tariff on solar PV panels was introduced in South Africa in 2024 to support the greater localisation of PV manufacturing. Increasing the cost of solar PV installations will increase the cost of solar electricity – which increases the cost of locally produced green hydrogen and reduces its competitiveness. Solar panels are only a portion of the cost of solar plants. Furthermore, successfully creating local RE manufacturing capacity could avoid international PV supply bottlenecks linked to surging demand from international green hydrogen projects delaying local green hydrogen projects. There are, thus, potential risks and benefits to the green hydrogen industry originating from the import tariff on solar PV panels, and it is not immediately clear whether the tariffs will disadvantage local green hydrogen development. However, a more coherent approach to industrial policy that considers the bigger mitigation and adaptation picture and explicitly considers questions such as this will help to ensure that adjustment costs are minimised. Given the potential for issues like these to derail long-term planning, **understanding and addressing structural rigidities and adjustment costs will be key to the new growth story**.

5. Conclusion

Climate change is a systemic problem that requires a systemic solution. This stands in sharp contrast to pollution control, where the emphasis is typically on controlling the impact of one or a small number of processes. Even a global environmental issue like stopping ozone depletion amounted to substituting a small number of gasses within a few production processes. Stabilising climate change, in contrast, requires a complete reorganisation of how and where economic activity happens.

Climate change also changes the very relationships policymakers rely on to effect this change. It worsens health and education outcomes and degrades ecosystems, but these factors are crucial in building resilience to climate change. A similar feedback loop exists with respect to social cohesion, public finances, innovation and so forth. Therefore, an integrated, coherent approach is needed where strategies, policies and measures are developed jointly.

A new growth model that uses the interlinkages between environmental, climate, economic and social systems to generate stronger growth, greater equality, deeper economic inclusion, and environmental sustainability could provide such an approach. Furthermore, it could also serve as a credible sustainable development vision for South Africans to unite behind.

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