TRADE & INDUSTRIAL POLICY STRATEGIES

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A tale of three transitions: The pursuit of just transitions in South Africa

INTRODUCTION

This policy brief opens the door for a deeper understanding of South Africa's tale of three transitions. First, the **electricity transition**, characterised by a shift to more decentralised, modular and renewable energy-based systems, is discussed with a focus on the necessary steps to transition the power system sustainability and inclusively. Second, the connected but broader **coal transition** is unpacked, bringing forward the importance of dedicated interventions in support of a just transition in the value chain, especially in the coalfields of Mpumalanga. Third, the need to pursue an **all-of-society and all-of-economy transformation** towards climate-resilient and low-carbon models of development is put forward, emphasising the multi-scalar, multi-context, multi-geography nature of climate and transition impacts. Last, the conclusion formulates the necessity of concurrent and mutually-reinforcing but dedicated responses for each of the 'three transitions'.

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INTRODUCTION

Technological evolutions and revolutions have framed the fabric of economies and societies since the dawn of time. Energy, a central element of human life since the domestication of fire, has experienced multiple waves of development over the centuries.

South Africa's electricity system is rapidly evolving. Initially driven by climate change objectives, renewable energy technologies, supported by battery storage systems, have emerged as the most affordable avenue to generate electricity. Economics now drives change. Historically concentrated on South Africa's coal-based vertically integrated utility, Eskom, the future of electricity policy contemplates a much different generation mix, geared toward renewable energy technologies, as beacons of a decarbonised, cost-effective, more decentralised system.

Akin to a Schumpeterian wave of 'creative destruction' (Schumpeter 1942), the unfolding 'electricity transition' has significant, multi-faceted implications. It directly impacts the people, communities and businesses dependent on the current coal-based electricity supply chain. More broadly, the coal value chain, which has shaped power generation and petrochemical production, but also infrastructure development (e.g. transport), research and development, employment, skills development, wealth accumulation, inequality and the South African landscape, especially in the heart of the coalfields in the Mpumalanga province, is on a gradual phase-out trajectory.

Yet, these impacts are relatively contained to specific geographies and economic activities. Indeed, a much broader socio-economic transition is unfolding, shaped by an economy- and society-wide pursuit of 'sustainable development'. Climate change impacts and the world's response to them – that is the fragmented and competitive transition to a low-carbon and climate-resilient model of development – has deep-seated implications for all communities, geographies and industries.

The magnitude of the impacts, associated with the relatively short timeframe of the shift, has raised the imperative of a 'just transition' in South Africa, especially since the agenda gained political prominence with the adoption of the Just Transition Framework in 2022 (PCC 2022). It enshrined in policy the need to put *people* at the centre of the transition, by fostering inclusivity and empowerment (participatory justice), minimising, mitigating and counter-balancing negative impacts (distributive justice), and redressing historical injustices and damages (restorative justice) (Montmasson-Clair 2021).

The adoption of the country's Just Transition Framework in 2022 enshrined in policy the need to put people at the centre of the transition, by fostering inclusivity and empowerment (participatory justice), minimising, mitigating and counter-balancing negative impacts (distributive justice), and redressing historical injustices and damages (restorative justice).

Rather than limiting the imperative of a 'just transition' to the 'energy transition', this flags the reality of a 'triple transition': a technological shift in the electricity industry, a phase-out of the coal (and liquid fuel) value chain, and a socio-economic transformation in the broader labour market and economy. While connected, these 'three transitions' require dedicated analyses and responses. Yet, the response to the broad societal transition is too often limited to an electricity (or energy) debate and South Africa's coal region.

