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Green Skills for a Just Transition: Lessons from Brazil and South Africa

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Recommendations

- Establish coordinated national green skills strategies linked to broader national development plans.
- Expand and integrate social protection programmes with environmental sustainability and just transition objectives to incentivise sustainable behaviours and protect affected workers and communities.
- Prioritise green skills training by investing robustly in vocational training and reforming educational systems to meet the demands of green jobs.
- Continue to support South–South initiatives that facilitate knowledge exchange on green skills and job development, promoting developing country perspectives in the energy transition.

Executive summary

As members of the BRICS bloc, Brazil and South Africa are accelerating their efforts towards carbon neutrality by 2050, a goal reinforced in successive BRICS statements. Both countries face the dual challenge of addressing socio-economic inequality while advancing a just and inclusive energy transition. This paper examines the critical role of green skills development and social protection in enabling equitable low-carbon transitions in these two emerging economies.

South Africa's Just Energy Transition Partnership (JET-P) and Brazil's well-established renewable energy sector offer distinct yet complementary experiences. While Brazil leverages a relatively clean energy mix and social protection initiatives such as Bolsa Verde, it contends with labour market informality and inequality. South Africa remains heavily reliant on coal and grapples with structural unemployment exacerbated by fragmented green skills planning, despite the potential of the JET-P.

This comparative analysis highlights four key recommendations: better coordination of green skills strategies aligned with national development goals; expansion and integration of social protection systems tailored for a just transition; prioritisation of green skills training through robust investment and education reform; and South–South cooperation to promote lesson sharing on energy transition pathways.

Introduction

The energy transition, while still unfolding, has made fundamental changes to the global jobs landscape, necessitating urgent policy to develop skills bases in support of green industrialisation and the low-carbon economy. Brazil and South Africa are both important emerging economies and potential green development hubs for the Global South, as well as both being part of the BRICS (Brazil, Russia, India, China and South Africa) bloc. Both countries have committed to carbon neutrality by 2050 but have very different skills profiles in the green sectors necessary to support this rapid transition. They have both assumed leadership roles in several important processes that support international just transition policymaking in 2025. Brazil chairs BRICS and hosts the Conference of the Parties (COP) 30 climate conference, and South Africa hosts the G20. Coordination of these policy processes can improve skills transition planning for developing countries, if lessons are drawn from Brazil and South Africa's experiences and underpinned by national development objectives. The skills and labour transitions of developing countries can help reduce poverty and inequality while strengthening partnerships in research, skills and development.

Driving the uptake of green jobs and reskilling

As the world transitions to a low-carbon economy, South Africa and Brazil face immense challenges and opportunities. Both countries have drawn a link between their progress on socio-economic development and the opportunities presented by the energy transition, aligning economic growth with increased environmental sustainability.¹ Beyond their financial needs, the energy transition hinges on both countries' abilities to support a labour transition and incentivise green jobs and industries. This will require targeted and effective interventions to reskill workers at risk of losing employment, as well as sustainable investments into local economies to diversify value chains away from fossil fuels.

The UN Environment Programme defines the green economy as one that leads to 'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.'² Further, features of a green economy include enhanced energy and resource efficiency, protection of biodiversity and economic investments to reduce carbon emissions. For both South Africa and Brazil, scaling renewable energy and enhancing energy efficiency are central to their green economy agendas. The last decade has seen the rapid decline of South Africa's electricity monopoly, Eskom, amid rising electricity costs, spiralling debt and frequent load shedding. The estimated economic loss of load shedding from 2020–2023 has been estimated at about ZAR 223 billion (about \$12.6 billion at 2023 average exchange rates).³ In 2023, over 350 days of load shedding caused a gross domestic product contraction of 1.8%⁴ while the over 200 days of load shedding-free economic activity in 2024 has raised economic prospects, with Eskom believing its improved performance can contribute about 2% growth for the economy.⁵ It is widely held throughout the government that the decades-long economic dependence on coal power is no longer viable and a swift and inclusive energy transition must be actioned.

