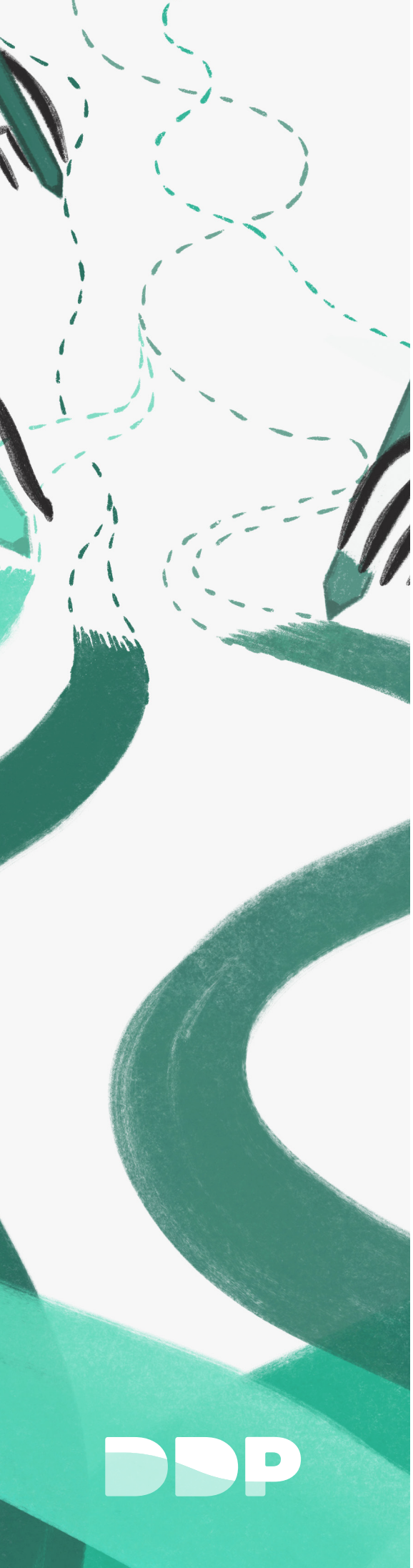

SOUTH AFRICA
INSIGHTS ON CLIMATE ACTION TEN YEARS AFTER THE PARIS CLIMATE AGREEMENT

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INTRODUCTION

South Africa is one of the most energy- and carbon-intensive economies in the world, due largely to its historical reliance on coal for primary energy. It also remains one of the most unequal societies globally, with a Gini coefficient of 0.67, around 60 percent of the population living below the upper-bound poverty line, very high levels of unemployment, and weak performance on human development measures, especially once adjusted for inequality (WB, 2023). Unlike many countries, higher levels of absolute and per capita energy use (and hence greenhouse gas emissions) have not translated into broad-based social or economic development. This disconnect reflects the structural legacies of an energy-intensive, extractive economy shaped during apartheid and left largely intact thereafter. Coal further remains an important (through shrinking) export and with coal production and use highly concentrated in Mpumalanga, it is an important contributor to employment and local economies in the province.

These conditions give rise to an acute sense of risk in policy discussions related to low-carbon transition, particularly in coal-dependent provinces such as Mpumalanga and in energy-intensive, trade-exposed industries. At the same time, the costs and risks of climate impacts are already high and growing, while South African business and policymakers increasingly recognise the risks of being uncompetitive in a

global economy shifting rapidly toward low-carbon production and trade (PCC, 2023b). Sectors such as automotive manufacturing, which face bans on internal combustion engine vehicles in major export markets, and energy-intensive commodities subject to emerging carbon border adjustment mechanisms, are particularly exposed (DTIC, 2023).

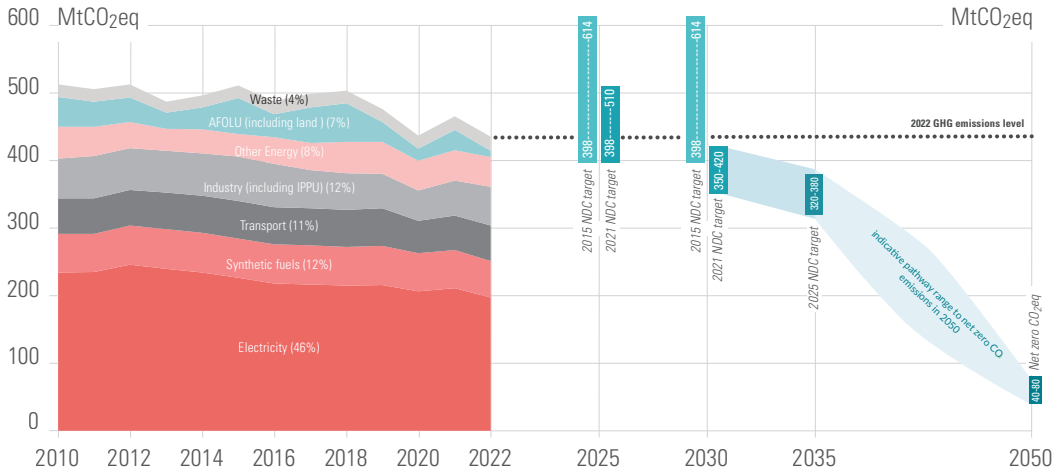
The question for South Africa then, is how to manage the climate transition without worsening socio-economic indicators, and indeed, how the process of transition can improve them. Climate action is thus framed predominantly through the lens of a "just transition" to a net-zero and climate resilient economy and society, although within this framing, competing views of mitigation ambition and development continue to affect the shape and pace of transition in different sectors.