AN ELECTRICITY TRANSITION

South Africa's electricity supply industry (ESI) has historically been vertically integrated in the national utility and centralised on the coal value chain. In addition to a natural monopoly in transmission, Eskom has concentrated the quasi-totality of generation and about half of distribution (40% of customers for 60% of electricity sales), the remainder being handled by municipalities. Eskom has also been active in coal mining and infrastructure. Indeed, coal has formed the backbone of South Africa's ESI for more than a century (Makgetla 2021). In 2023, the country's 15 operational coal-fired power stations accounted for 70% of South Africa's electricity generation capacity and 83% of electricity production.

With the advent of democracy, Eskom's powerhouse was put at the service of socio-economic development. Over-investment during the apartheid era, combined with a pricing formula not reflecting new construction costs, led (for a time) to excess supply and very low prices. As discussed in the next section, this underpinned the growth of industrial development, especially energy-intensive industries. The utility also pursued a policy of electrification, widening electricity access from 58% in 1996 to 87% in 2022 (World Bank data).

The paradigm on which Eskom thrived in the early democratic era, i.e. abundant low-cost power, is however no longer valid. It ended abruptly with devastating power shortages in 2007 triggered by a failure by government to invest in new generation capacity. In fact, the historical coal-based generation fleet is at a crossroad. A sizeable share of existing power stations has reached its end of life or will do so in the near future. The average age of Eskom's coal-fired power stations (excluding the new Medupi and Kusile plants) is over 40 years, and about 22 GW are set to be decommissioned by 2035. Belated investment in the world's two largest dry-cooled coal-fired power plants, Medupi and Kusile, then precipitated rapid, aggressive electricity price increases. Average electricity prices have increased seven-fold in nominal terms over the 2007/2008-2022/2023 period (Eskom data), with disastrous consequences on industrial development and social progress.

In the meantime, global technological developments, alongside massive cost reductions, have propelled renewable energy (with battery storage technologies) as the more cost-effective avenues to generate electricity. Between 2010 and 2023, the global weighted average levelised cost of electricity of newly commissioned utility-scale solar PV projects declined by 90%, while that of onshore wind fell by 70% (IRENA 2024).

Correspondingly, South Africa's renewable energy journey at scale was initiated in 2011 through the state-led public procurement. The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) was the first meaningful step towards diversifying the country's electricity mix (as well as introduce some ring-fenced competition at the generation stage).

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While haphazard in its delivery, in part due to the resistance of the national utility to introduce independent power production, the REIPPPP, along with other state-led procurement programmes, has successfully procured about 9.5 GW, as of March 2024. Of that, about 6.3 GW have already been connected to the grid. Prices have congruently come down significantly over time, reaching R0.485 per kWh for solar PV and R0.497 per kWh for wind energy technologies in 2021 (IPP Office 2024).

In parallel, the modernisation of the ESI's obsolete, vertically integrated business model has been ushered by energy insecurity, significantly reshaping Eskom's role. The unbundling of the utility into separate generation, transmission and distribution units, first proposed in the 1998 White Paper on Energy Policy, was operationalised in July 2024 when the National Transmission Company South Africa officially began trading. Then, the Electricity Regulation Amendment Act (signed into law in August 2024) lays the legislative foundations for establishing a fully independent Transmission System Operator and a more open and deeper market infrastructure.

Complementarily, private sector participation in the sector has been facilitated by the easing (in 2021) and then removal (in 2022) of the licensing requirements for building power generation capacity. This has led to a massive pipeline of investment by the private sector (notably energy-intensive users) in power generation, overwhelmingly in renewable energy. Over the 2022-2024 period (up to Quarter 3), a total of 9.5 GW of private sector-led projects were registered at the National Energy Regulator of South Africa and a significant pipeline of projects (estimated at around 22 GW by the Presidency) is at various stages of development.