Brazil presents a different case, having a relatively clean energy mix, with about 60% of electricity generated from hydroelectric sources. Years of climate denialism under the Jair Bolsonaro administration undermined Brazil's history of climate leadership – at one point, deforestation rose by 150% under his leadership.⁶ The climate crisis threatens the

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- 1 Government of South Africa, "Remarks by President Ramaphosa on the Occasion of his Participation in the Round Table Discussion on Green Growth Partnerships at the Summit for a New Global Financing Pact, June 22, 2023", <https://dirco.gov.za/remarks-by-president-cyril-ramaphosa-on-the-occasion-of-his-participation-in-the-round-table-discussion-on-green-growth-partnerships-at-the-summit-for-a-new-global-financing-pact-22-june-2023/> and Government of Brazil, "President Lula Launches National Energy Transition Policy, Expected to Bring BRL 2 Trillion in Investment", August 27, 2024, <https://www.gov.br/planalto/en/latest-news/2024/08/president-launches-national-energy-transition-policy-expected-to-bring-brl-2-trillion-in-investment>.
 - 2 UN Environment Programmes, "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers", 2011, 2.
 - 3 Kay Walsh, Jaco Nel and Jessica Kiln, "Re-estimating the Economic Cost of Load Shedding in South Africa", Submission for the Biennial Conference of the Economic Society of South Africa, Nova Economics, September 11, 2023, https://cms.novaeconomics.co.za/wp-content/uploads/2023/10/Updated_Eskom_CoLS_ESSA_presentation_2024.pdf.
 - 4 Raine Adams, "Eskom: Are Brighter Days Ahead?" Allan Gray, February 1, 2024, <https://www.allangray.co.za/latest-insights/markets-and-economy/eskom-are-brighter-days-ahead/>.
 - 5 Eskom, "Eskom Marks 200 Days of Load Shedding Suspension", October 13, 2024, <https://www.eskom.co.za/eskom-marks-200-days-of-loadshedding-suspension-that-has-led-to-predictions-of-2-gdp-growth-for-south-africa/>.
 - 6 AFP, "Brazilian Amazon Deforestation Up 150% In Bolsonaro's Last Month", *Al Jazeera*, January 7, 2023. <https://www.aljazeera.com/news/2023/1/7/brazilian-amazon-deforestation-up-150-in-bolsonaros-last-month>.

continued viability of Brazil's hydroelectric energy sector as rivers and dams dry up and the country's energy needs grow. Following a change of government and the return of President Luiz Inácio Lula da Silva, Brazil has begun to address deforestation and re-engage in climate diplomacy.

The global transition will create millions of jobs worldwide, particularly in the energy sector and in developing economies. However, realising this potential requires concerted policy effort to address the skills deficit in green sectors.

Green skills gaps: policy and finance challenges in South Africa

South Africa's Just Energy Transition Partnership, announced at COP26 in Glasgow in 2021, was the first North–South international financing mechanism designed to transition a developing economy away from fossil fuel-based power. South Africa has had to balance accelerating its transition timeline with increasing domestic pressure to address the critical developmental challenges of slow economic growth and high inequality, poverty and unemployment. Building the country's 'green skills' ⁷ capacity is thus a priority.

To this end, the Presidential Climate Commission⁸ developed the Just Transition Framework which aligns with the National Development Plan and is further supported by a Just Transition Investment Plan and an Implementation Plan. These policies delineate strategic actions to 'leave no one behind' in the transition and earmark skills development and social investment for the just transition. While the policies support each other to cascade finance and political commitment for an inclusive transition of the affected coal, electricity and automotive industries, the remaining challenges provide lessons for Brazil and other BRICS countries for nurturing green skills in a developing country context.