Over the past 10-15 years, the institutional architecture for climate policy and planning has been put in place, including through legislation, regulations, long-term policies and planning, carbon pricing, data and monitoring/reporting frameworks, and the emergence of new institutions to advise on and govern climate action. While early mitigation efforts may have had smaller impacts in emissions terms, they signalled important institutional shifts (Burton et al, 2022). These have been gradually strengthened and expanded over time, including through incorporation into sectoral strategies, sometimes explicitly through climate targets and processes, and sometimes indirectly through synergies with development goals and mitigation co-benefits. International cooperation and domestic coordination mechanisms such as the Just Energy Transition Partnership (JETP) provide early insights into assessing and addressing barriers to action, mobilising and allocating finance, and aligning climate and development goals. Nonetheless, gaps in planning and implementation persist.

Given its centrality to GHG emissions (**Figure 1**), the energy sector, which accounted for 86% of GHG emissions in 2022 (including LULUCF), is critical to both South Africa's climate ambitions and developmental goals. The energy supply industries, predominantly electricity and coal-to-liquids, account for 59% of emissions. Energy policy, and electricity policy within it, is thus a critical domain with major effects on GHG emissions pathways. Concrete actions to deploy

Figure 1. GHG emissions by sectors

Historical GHG emissions (2010-22) as reported in the National Inventory Document submitted as part of South Africa's first Biennial Transparency Report (percentages are average shares of total annual GHG emissions, including land use, over the period 2010-22).



Notes: Historical GHG emissions are sourced from South Africa's first Biennial Transparency Report. and include LULUCF emissions. NDC target levels presented here do not take into account the accounting approach that South Africa has stated in its NDCs and in its first BTR will be applied to reporting on the implementation and achievement of these NDC targets - the exclusion of land sector emissions from natural disturbances. The process and methodology for accounting is stated in South Africa's first BTR. Application of the accounting approach could result in an effective increase in South Africa's target levels of between 20 and 50 Mt, if this approach is applied up to 2030 and 2035 respectively (in other words, South Africa will be able to meet its NDC targets if its total net GHG emissions are 20-50 Mt higher than the respective target ranges in 2025, 2030 and 2035). South Africa's NDCs, and specifically its most recent NDC (submitted in 2025) affirm South Africa's long-term GHG emissions target of net zero CO2 emissions in 2050. This outcome, based on existing analysis, would result in GHG emissions (non-CO 2) of between 40 and 80 Mt-CO 2-eq in 2050 (Marquard et al 2022).

renewable energy have yielded successes and nascent sector reforms have enabled a substantial new renewable pipeline to emerge, though concrete reductions beyond electricity are yet to emerge.

Overall, the pace and scale of change remain slow. While South Africa's emissions peaked in 2009, much of this is explained by challenges in electricity planning and infrastructure execution, and poorly performing coal plants, as well as price increases. This led to an electricity supply crisis characterised by ongoing loadshedding over many years, coupled with stagnant economic growth and underwhelming per capita GDP growth, which has translated into lower electricity use, especially in industry.