At the same time, while still nascent, the integration of embedded generation has been increasingly welcomed and facilitated at the local level. By the end of 2023, 71 of 165 municipal distributors, accounting for the majority of municipal electricity demand, allowed embedded generation on their networks (SALGA 2023). Several municipalities have also started processes to procure electricity from Independent Power Producers (IPPs). Public entities have also initiated their own rollout of small-scale embedded generation on government buildings. For instance, the Department of Public Works and Infrastructure plans to roll out up to 4 GW of renewable energy on public structures in the coming years. A tax incentive for households and businesses has further incentivised the installation of solar (and battery) systems. According to the South African Photovoltaic Industry Association, about 1.9 GWp of small-scale rooftop solar was online in March 2023.

Although still limited, micro- and mini-grids are also playing an increasingly stronger role in the country. The state has relied on decentralised solutions to electrify numerous remote areas in the country in the Eastern Cape, KwaZulu-Natal, Limpopo and Northern Cape. Through the Integrated National Electrification Programme, about 215 000 households have been electrified through non-grid, solar-based solutions over the 1994-2024 period (Portfolio Committee on Mineral Resources and Energy 2019; DMRE 2024). Eskom has also developed its own containerised microgrid solution with pilots in several communities around the countries (Lynedoch in the Western Cape, Ficksburg in the Free State, Swartkopdam in the Northern Cape). Bushveld Energy has additionally spearheaded the installation of the first hybrid mini-grid system in the country using 1 MW/4 MWh vanadium redox flow battery (VRFB) storage along with a 3.5 MW solar plant (Engineering News 2022).

As a result of these developments, the share of renewable energy in South Africa's electricity mix has increased from just above 2% of generation capacity in 2010 to 17% in 2023 (IRENA data). The massive investment in renewable energy by the private sector and households as well as improved performance of Eskom's coal-based generation fleet, have contributed to a halt in loadshedding in 2024.

Beyond mining, an extensive coal value chain has developed, comprising numerous economic activities beyond electricity generation. Coal has been central to the iron and steel industry and the petrochemical value chain.

Yet, both the physical (the grid) and the market infrastructure have to be enhanced to further enable the rollout of (large-scale) renewable energy generation capacity. Grid capacity is increasingly constrained, especially in the Cape provinces. The Transmission Development Plan contemplates the construction of over 14 000 km of transmission lines over the 2023-2032 period. A curtailment framework is also set to liberate some grid capacity. Complementarily, trading and wheeling frameworks have to be successfully implemented to support a more open, competitive market. In addition, regional integration, through the Southern African Power Pool, which still is at its infancy, should be deepened to optimise the rollout of (renewable) energy across the region.

At the local level, municipalities require new business models to be financially sound and genuinely integrate renewable energy in their systems. Municipalities should be supported to attract investment in renewable energy, increase their portfolio of renewable energy assets, and dependably provide reliable, low-carbon, affordable energy to their customers. Ultimately, municipalities require a new financing model integrating and leveraging the potential of renewable energy, particularly small-scale embedded generation (Montmasson-Clair et al. 2017).

Finally, the rollout of renewable energy should be aligned with South Africa's broader socio-economic agenda. Renewable energy remains the privilege of a few in South Africa and significant efforts are needed to affect an inclusive rollout. A just transition requires both a sustained rollout of renewable energy to poor and marginalised communities across the country and the inclusive ownership of assets within an energy system that enables all citizens to play a much more productive role in the economy. The rollout of renewable energy should also support the development of industrial value chains, as contemplated by the South African Renewable Energy Masterplan (SAREM).

A COAL TRANSITION

More than just fuelling the economy, the ESI, underpinned by the coal value chain, has been a central part of the country's socio-economic fabric. As such, the 'energy transition', through the coal value chain, has some definite on-the-ground socio-economic impacts for people, communities and businesses that have historically relied on it.

While past its peak, coal mining remains a large pillar of the country's economic and social structures. In 2023, coal mining contributed around 1.1% to GDP, through about 160 mines. Coal ranked as the third most significant commodity mined in the country, feeding both domestic (about 70% of volume and 50% of value) and export markets (Makgetla et al. 2019).

