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GREEN INDUSTRIALISATION

How China and South Africa Can Rewrite the Green Industrialisation Rules

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Preface

This working paper asks a single practical question: how can China and South Africa rewrite the rules of green industrialisation so that renewable energy deployment builds industrial capability and distributive justice rather than reproducing dependency? It is written for the policymakers, funders and researchers working at the intersection of the energy transition, African industrial policy and South–South cooperation, and is designed to be read as a decision aid rather than a description. The paper argues that the outcomes of the bilateral relationship are set less by intentions than by rules, and that those rules are still open to revision in the window before the next decade's infrastructure is locked in.

The paper is the culmination of 18 months of original research conducted in 2024 and 2025 under the SAIIA Futures Programme. Its evidence rests on two primary streams: the BRICS Climate and Just Energy Transitions Policy Innovation Labs, convened online on 14, 15 and 17 April 2025, and a parallel programme of strategic interviews with respondents across South Africa, Brazil, Russia, China, the United Arab Emirates (UAE) and Saudi Arabia.¹ These are complemented by a desktop review of primary policy instruments and reputable secondary analysis, and are read alongside the companion 'The BRICS Energy Compass: A Framework for Decision Makers' working paper, of which this case study is the bilateral microcosm.² The full method, evidence base and confidence protocol are documented in Appendices A and B.

The paper opens with an executive summary and a 'findings at a glance' synopsis, then tells the story in a narrative diagnosis – the two national stories and the bloc's central contradiction – before moving through five analytical sections. Section 1 maps the relationship as a single system of actors, rules and material. Section 2 reads it as a transition in three layers, with landscape pressures, a vulnerable incumbent regime and carrying niches. Section 3 sets out four scenarios for 2035. Section 4 offers a transformative theory of change. Section 5 translates the analysis into 12 transformative outcomes, a material trace of six projects, a short watchlist of signals to 2030 and the conclusion. Two appendices document the method and the evidence base. Taken together, the narrative diagnosis and the five sections form the paper's six-phase analytical stack.

The headline conclusions are gathered in the 'Findings at a glance' that follows, so a reader with limited time can take the argument in a single page before deciding how deep to go.

¹ The research programme comprised the BRICS Climate and Just Energy Transitions Policy Innovation Lab, convened under the SAIIA Futures Programme on 14, 15 and 17 April 2025, and a parallel programme of strategic interviews with respondents from South Africa, Brazil, Russia, China, the UAE and Saudi Arabia (2024–2025). See Appendix B.

² Deon Cloete et al., "The BRICS Energy Compass: A Framework for Decision Makers" (Working Paper, SAIIA, 2026).

Findings at a glance

Eight findings, each substantiated in the sections that follow.

1. Rules, not intentions, govern the relationship.

In nearly every dimension of the system, the operative rule favours deployment -by-import over industrialisation-by-localisation; Chinese firms already supply roughly three-quarters of South Africa's solar market.³

2. China is the structural pivot of the clean-energy system.

It manufactures over 80% of the world's solar panels and a majority of its wind turbines and storage batteries, which makes cheap deployment possible and dependency unavoidable unless the rules change.⁴

3. The pivot cuts both ways.

China passed its 2030 wind-and-solar target about six years early, roughly 1.4 terawatts (TW) by the end of 2024,⁵ yet approved more than 100 gigawatts (GW) of new coal in each of 2022 and 2023: the dominant clean-technology innovator is also the most powerful regime maintainer.⁶

4. South Africa leads on norms but is constrained at home.

It signed the world's first just energy transition partnership and authored the just transition framing later used in Indonesia, Vietnam and Senegal, while remaining among the highest per-capita emitters with a coal-anchored grid.⁷

³ Hongli Guo, Wen Feng and Ruining Yan, "[China's Strategic Thoughts and Suggestions on Promoting South Africa's Clean Energy Transition](#)", *Frontiers in Chemical Engineering* 7 (2025).

⁴ Ember, *China Energy Transition Review 2025* (Ember, 2025); International Energy Agency, *Solar PV Global Supply Chains* (IEA, 2022). China produces over 80% of the world's solar panels and a majority of its wind turbines and storage batteries.

⁵ Michelle Lewis, "[China Installed a Record Capacity of Solar and Wind in 2024 – in Numbers](#)", *Electrek*, January 21, 2025.

⁶ Global Energy Monitor and Centre for Research on Energy and Clean Air, quoted in Darrell Proctor, "[China Approves 106 GW of New Coal-Fired Capacity](#)", *POWER*, February 28, 2023.

⁷ Sangeeth Selvaraju et al., "[Just Energy Transition Partnership Grants and Country Platforms: Lessons from Indonesia and South Africa](#)" (Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, 2025); Tokelo Shai, "[What Are JETPs?](#)", Institute for Human Rights and Business, November 6, 2025. South Africa signed the first JETP at COP26 in 2021; the model was replicated in Indonesia (November 2022), Vietnam (December 2022) and Senegal (June 2023).