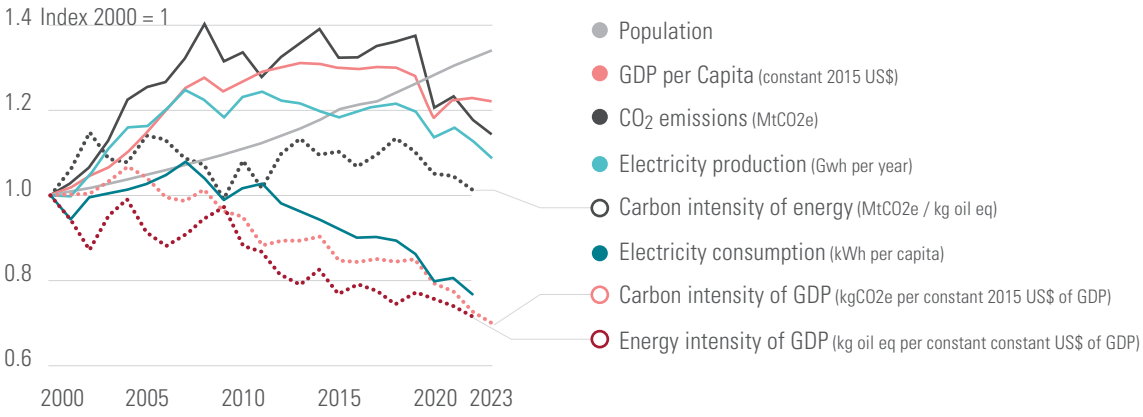
Sustained GHG emissions reductions, driven by decoupling economic growth and emissions through cleaner technologies and practices and purposeful structural diversification of the economy is only now beginning to emerge. New institutions and emerging coordination mechanisms will need to scale up rapidly, in action, policy, implementation, and finance, to keep emissions reductions on track in context of a global economic reordering, deliver co-benefits such as cleaner air and health gains, and unlock the developmental potential of stable power supply and new climate-compatible sectors and value chains (Zalk et al., 2024).

Sustained progress rests on faster implementation and scaled-up financing in the power sector, particularly to address critical grid constraints and ensure a just transition in closing coal assets, attention on maximising energy efficiency, the development of pathways for major emitting industrial firms and sectors, and transforming just transition and economic diversification plans in the transport sector into actively shifting modes, enhancing electrified public and private transport, , and transitioning supply chains in automotives towards new energy vehicles chains in automotives.

CLIMATE POLICY DEVELOPMENT AND CONTEXT SINCE 2015

South Africa's formal climate policy framework took shape with the 2011 National Climate Change Response White Paper (DEA, 2011), adopted the same year South Africa hosted COP17 in Durban. The White Paper drew on over a decade of preparatory policy processes and South Africa's long participation in the UNFCCC. An early measure implemented alongside the White Paper was the launch of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), a renewables auction scheme launched in 2011 (see below).

Figure 2. Indexed decomposition of drivers of GHG emissions in South Africa 2000-2023



In 2015 South Africa submitted its first Intended Nationally Determined Contribution (INDC), ahead of COP21 in Paris. This commitment, later formalised as its first Nationally Determined Contribution (NDC) upon ratification of the Paris Agreement in 2016, largely reiterated the mitigation framework introduced in the 2011 White Paper. The NDC restated the country's greenhouse gas (GHG) emissions trajectory, which would peak in 2025 and plateau to 2035 in a range of 398-614Mt CO_2eq, and then decline to mid-century (Climate Transparency, 2021). At this stage, policy ambition was framed more by continuity than by transformation, reflecting the still-limited political and institutional capacity to advance implementation of key mitigation measures.

Between 2015 and 2019, policy debates were dominated by attempts to operationalise instruments that had long been under discussion. Chief among these was the carbon tax, first proposed in 2010 and only passed into law with the Carbon Tax Act of 2019 (RSA, 2019). The long delay reflected the influence of powerful stakeholders in energy-intensive and coal-related industries (Baker et al, 2015; Just Share, 2025), notably concerns about the economic burden it would place on energy-intensive firms and competitiveness effects. This was despite significant work by the National Treasury to examine questions of design, effects on poor households and sectors, and revenue recycling options. While the tax is now in place, the effective tax rate remains lower than has been proposed, with higher allowances (Mxakaza, 2024).

Alongside the tax, the mandatory reporting of GHG emissions by large emitters (through the National Greenhouse Gas Emission Reporting Regulations) began to be implemented in this period, laying the groundwork for improved data, more transparent monitoring and future compliance systems (DFFE, 2020). Other sectoral policies and measures to manage greenhouse gas emissions included the green transport strategy (DoT, 2017), and planned national energy efficiency standards/policies (post-2015 NEES) (DoE, 2016). A number of policies and measures were put in place though thus far with limited or small effects on emissions reductions.

South Africa complemented these developments with the submission of its Long-Term Low Emission Development Strategy (LT-LEDS) to the UNFCCC in 2020. The LT-LEDS sets out potential pathways for achieving a just transition to a low-carbon economy by mid-century, with a particular focus on decarbonising the electricity sector and balancing climate ambition with pressing development priorities. The Lt-LEDS provides a strategic vision rather than a binding plan, providing a framework to guide future iterations of the NDC and related policies. It included a 'soft commitment' to net-zero carbon emissions by 2050, already committed to (in principle) by stakeholders during consultations undertaken by the National Planning Commission on the just transition vision for South Africa, over 2018-2019 (NPC, 2019). South Africa is currently deepening analysis and stakeholder engagement to inform an update its LT-LEDS with sector measures and pathways, in the context of meeting development goals and building prosperity, and by linking short/medium term sector targets to the long term 2050 goals.