Beyond mining, an extensive coal value chain has developed over time, comprising numerous economic activities beyond electricity generation. Coal use has been central to the iron and steel industry (through primary production) and the petrochemical value chain (through Sasol's coal-to-liquid process). Most industries have explicitly (like aluminium smelting) or implicitly developed off the back of low-priced electricity, part of a coal beneficiation strategy fuelled by (temporary) excess capacity, and relatively economically affordable coal deposits (especially when externalities are not internalised). Some transport activities, such as the Richards Bay Coal Terminal, CoalLink railway line and coal trucking, also directly depend on the value chain.

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In line with its economic significance, the coal value chain is a source of employment in the country, particularly in coal-dependent regions. It is the main source of livelihoods in eMalahleni (Witbank), Steve Tshwete (Middelburg), Govan Mbeki (Secunda) and Msukaligwa (Ermelo) (Makgetla et al. 2019).

At present, about 150 000 people are directly employed in the coal value chain. About three out of four of these jobs are inherently linked to the production and transport of coal. Mining accounts for the lion's share, with about two-thirds (91 600) of direct jobs. Transport-related jobs stand at around 15 000, spilt between Transnet Freight Rail (an estimated 12 000), the Richards Bay Coal Terminal (about 500) and coal trucking (about 200 small businesses employing 2000-4000 people).

The remaining direct coal jobs are located at the point of consumption, essentially in power generation (an estimated 10 000), petrochemical production (close to 18 000), steelmaking (more than 6500) and cement production (about 7000) (Hermanus and Montmasson-Clair 2021). In addition to direct jobs, the value chain indirectly supports a wide array of activities, especially in coal-dependent communities, such as the small businesses which service mining activities and mine workers in the coal towns. Workers in coal mining also support on average three to 10 dependents (Burton, Caetano, and McCall 2018).

Importantly, people employed in the coal value chain fare better than those in many other parts of the economy. The median pay in coal mining and heavy chemicals was over R10 000 a month in 2017, and close to R15 000 for electricity workers, compared to just over R5000 for other formal workers (Makgetla et al. 2019). Employment in the value chain is furthermore a key source of social safety. Although the role of contractors has grown significantly over the last two decades (to reach 59% of the coal mining workforce in 2020), the country's labour movement has been instrumental in securing relatively better-paid, stable employment within an organised labour force with access to collective bargaining, advancing labour rights and worker interests (Hermanus and Montmasson-Clair 2021; Makgetla and Patel 2021).

At the same time, coal dependency is a source of vulnerability which makes individual transitions harder. Education levels in coal mining are slightly lower than the norm for other formal workers. And while most of this workforce receives specialist training, resulting in being categorised as 'semi-skilled' (72%), the majority of coal workers are at risk of being unable to transfer their skills to other sectors outside mining, making shifting to other sectors difficult for these workers (Makgetla et al. 2019).

At the geographical level, the activities associated with the value chain have effectively displaced other economic sectors. As a result, the municipalities have heavily undiversified economies relying on coal and coal-related activities. Most economic activities, such as retail, transport, food and accommodation, and even government services, largely support coal value chain activities and the people employed in them (Makgetla et al. 2019). These municipalities display a mix of characteristics which is typical of mining towns (narrow economic base, geographical dislocation and 'coal identity' (Makgetla and Patel 2021).

In addition, mining activities (operationally and through a lack of rehabilitation) have generated significant environmental damages, such as air pollution, the sterilisation of soil, a loss of biodiversity and wildlife, the contamination of ground and surface water, land degradation and a loss of arable land. This has had dramatic effects on the region with notable decreases in arable soil, agricultural yields and overall health of fauna and flora (Campbell, Nel, and Mphambukeli 2017).