The Just Transition Framework's vision for transitioning the formal labour sector away from coal is consistent with the International Labour Organization's (ILO) suggestions for decarbonising the economy. The ILO highlights the need to 'invest in existing and new technical and vocational training systems, retrain workers, anticipate needs and provide upskilling measures, offer on-the-job training and apprenticeships' or adopt new economic models for sustainable development such as investing in a low-carbon digital or care-economy.⁹ The framework identifies three priorities: the reskilling and upskilling of adult workers; the realignment of the skills development system with anticipated labour needs for a green economy; and the strengthening of the foundational education system to support an adaptive future workforce.¹⁰

7 Green skills can be defined as 'the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society' in Charles Arthur, "What Are Green Skills?", UN Industrial Development Organization, August 8, 2022.

8 "About Us", Presidential Climate Commission (PCC), <https://www.climatecommission.org.za/about>.

9 ILO, *Employment and Just Transition to Sustainability in the BRICS Countries* (Working Paper for the 1st BRICS Employment Working Group, 2022), 5.

10 PCC, *A Framework for a Just Transition in South Africa* (2022).

Of the R1.4 trillion (about \$79 billion) needed to finance South Africa's transition between 2023 and 2027, the skills and jobs transition has been allocated R2.7 billion (about \$153 million at 2023 average exchange rates).¹¹ These focus areas respond directly to structural deficiencies in South Africa's green skills planning ecosystem. The country lacks a coherent national coordination mechanism to plan and develop sustainability skills in South Africa, and its Environmental Sector Skills Plan is yet to be updated from 2010.¹² Appropriate skills identification and planning requires national support (to build policy coherence and ensure alignment with national development goals and Just Energy Transition objectives) and can benefit from international lesson-sharing to leapfrog planning hurdles.

These hurdles have serious impacts on the capacity of vulnerable workers and communities to adapt to change. The energy transition is expected to drive a complete economic transformation, as most new jobs will not be created in the same industries or geographic locations where initial job losses occur. South Africa's coal industry, largely concentrated in the Mpumalanga province, is the most vulnerable to job losses. Notably, renewable energy jobs may not share the same geographic concentration.¹³ The coal value chain currently employs close to 93 000 people, predominantly in Mpumalanga.¹⁴ While some of the job losses in the coal value chain may be offset by job creation in the renewable energy sector, this is dependent on ensuring the renewable energy sector develops the capacity to employ local people as well as source resources and materials locally. Moreover, it is unlikely that the renewable energy sector will create enough jobs to substitute for the coal sector. Economic diversification and better policy planning to take advantage of green economy opportunities will be needed to absorb fossil fuel workers.

Similarly at risk is the South African automotive industry. Failure to respond quickly to the shift towards electric vehicles could endanger an estimated 100 000 jobs in the Eastern Cape, one of South Africa's most economically vulnerable provinces, with the highest expanded unemployment rate at 49.0%.¹⁵ It would also put an additional half a million jobs at risk in associated transport sectors, including taxi drivers, auto mechanics and petrol attendants. Thus, it is essential that South Africa's automotive industry prepares for a potentially swift change in demand by investing in innovative technologies and reskilling the workforce.

Uncertainty around securing appropriate financing, access to essential green technologies and spillover effects from global crises necessitate the development of responsive processes. Peer learning between South Africa and Brazil can help both

11 Government of South Africa, *The Just Transition Implementation Plan: 2023–2027*.

12 Government of South Africa, Just Transition Implementation Plan; Government of South Africa, Department of Environmental Affairs, *Environmental Sector Skills Plan for South Africa* (2010).

13 Jesse Burton et al., "Socio-Economic Considerations for a Paris Agreement-Compatible Coal Transition in South Africa" (Policy Paper, Climate Transparency, July 2019).

14 Statista, "Number of People Employed by South Africa's Coal Mining Industry from 2011–2022" (Statista Research Department, July 18, 2025).

15 Statistics South Africa, *Quarterly Labour Force Survey, Quarter 1: 2025*, Statistical Release P0211, 10.

countries avoid costly misjudgements. While there is policy-level commitment to reskilling programmes and human resource development, the small scale of allocated finance will hinder implementation. The process behind the allocation of R2.7 billion to skills development was not transparent. Details on how the funding will be spent remain vague and the lack of transparency continues to undermine the necessary partnership that should exist between the state and its most vulnerable people. Compared to the scale of funding directed towards renewable energy initiatives, the limited investment in skills development risks jeopardising the ability of coal-dependent workers and communities to adapt to a changing energy landscape.