In 2021, South Africa submitted an updated first NDC that progressed the mitigation target ranges of its 2015 iNDC, lowering the upper bound significantly, from 398-614Mt CO_2-eq to 398–510 Mt CO_2-eq for 2025 and 350–420 Mt CO_2-eq for 2030. These revisions were widely regarded as more credible and ambitious compared to the earlier targets, which had been partially based on modelling, stakeholder engagement and analysis undertaken in the LTMS process from 2006-2008. The broad range from 2015 represented an accommodation by government of stakeholders with "diametrically opposed views on mitigation" (Burton et al, 2022), and also did not reflect the changing techno-economics especially of the power sector globally and in South Africa. Notably, coal capacity additions by Eskom and planned by IPPs had proven to be significantly more expensive than renewable alternatives (Bischof-Niemz, 2018; Ireland & Burton, 2018; Merven et al, 2021).

The updated first NDC range reflected emission outcomes consistent with existing policies, notably the 2019 Integrated Resource Plan for Electricity. However, at the time, reaching the lower bound/most ambitious outcome of the target range for 2030 implied the need for enhanced implementation of policies and scaling up of measures, primarily in the electricity sector (since alongside EEDSM, it remains the most cost effective policy domain for action). Specifically, this would involve a faster and higher roll-out of wind and solar, greater energy efficiency, progress in transport modal shifts and electrification, and earlier retirement or reduced utilisation of coal-fired power plants (Marquard et al., 2021; PCC, 2021).

Since 2021, much slower than expected economic growth has translated into lower-than-expected economy-wide emissions and lower electricity demand, altering the degree of effort needed to attain the target ranges for 2025 and 2030. However, Eskom has also recently extended the lives of some of its coal power stations as a supply security measure, and has sought postponements or exemptions for compliance with air pollution laws. Practical planning towards widespread coal plant repurposing, repowering, or closure remains partial at best, even as Eskom plants are reaching the end of their techno-economic lives. Eskom now faces the challenge to manage the closure/repurposing of at least seven plants by 2035, while it has struggled to progress the transition at Komati, the first and only plant to shutdown so far (PCC, 2023a).

Domestic mitigation policy strengthening has been accompanied by the emergence and development of institutions to implement and manage South Africa's climate transition, led by the Department of Forestry, Fisheries and the Environment, and now concretised in the newly promulgated Climate Change Act of 2024. It took 6 years for the draft Climate Change Bill, initially proposed in 2018, to be signed into law in mid-2024, with organised business strongly opposing elements of the Bill that would have imposed emissions limits or be accompanied by legal, criminal, or financial effects for firms (Just Share, 2025). The Act establishes arrangements for cross-governmental coordination on climate, includes a national emissions trajectory, as well as sectoral emission targets (SETs) and carbon budgets for sectors and firms; requires city- and provincial climate plans to be developed; and institutionalises formally the Presidential Climate Commission (PCC) to advise on matters related to climate change and the just transition.

The PCC was launched in 2019 as a multi-stakeholder body comprising a technical secretariat and Commissioners from across the political spectrum, including youth, labour, civil society, and business. In that capacity, it led the development of the National Just Transition Framework, approved by the Cabinet in 2022, and provides advice on just transitions in the mitigation and adaptation spheres, as well as climate finance issues. The PCC conducts independent analysis and commissions research, coordinates ongoing and frequent stakeholder engagement at local, provincial and national scales, and across key sectors, and monitors climate action. Mitigation-related work is diverse and includes just energy transition and coal plant closures, market reforms, grids, CBAM response, urban/municipal transitions, a draft transport just transition plan, and skills. One area has also been the strengthening of a national climate-energy-economy modelling ecosystem comprising different modelling teams and a wide array of analytic tools. This ecosystem includes teams undertaking net zero pathways analysis for the Commission (PCC, 2025) using energy-economy modelling tools such as SATIMGE, but also incorporating adaptation costs into long-term economic modelling; different types of economic models (CGE, multiplier models, micro-sim), as well as spatially and temporally detailed power system modelling (PypSA, Plexos, grid modelling), and the integration of co-benefits analysis such as air pollution and water into energy systems analysis. Finally, the PCC facilitates stakeholder engagement and provides advice for policy processes, including the first updated NDC in 2021 and the second NDC in 2025.