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Mining activities have also had material social impacts, generating artificial tensions between environmental, health and sociocultural priorities on the one hand, and jobs and livelihoods on the other. Environmental impacts, along with blasting and noise pollution, have a detrimental impact on the health of workers and communities (groundWork, Centre for Environmental Rights, Human Rights Watch, and Earthjustice 2019), often even preventing people from gaining employment. Mining has also historically dispossessed many people from their ancestral land, resulting in the loss of land and livelihoods as well as the socio-cultural degradation (Skosana 2019; 2020).

South Africa's coalfields face a range of other vulnerabilities, like many other areas in the country (Monaisa and Montmasson-Clair 2022a). Levels of poverty and inequality in Mpumalanga's most coal-dependent municipalities are relatively high compared to national rates, while high levels of unemployment still persist. In 2019, labour force participation in eMalahleni, Steve Tshwete, Govan Mbeki and Msukaligwa stood at 68%, 66%, 67% and 60% respectively, compared to 60% nationally. Furthermore, like most municipalities in the country, affected towns are heavily under-resourced. Going forward, it is not clear how affected and overstretched municipal governments will be able to sustain (let alone enhance) service delivery. This is particularly critical as coal mines and Eskom have provided many of the local public services to date.

The coal value chain is on a progressive, long-term phase-out over the next two to three decades. In line with the Integrated Resource Plan, Eskom has initiated the close-down of South Africa's fleet of coal-fired power plants, mostly composed of old generation units. The Komati power station closed in 2022 while the Camden, Grootvlei and Hendrina plants are set to shut down over the 2027-2030 period. While local coal sales have been stable or marginally growing over the last decades, this planned decommissioning will have direct consequences on the domestic market.

In addition, other key coal users, such as the petrochemical and steel value chains, have initiated a long-term technological shift towards low-carbon production structures. The future of the coal-based activities in the country, such as Sasol's coal-to-liquid plant, is highly uncertain (Crompton, Young, and Hahn 2024). Export sales, in volume, have been on the decline since their peak in the last quarter of 2018. In the second quarter of 2024, they reached just over 10 million tonnes, compared to over 21 million tonnes at the peak (Department of Mineral Resources and Energy data).

Given these features, the need for a just transition in the coalfields and the coal value chain is clear. Moreover, a just transition in the coal value chain is nationally important from a political economy perspective. The livelihood of many workers, households and communities is at stake and in jeopardy as South Africa's 'energy transition' unfolds. It requires dedicated responses at the level of individuals, firms, value chains and geographies.

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A BROADER SOCIO-ECONOMIC TRANSITION

The electricity and coal transitions and their definite impacts should not overshadow the broader socio-economic transformation triggered by the shift to a green economy and the need for an 'all-of-society and all-of-economy just transition'. Indeed, virtually all value chains, households and geographies are affected by climate and transition impacts. The ESI, and the coal value chain underpinning it, is only one of the impact channels into the economy and society.

In light of the global low-carbon transition, South Africa's high carbon-intensity translates into an elevated degree of economic risk (Montmasson-Clair 2020). The majority of South Africa's greenhouse gas (GHG) emissions are concentrated in a small number of upstream firms, and these underpin the entire economy's carbon dependency. Eskom (39% of national GHG emissions) and Sasol (14%) overwhelmingly dominate the emissions landscape, followed by companies in mining, cement, metals and forestry (ArcelorMittal ranks third with less than 3%) (CER, n.d.). This has created a notable carbon-intensive path dependency in the economy, as most firms are reliant on such core companies for their energy and other key inputs. As global markets increasingly shift away from carbon-intensive goods and jurisdictions (including through green protectionist measures), South Africa's exports face declining demand (Montmasson-Clair 2020).

Beyond the electricity transition, the techno-economic transition needed to maintain the competitiveness of the South African economy in a decarbonised world appears challenging. For instance, the pathways to 'green steel' and 'green aluminium' in South Africa remain unclear, due to the high capital cost required, lack of access to technology, and the absence of domestic demand (Monaisa and Montmasson-Clair, 2022b) . The broader shift to 'greentech' will also impact numerous other industries, such as the automotive and liquid fuel value chains, with the shift to electric vehicles (EVs), or agricultural value chains, with the phase-out of fossil fuel-based chemical fertilisers.