Precarity and inequality: green jobs in Brazil and South Africa

'Green' jobs directly or indirectly benefit the environment and promote sustainable development through economic practices that reduce environmental risks and support poverty alleviation.¹⁶ Brazil has seen a steady increase in the number of green jobs. Over two million workers have green jobs and nearly 1.5 million of these are in the renewable energy sector alone.¹⁷ The country's success with creating green jobs in the formal sector provides key policy lessons for South Africa's skills transition. Research shows that South Africa has high green job creation potential and could generate between 85 000 and 275 000 green jobs by 2030, mainly in the energy and agriculture sectors.¹⁸ It has been estimated that targeted financing for South Africa's solar sector could create about 140 000 jobs by 2030 – 50 000 more than the number of people currently employed in the coal value chain.¹⁹

Brazil's abundant natural resources have supported its labour transition, as job creation took place in the forestry, sanitation and transport sectors, in addition to the renewable energy sector. At the same time, a number of national policies, such as the National Policy on Climate Change, have encouraged the creation of green jobs in the renewable energy and sustainable agriculture sectors, providing critical legal frameworks for green job creation.

Despite these achievements, Brazil continues to face challenges in its labour transition. The country's labour market is characterised by high levels of informality. Wage discrepancies are also high, especially in informal, new and digital sectors that still lack sufficient regulation. Much like in South Africa, there is a need to engender sustainability into the workforce's skillset through formal education, especially for young school-leavers. For instance, waste recyclers in the informal economy, despite making tangible environmental contributions, earn an average of about \$230 a month, below Brazil's

16 Green jobs have a direct or indirect positive impact on the environment with the objective to achieve sustainable development from economic practice with lower environmental risks and poverty reduction. See Climate Transparency, *Energy Transition in Brazil* (Climate Transparency, April 2019).

17 Marsilea Gombata, "On the Rise, Green Jobs Face Challenges", *Valor International*, December 18, 2023.

18 Shortlist and FSD Africa, "Forecasting Green Jobs in Africa", Shortlist, 2024.

19 Shortlist and FSD Africa, "Forecasting Green Jobs".

minimum wage of \$250.²⁰ A key insight from Brazil's green jobs experience would be for the inclusion of all these formal, informal and emerging sectors of the labour economy into the green-jobs matrix, allowing for these issues of informality and inequality to be addressed in just transition policy.

Social policy to safeguard transitioning livelihoods in the Global South

Social protection programmes have emerged as a critical component of the just energy transition by offering mechanisms to protect vulnerable workers and communities in transition. Skills development is itself a form of social protection, enabling workers to reskill and adapt to changing labour markets, while more traditional measures such as cash transfers and social insurance provide vital income support. Brazil and South Africa have extremely unequal societies, where poverty and unemployment remain heavily racialised. Social protection, because of its ability to encourage adaptation and resilience, should form part of just transition planning across developing countries, especially those with high levels of inequality, poverty and discrimination and those dependent on fossil fuel industries.

Brazil has demonstrated significant progress in leveraging social protection to reduce poverty and inequality. Over 28 million people have been lifted out of poverty over the last 15 years, and the population living in poverty has fallen to 10%. These achievements have been directly attributed to social interventions. By combining cash transfers with conditional benefits, Brazil's Bolsa Família and Bolsa Verde programmes, among others, have incentivised beneficiaries to invest in education, health and environmental conservation. In particular, the Bolsa Verde programme provides a top-up to the Bolsa Família cash transfer, as beneficiaries adopt more sustainable practices. Many recipients are from extremely poor rural households and are financially encouraged to avoid environmentally harmful behaviours through this additional support. The Bolsa Verde transfer incentivises the gathering of fruit, artisanal fishing and craftmaking from natural resources. Recipients' efforts are measured by tracking satellite images and radar hotspots to detect deforestation.²¹ A key lesson from Brazil is the importance of linking social protection with environmentally sustainable practices. By tying cash transfers to specific behaviours, such as sustainable farming practices or reforestation, governments can promote both social and environmental goals.