South Africa released its draft second NDC for 2035 for public comment in July 2025, with the final NDC expected to be submitted to the UNFCCC in advance of COP 30. The technical work comprised analysis covering equity/fair shares; economy-wide emissions modelling including implementation of packages of policies and measures; mitigation and adaptation investment and just transition needs assessment; and detailed power system and air pollution modelling. The range proposed in the draft for stakeholder comment was 320-380 Mt CO_2-eq for 2035, with existing measures able to reduce emissions to 366 Mt in 2035 and full policy implementation, even with high economic growth assumptions, reaching 322 Mt in 2035.

The PCC released a proposed range of 248-329 Mt in advance of the draft NDC, with stakeholders and commissioners advocating for a wide and varying range. Public consultation on the NDC hosted by the PCC demonstrated widespread disagreement on the mitigation ranges, with some stakeholders advocating a return to the pre-2021 NDC benchmark range for 2035 (up to 614Mt). Such levels, as with the upper level of the proposed NDC range of 380Mt, would require slowing down planned transformation of the energy system and actively maintaining and refurbishing fossil fuel assets (Marquard et al, 2025).

The period since 2015 has seen South Africa move from reiterating its earlier policy commitments to tightening its emissions targets and making more concrete progress on implementation. The policy landscape remains constrained by economic challenges and the structural dominance of coal, but the combination of falling renewable costs, improved coordination of and quantities of international climate finance, and domestic recognition of the need for a just transition has strengthened climate policy and institutions. The following sections discusses the concrete successes in renewable energy deployment and in just transition planning and institutions.

CONCRETE PROGRESS IN ELECTRICITY PLANNING AND NEW RENEWABLE GENERATION CAPACITY

The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), launched in 2011, is one of South Africa's most notable mitigation successes. Its first three bid windows (2011–2014) secured more than 6,300 MW of renewable capacity from 92 projects, mobilising over ZAR 200 billion (USD ~15 billion) in private investment with cumulative emissions reductions of 102 Mt CO_2eq by 2022 (BTR1, DFFE, 2024). The programme built on the first public electricity planning process undertaken in South Africa, culminating in the Integrated Resource Plan (IRP) 2010, and became a key mechanism for implementing the IRP 2010 renewable energy capacity. The IRP 2010 introduced the practice of imposing GHG emissions limits into electricity planning, although this practice has had limited effects on the final capacity expansion plans under various IRP processes, thus far.

Although the renewables programme has faced challenges, including political barriers, and now network infrastructure constraints, the pipeline of wind, solar, batteries and hybrid plants has grown substantially over the past 5 years. Concrete regulatory changes and sector reforms are enabling deployment at scale, with sufficient projects under development to meet the levels of installed renewable generation capacity aligned with ambitious climate targets in 2030 and beyond.

Despite the early success of the programme, progress stalled in 2015 when Eskom refused to sign further power purchase agreements, citing cost and over-supply concerns. A multi-year REIPPPP hiatus then ensued, reflecting political contestation over independent power producers and the role of the private sector in electricity, the dominance of coal interests, and uncertainty in energy planning. Investor confidence fell, and no new projects reached financial close until a new administration and Minister of Energy resolved the blockage in 2018 (Hanto et al, 2022).

Although procurement restarted with Bid Window 5 in 2021, momentum had slowed. Projects faced delays from high interest rates, supply chain issues, and especially transmission bottlenecks in resource-rich provinces. Eventually, almost half of the projects in round 5 failed to reach financial close, leaving a gap in planned capacity additions, despite extensive supply shortages. Meanwhile, rooftop and embedded generation remained constrained by licensing and regulatory barriers.

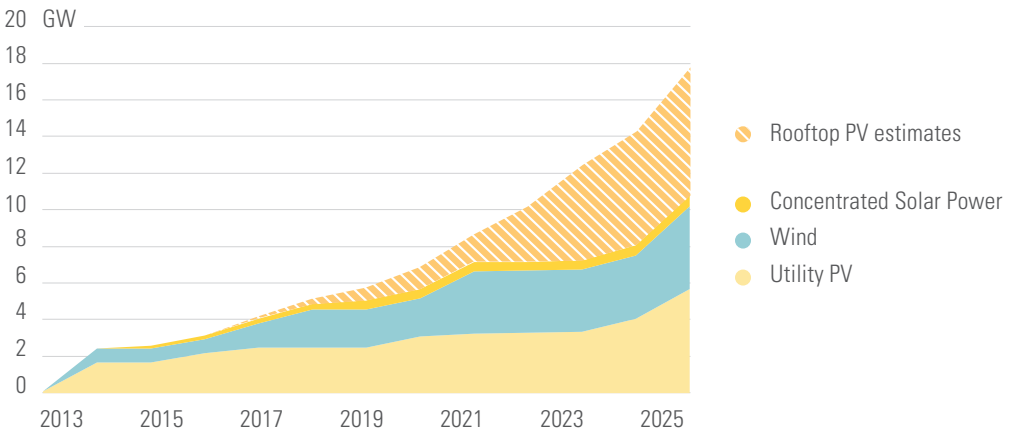
The worsening power crisis after 2019 changed this dynamic. Escalating load-shedding and falling technology costs drove rapid growth in embedded generation and renewed interest in utility-scale projects and the attempted reinvigoration of the REIPPPP. In 2022, government declared an emergency and introduced major reforms: lifting licensing thresholds, simplifying registration with NERSA, and offering tax incentives for households and firms for rooftop solar. These measures triggered a surge of private investment outside the REIPPPP. Rooftop and embedded PV grew from under 1 GW in 2019 to an estimated 7 GW by 2025, nearly double the solar capacity procured through REIPPPP since 2013 (CRSES, 2025). This shift marked a fundamental turning point in South Africa's renewable trajectory and contributed to reducing load shedding.