Domestically, beyond the coal value chain, industries set to experience disruptive transitions or face decline employ a large proportion of the population. About 250 000 mechanics, a third of which are informally or self-employed, will require retraining and up-skilling to service EVs. Petrol stations across the country, with some 140 000 workers, face a slow but almost certain decline in the coming decades (Maseko et al. 2020). The platinum value chain, which directly employs more than 180 000 people, especially in the North West, is also at risk from the rise of EVs and the decline of catalytic converters (Montmasson-Clair et al. 2020). The agricultural value chain, which employs 785 000 people in industrial agriculture, 300 000 in food processing and 80 000 in the production of wine and other alcoholic beverages, will face significant climate impacts (Makgetla et al. 2020a).

Overall, maintaining (if not improving) the competitiveness of the South African economy in a climate-compatible market is contingent on addressing both supply- and demand-side constraints (Montmasson-Clair and Chigumira 2020). Access to 'green' innovations and production processes, new forward-looking skills, and finance, especially grant and affordable, patient capital, are central determinants of the green industrial transition. It also relies on securing markets, notably by fostering domestic demand and value chain linkages, but also through trade agreements, such as the African Continental Free Trade Area agreement.

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Beyond the necessity of 'greening' existing industries, the development of new 'green industries' is paramount. South Africa displays globally competitive potential for the development of several emerging green value chains, such as renewable energy, battery storage, green hydrogen, sustainable aviation fuel and next generation sanitation (see, for instance, Mudombi 2018; Montmasson-Clair 2024; Patel 2020; Chireshe, Bole-Rentel, and Reeler 2022). The country is also rich in several 'critical minerals' (such as PGMs, manganese, chromite, titanium, vanadium, and zinc) which are forecasted to experience increased demand in the future. Coupled with South Africa's industrial capabilities, this opens the door for mineral beneficiation and value creation (Montmasson-Clair, Hermanus, and Dane 2024).

Compounding these transition impacts, South Africa is highly vulnerable to biophysical climate impacts. Changes in weather patterns and temperatures, increased occurrence and intensity of extreme events (such as floods or droughts) and sea-level rise in coastal areas are forecasted to have structural impacts on the South African economy. While not as low as most other countries on the continent, South Africa's resilience and adaptive capacity remains highly limited. Besides environmental, health and safety risks that may arise from climate impacts, food systems and physical infrastructure (for transport for instance) are particularly at jeopardy.

Despite a wide range of labour market policies providing a degree of protection and support for workers and strong unionisation in some sectors (such as mining), most workers display low resilience levels (Makgetla et al. 2020b; Montmasson-Clair 2021). Standards and eligibility are too low to ensure the promotion of decent work, notably in new economic activities (including 'green jobs' which do not automatically lead to decent work), or constitute a robust safety net for workers who would lose their employment in the transition. Numerous workers, especially in the informal sector, do not receive a living wage, materially reducing their ability to mitigate or adapt to climate-related impacts. In addition, the existing employment-related safety net, the Unemployment Insurance Fund, covers workers imperfectly. Similarly, while South Africa's social grant system has done a great deal to reduce poverty and protect people against destitution, it is not sufficient to adequately ensure the climate resilience of vulnerable communities (and more broadly secure the right to social security). Social assistance benefit levels are too low to ensure an adequate standard of living (Montmasson-Clair 2021).