South Africa, while making strides in social protection, faces some significant challenges. The country's high levels of unemployment and inequality necessitate robust social safety nets to cushion the impact of the energy transition. Cash transfer programmes, such

²⁰ Gombata, 'On the Rise, Green Jobs Face Challenges'.

²¹ There are several social programmes that guarantee access to modern cooking fuels and electricity in Brazil for low-income families. These include Luz Para Todos (aims to universalise electricity), Auxílio Gas (to assist low-income families to buy gas through a bimonthly voucher), Tarifa Social (a discount on electricity bills for low-income registered families) and Bolsa Família (a cash transfer programme targeting poverty and vulnerability). See Paula Bezerra et al., "The Multidimensionality of Energy Poverty in Brazil: A Historical Analysis". *Energy Policy* 171 (2022): 113268, <https://doi.org/10.1016/j.enpol.2022.113268>.

as the Social Relief of Distress grant (which currently functions as an unemployment grant), have provided essential support, but more comprehensive measures are needed to address the complex needs of vulnerable people and affected communities. Workers in the coal value chain often earn more than other formal sector workers despite having lower levels of formal education, making social protection an inadequate compensation, especially considering the very low value of South African grants.²² Given that new green jobs may not absorb these workers completely, social protection is a necessary measure to mitigate high initial job and income losses from the decommissioning of coal power plants and the low-carbon transition of the economy.

Expanding social protection coverage is critical for developing countries, as common policy response measures to the projected negative losses of the just transition (such as employee guarantee schemes) are not applicable to developing country contexts.²³ Additionally, skilling, upskilling and reskilling the workforce presuppose that skills development in transitioning countries is both well-resourced and well-developed. This is not the case, even for middle-income countries such as Brazil and South Africa. Especially in South Africa, the renewable energy industry is just emerging and thus strategic investment into training programmes and educational courses is still necessary. The same is true for Brazil's informal economy, where combinations of social protection programmes are necessary to achieve positive impacts on poverty, skills and income security.

Conclusion

As the world transitions towards a low-carbon economy, South Africa and Brazil face immense challenges and opportunities in their efforts to engineer an inclusive, fair and just transition of the energy sector. Both countries recognise the potential of this energy transition to drive economic growth and improve social welfare, but significant hurdles remain. Brazil and South Africa need to plan appropriately for the short-term job losses that will come from decommissioning power stations, transitioning to climate-smart agricultural practices and reinvesting in nascent but growing green industries.

Skills development and social protection are broad measures that can protect and help adapt the vulnerable livelihoods of fossil fuel sector employees and surrounding communities to a low-carbon reality. South Africa's Just Energy Transition Framework, Investment Plan and Implementation Plan provide valuable blueprints for addressing the skills gap and supporting vulnerable workers. However, challenges such as limited funding and a lack of coordination of skills development processes hinder progress. Going beyond frameworks and action plans requires South African policymakers to coordinate social policy across sectors and geographies to limit the very real threat that the transition

²² International Energy Agency, *South Africa Sector Jobs Resilience Plans*, 2023.

²³ ILO, "[Skills Development for a Just Transition](#)", *Just Transition Policy Brief series*, 2022.

poses to the current socio-economic structure. Brazil, with its experience in renewable energy and social programmes, can offer valuable lessons to South Africa as it faces a similar developmental context.

By investing in education and training, expanding social safety nets and promoting sustainable practices, both countries can create a just and equitable transition. International cooperation and knowledge sharing will be essential to overcoming common challenges and accelerating the development of green skills. Ultimately, a successful transition will require a holistic approach that considers the social, economic and environmental dimensions of change.

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