Under the REIPPPP, however, challenges persisted. Round 6, launched in 2022, resulted in no wind projects proceeding due to grid constraints, further widening the gap between planned and constructed new generation additions. In round 7, launched in January 2024, wind projects have continued to face similar challenges, with capacity reallocated to solar and negotiations ongoing for some wind projects to reach financial close.

South Africa's severe capacity shortages, combined with transmission constraints, prompted government to introduce large-scale battery storage to stabilise the grid and support variable renewable energy. In November 2023, preferred bidders were announced for the first Battery Energy Storage Independent Power Producer Procurement Programme (BESIPPPP) (IEA, 2024). Since then, three bid windows have been completed, with the third concluding in May 2025 and securing a total of 6,976 MWh of planned utility-scale storage capacity (Murray, 2025).

Further reforms strengthened the shift. Amendments to the Electricity Regulation Act paved the way to unbundle Eskom, creating the new National Transmission Company of South Africa (NTCSA) albeit under an Eskom Holding Company, and launch a process to create a competitive wholesale market, expected to launch in April 2026. Since 2022, independent power producers have been able to contract directly with private offtakers, expanding the pipeline dramatically by creating avenues to market that did not rely solely

Figure 3. Historical RE build, planned expansion and rooftop PV estimates (as of June 2025)



Source: These values are obtained and combined from various sources including the Eskom TDP, GCCA, and RE Grid Survey, as well as from REDIS, the GSB Power Futures Lab, various news articles, with manual cross-checking, updating, research, and validation from the ESRG power sector modelling team.

on the government's public auction rounds. By 2023, the pipeline for new variable renewable energy projects reached 64 GW, rising to 134 GW of wind, solar, and hybrid storage projects by 2024 (REGS, 2023, 2024).

The National Treasury is furthermore developing an innovative financing mechanism with development finance partners – a Credit Guarantee Vehicle - to derisk grid expansion through independent transmission auctions (to be launched in late 2025) (RSA, 2025). This will however finance only a small share of the grid expansion contemplated by the NTCSA in its Transmission Development Plan by 2030. The TDP requires a significantly scaled up rate of deployment and finance than has been achieved historically, to alleviate grid constraints in the short term and enable much greater evacuation of new renewable power by 2035.

CONCRETE PROGRESS IN CLIMATE AND DEVELOPMENT PLANNING: THE JUST ENERGY TRANSITION PARTNERSHIP

Considering South Africa's structural carbon-intensity and high levels of poverty and inequality, a crucial aspect within climate policy development and institution-building is related to the links between the socio-economic and development elements of climate transition. Mitigation approaches have expanded to actively consider the justice implications of transition (for example on workers, communities) and opportunities in new sectors (for example, new industrial and economic diversification opportunities). Recognising that coal, automotives and other sectors underpin jobs, livelihoods, and regional economies, policymakers began to integrate considerations of social equity and economic diversification into climate planning, and especially since 2021/2022, just transition has become central to climate policy discussions. The vision of the national just transition framework addresses all elements of the climate transition (mitigation and adaptation, physical and transition risks), while the Climate Change Act is intended to enable "a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa" and defines a just transition as a shift towards a low-carbon, climate-resilient and ecologically sustainable economy and society which contributes toward the creation of decent work for all, social inclusion and the eradication of poverty (RSA, 2024). Policy developments within national sector departments include the DFFE's National Employment Vulnerability Assessment and Sector Jobs Resilience Plans, the DMRE's JET Framework for Energy and Minerals, a recent draft Transport Just Transition plan; in provinces (for example, Mpumalanga's Phase I JT plan); in municipalities; and in firms e.g. Eskom's JET Office overseeing coal plant closures.