Most households in the country do not have the ability to withstand any sort of shock, from climate impacts to transition impacts. South Africa's unemployment rate, including discouraged jobseekers, stood at 45.5% in the third quarter of 2024, with even higher percentages for women, Black people and the youth (Statistics South Africa 2024). In addition, in 2023, 65.8% of the population still lived below the upper-bound poverty line of R1558 per person per month (Quantec data). Also, most part of the population does not own meaningful assets. The value of housing for the poorest 30% stood at about R30 000 in 2017 (Makgetla 2020). In 2017, under two thirds of households in the poorest 60% had running water on site, half had flush toilets and municipal refuse removal, and just over four out of five had electricity. Furthermore, even where low-income households have access to services, the quality is often poor, notably due to financial access issues (Mohlakoana and Wolpe 2021).

A comprehensive policy framework encompassing a just transition across value chains (i.e. beyond coal and energy), geographies (i.e. beyond the coalfields), dimensions (procedural, distributive and restorative justice) and angles (climate and transition impacts) is needed. Going forward, it is foundational to foster a just transition of the South African economy to a climate-compatible development model as well as deliver inclusive pathways to 'just resilience' across society is paramount.

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The paradigm on which South Africa's current socio-economic structure emerged and grew, and the economy and society evolved, was never sustainable and is in fact no longer valid. A new development paradigm, underpinned by a green industrial policy, is urgently needed.

CONCLUSION

South Africa's transition to an inclusive, green economy is multi-faceted, and so is the country's just transition agenda. At the core, three intertwined, but different, transitions are unfolding, at the levels of the electricity system, the coal value chain, and the broader economy and society. A techno-economic shift in the electricity sector, underpinned by renewable energy, is reshaping the provision of power, towards an increasingly decentralised system. In South Africa, coal use in power generation does not occur in isolation and interacts with a whole value chain. The progressive phase-out of coal impacts the jobs, livelihood and business models of a wide range of people, communities and businesses, especially in the heart of the coalfields in Mpumalanga. Then, a broader transition, to shift to climate resilient, low-carbon world, is fledging, with economy- and society-wide implications.

Each of these three transitions requires a dedicated policy response to affect a just transition. While complementary, the frameworks and interventions for each level of entry cannot be substituted for one another. Similarly, a just transition plan focused on one level of action is not suitable for ensuing a just transition at the other scales. With the shift to a renewable energy based, decentralised electricity system, targeted interventions are needed to make the rollout inclusive (i.e. accessible and beneficial to all in society) and socially owned (either by the state or communities).

The phase-out of the coal value chain requires rethinking the coal-based economy of the coalfields towards a diversified model of development, and the support to the livelihood of those who, more broadly, depend on it. While renewable energy may play a part in this socio-economic rejuvenation, it is not a silver bullet. Most people whose livelihood relies directly or indirectly on the coal value chain are unlikely to benefit from renewable energy developments. A wider, deeper strategy, notably to diversify and rejuvenate the economy of the coalfields, empower workers and communities, develop new value chains and rehabilitate natural ecosystems, is necessary. Then, the multi-faceted nature of climate and transition impacts calls for a new socio-economic strategy for the country, compatible with a climate-changed and climate-constrained world. It ought to internalise the shift in occupations/skills and economic activities, but also the heightened need for resilience to shocks, which are set to be more recurring and potent in the future.

The definition and implementation of such a 'triple transition' holds the key to South Africa's economic success and social progress in an environmentally compatible pathway. South Africa's modern economic history to date and its path forward illustrate that, while the destination matters, the journey is as (if not more) important. The country finds itself at a critical junction.

Historically, South Africa's economy and society have been intrinsically shaped by a Minerals-Energy Complex rooted in the coal value chain. Socio-economic development, spatial and infrastructure planning and wealth accumulation have all been moulded, or at least |underpinned, by the coal value chain. This has spurred the country's development but has also come at great social and environmental costs. The paradigm on which South Africa's current socio-economic structure emerged and grew, and the economy and society evolved, was never sustainable and is in fact no longer valid. A new development paradigm, underpinned by a green industrial policy, is urgently needed.

The multi-faceted nature of climate and transition impacts calls for a new socio-economic strategy for the country, compatible with a climate-changed and climate-constrained world.

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