This domestic approach was reinforced by diplomatic developments, notably the announcement of the (initially) $8.5 billion Just Energy Transition Partnership (JETP) with the International Partners Group (IPG) in 2021. The Partnership signalled a shift in climate diplomacy, positioning South Africa as an early mover in new climate finance and diplomatic modalities for mobilising climate finance to support coal-dependent economies in transition. However the identified priority sectors went beyond coal, to consider also socio-economic aspects of clean electricity, new energy vehicles, and new export products such as green hydrogen and derived products, i.e. direct or indirect interventions in major industrial sectors facing transition impacts or opportunities. [1].

South Africa put together a Presidential Climate Finance Task Team and a JETP Secretariat to develop over the course of 2022 an to identify the investments needed to deliver a just transition across the priority sectors. The JET Investment Plan (JET IP) was launched in November 2022. It lays out investment needs totalling $98bn over

1 The national Just Transition Framework (2022), the JETP, and institutions such as the Presidential Climate Commission have also broadened the scope of climate policy beyond coal and electricity to include value chains such as automotive manufacturing and transport. South Africa's EV white paper aims to leverage local mineral resources to build regional value chains in batteries and EV components and promote green industrialisation through localisation and integration with clean energy (DTIC, 2023).

2023-2027 and included two additional priority areas that were deemed critical for the successful implementation of a just transition (skills and municipalities).

The predominant investment is in the electricity sector, recognising both the extant challenges (coal dependence and supply insecurity) and the opportunities for mitigation, improved supply and affordability. The infrastructure investment needs for coal plant decommissioning, transmission, distribution, and wind, solar PV and batteries would reach a low-middle range of the 2030 NDC (the IP included modelling of tens of scenarios to assess options and investment needs for the 2030 NDC mitigation target range). Additional focus areas were on elements to improve social outcomes in the sector, including piloting social ownership models, manufacturing and localisation, and a coal region focused set of programmes to protect workers and communities and promote diversification and repurposing of coal assets. The latter identified nine key investment areas, based on existing literature from government, civil society, unions, and business, totalling ~$4bn over the period to 2027. Importantly, the JET-IP was the first explicit analysis of climate and development ambition financing needs and gap analysis.

Until now, most support has flowed to the programmes in Mpumalanga and into green hydrogen-related areas, while new energy vehicles received less funding attention, despite its importance to industrial output and manufacturing.[2]

South Africa's automotive manufacturing sector is a large employer with an integrated component value chain that is a major contributor to manufacturing jobs and value add in the country, and a small player globally. It faces challenges in that production for domestic and export markets are co-dependent and major export markets such as the UK and EU (accounting for 46% of exports in 2022) have either imposed bans on ICE vehicles in support of their own domestic mitigation pathway, or global markets are shifting away from ICE specific components and towards electric vehicle components (with 67% of components at risk). As production turnover occurs approximately every 7 years, this leaves little room for production shifts before ICE bans and market shifts puts these exports at risk (DTIC, 2021; DTIC, 2023). Transitioning the vehicle manufacturing sector is thus important given the high number of quality jobs in the sector – at 110 000 direct jobs the sector surpasses coal - and the concentration of manufacturing in certain regions such as the Eastern Cape. In response, the National Treasury has allocated fiscal resources totalling R1 billion in tax incentives to encourage the upstream sector to transition and ensure that decarbonisation is a driver of growth, rather than of de-industrialisation. Nonetheless, challenges remain – despite lower total costs of ownership already, capital cost parity is a major driver of uptake and has not yet been reached in South Africa. And a large share of passenger transport is not in private vehicles but in minibus taxis, requiring a separate set of incentives for both manufacturing and consumer uptake (including resolving operational questions).

The diplomatic and political efforts under the JET IP have also created focused attention on issues of finance (PCC JTFM, 2024), the explicit challenges of novelty, small ticket size, and innovation facing just transition projects (Lowitt, 2021, 2022), and especially to access private finance due to lack of information and 'bankability', and high transaction costs (PCC JTFM). The efforts have broadened attention to new areas for mitigation and development action, and have galvanized non-state actors to address gaps in the partnerships (for example by developing funding modalities to support bottom-up project development and address community needs). It has triggered a concerted diplomatic, cooperative, and focused process on the realities of delivery and implementation and the financing modalities to achieve this.

The JETP has contributed to building institutional and governance capabilities and structures, and the technical and social knowledge required for transition. The project management unit in the

2 The JET Investment register is available here: https://justenergytransition.co.za/jet-investment-register-dashboard and NEVs have received the smalles allocation thus far.

Presidency (JET PMU) oversees implementation of the JET Investment and the subsequent Implementation Plans, including financial tracking and a grants register, monitoring, evaluation and learning, and coordination. While critiques of the quantity and quality of finance persist, both grant and concessional finance have flowed, as can be seen in the quarterly grants register reports, and concessional/policy loans, while adding to debt, come with very attractive terms compared to borrowing. One critique has been the overemphasis of grants for technical assistance, research/consulting, and foreign entities, instead of benefitting people most impacted by transition, with projects struggling to find funders struggling to get funding to projects on the ground.

A major innovation in response was the recent launch of the JET Funding Platform to directly support projects on the ground and ensure scarce grant funding flows to projects beyond technical assistance. Projects that meet just transition criteria are assisted with business development and project preparation, and then with matchmaking to funders. The focus is on community originated and driven projects, covering economic diversification, enterprise development, skills/training, community and government support, and clean energy and just transition models, i.e. also supporting initiatives to address poverty in the coal region and beyond.

However the process has not been without challenges. Civil society has criticised (especially early in the process) the lack of transparency and inclusion in the process as well as in data and beneficiaries. There are limitations to how funding can be deployed in terms of flexibility and funder requirements, as well as geopolitical interests; in the long-term some areas requiring support would be difficult to fund via grants without significant reforms. On the other hand, policy and concessional loans provide significant flexibility to the government to channel to those areas with the greatest need, but will require being translated or mainstreamed into public sector just transition programmes and activities. And new and additional, high quality funding will be needed as mitigation ambition scales up and accelerates.

Despite the significant efforts outlined above, political fragmentation and contestation have persisted and intensified as the practicalities of transition start to draw nearer. While the JET IP implementation unit sits in the Presidency, reporting to a JET inter-ministerial committee, and works toward successful implementation of the investment plan, much sectoral decision-making resides within associated ministries or firms. Policy processes therein do not yet reflect the latest science or comprehensively integrate climate considerations and typically are more accommodating of entrenched sectoral interests that promote alternative or slower sectoral transformations than required by a fair contribution to the Paris goals.

Significant work is thus still needed to translate the depth of vision and the early insights into a stronger and deeper programme of action across multiple policy areas and sectors

WHERE IS FURTHER PROGRESS NEEDED IN MITIGATION?

While concrete progress has been made in the power sector (notwithstanding that challenges remain especially for network investments and in just transition implementation, and that blockages could re-emerge,) other transformations and interventions have not progressed significantly despite their importance for achieving net zero in the longer term.

After electricity, the largest emitting sectors are in industry (especially synthetic fuel but also other sectors such as iron and steel) and transport. Transformations required in the transport sub-sectors, and barriers to action, include:

- Transport modal shifts and electrification (rail and buses) : upfront costs, political economy of existing industries;
- Electrification of private passenger vehicles and associated value chain diversification: upfront costs for consumers and producers; institutional barriers to coordination and funding;

Civil society has also criticised heavily the emphasis on green hydrogen for export, seeing it as undermining domestic clean power transi-

tion and putting communities at risk. However, one element with wide agreement is the transition of the existing carbon-intensive steel industry to one based on green iron ore for export and for domestic steelmaking. While industrial decarbonisation is held back by political opposition and firm hedging, high upfront investments with limited financial resources, and undeveloped markets for products or a lack of green product premia. McCall et al (2025) note, green hydrogen direct reduction "is slated to be the mainstay of a fully decarbonized global production route. However, to be bankable, these require large direct capital subsidies, large operational subsidies in hydrogen supply and, understandably, commensurate protection against high embedded emissions imports", and thus require terms that "level the international playing field" as otherwise "such projects will likely not be bankable despite the country's potential as a low-cost production location due to its renewable energy resources and iron ore reserves". A particular opportunity thus lies in a stepwise process for the local industry (which faces significant competitiveness challenges already) – starting with electric arc furnaces that can in time be fed by green direct reduced iron. But cooperation is needed in both climate finance and tech transfer to enable large-scale 'green industrialisation' projects in South Africa.

Finally, mobilising finance remains an acute challenge. Estimates to reach net zero by 2050 require investment of $224bn in power, transport, and industry to 2050 (NPV) (CCDR, 2023). The availability and cost of capital is thus critical, with South Africa, like many emerging markets, facing higher rates than developed countries due to real or perceived risk premia. It is likely that the quantum of funding required for the energy transition will soon exhaust domestic financing capacity without some forms of financial innovation and greater international flows (Intellidex, 2022). Furthermore, South African commercial banks are constrained by implicit sector limits imposed by ratings agencies and regulatory rules (B20, 2025), and further innovations are needed domestically to unlock domestic resources at scale.

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