5. The finance structure engineers dependency.

Against a JET Investment Plan need of about \$98.7 billion,⁸ pledges peaked near \$13.8 billion and fell to \$12.8 billion after the US withdrawal;⁹ by 2024 only about 4% of the financing was grant based, most of it flowing to foreign implementing entities.¹⁰

6. The carbon border raises the stakes.

The EU's Carbon Border Adjustment Mechanism now prices the carbon content of exports, turning South Africa's mineral endowment from an automatic advantage into one contingent on moving up the value chain.¹¹

7. Four futures, one decision.

The trajectory to 2035 turns on two uncertainties (the terms of the China relationship and South African delivery capacity), yielding four scenarios: Solar Vassal, Managed Dependence, Stalled Sovereignty or Beneficiation Breakthrough.

8. A small set of rules can rewrite the trajectory.

Local content conditions, beneficiation-linked procurement, grant-weighted finance and reciprocal localisation clauses, none of which requires a new treaty, are the levers; three early signals show whether the system is bending towards Beneficiation Breakthrough rather than Solar Vassal.

⁸ Republic of South Africa, "Just Energy Transition Investment Plan 2023–2027" (Presidency, 2022), stating a financing need of ZAR 1.48 trillion (about \$98.7 billion).

⁹ Terence Creamer, "[South Africa Confirms US Withdrawal of \\$1.5bn Just Energy Transition Partnership Pledge](#)", *Engineering News*, March 6, 2025.

¹⁰ Luam Kidane, "[Dependency by Design: How the JET-IP Structures South Africa's Energy Future](#)", Transnational Institute, November 20, 2025.

¹¹ Michael Lengahan, "[CBAM and South Africa's Metals Sector](#)", *Anthesis*, July 31, 2025; Reinhardt Arp, "[CBAM: What It Means for Exporters of Steel, Iron and Aluminium](#)", *Carbon Trust*, January 15, 2025. The CBAM definitive phase began in January 2026.

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Executive summary

China manufactures four-fifths of the world's solar panels, a majority of its wind turbines and most of its storage batteries,¹² and closed 2024 with roughly 1.4TW of wind and solar installed, six years ahead of its own 2030 target.¹³ South Africa originated the just transition as a policy model, signing the world's first Just Energy Transition Partnership in 2021, a template since taken up in Indonesia, Vietnam, and Senegal, yet it still runs the most carbon-intensive power system in the G20, around 80% coal.¹⁴ . Put the two together and you have the BRICS energy narrative in microcosm: scale against justice, ambition against implementation, sovereignty against dependency. Both governments reach for the same vocabulary of green industrialisation, just transition, and energy sovereignty, but they mean materially different things by it, and the gap between the shared words and the contested meaning is the subject of this paper.

This paper argues that the relationship is governed not by intentions but by rules. Across almost every dimension of the system the operative rule favours deployment-by-import over industrialisation-by-localisation. Renewable deployment decarbonises the grid while deepening structural dependency; the same panels can count as green capacity whether they build sovereignty or reproduce it. Whether the next decade is one of Solar Vassal or Beneficiation Breakthrough depends on whether a small set of rules – local content, beneficiation-linked procurement, grant-weighted finance and reciprocal localisation clauses – is rewritten before the panels arrive.

A factory that built itself a customer

On a stretch of veld in the Northern Cape, the sun shines on a 100MW solar farm whose panels were trucked in from China, financed by a Chinese policy bank and stitched together by a contractor whose engineering college is in Wuhan. The panels tell the story of the relationship.

The panels are doing exactly what they were bought to do: turning photons into kilowatts, keeping the lights on in Johannesburg and shaving a few million tonnes of CO₂ a year off South Africa's accounts. They

¹² Ember, *China Energy Transition Review 2025*; IEA, *Solar PV Global Supply Chains*.

¹³ Lewis, "China Installed a Record Capacity".

¹⁴ Sangeeth Selvaraju, A. Pratiwi, and L. Sabogal Reyes, *Just Energy Transition Partnership Grants and Country Platforms: Lessons from Indonesia and South Africa* (London: Just Transition Finance Lab, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, 2025), <https://doi.org/10.21953/researchonline.lse.ac.uk.00137110>; and Climate Transparency, "South Africa," in *Climate Transparency Report 2022* (Climate Transparency, 2022), <https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-South-Africa-Web.pdf>

are also doing something else, something less noticeable and more durable. They are making the country a customer.

Roughly three-quarters of South Africa's solar market is Chinese, and Chinese firms increasingly supply its storage batteries and wind turbines too.¹⁵ The 244.5MW Longyuan De Aar wind farm, built with Chinese turbines by the only Chinese company to bid into the renewables programme, is the most photographed example.¹⁶ The coal fleet it is displacing tells a different story: the heavy kit for the Medupi and Kusile stations, built a decade earlier, came from Hitachi, which supplied the boilers, and Alstom, which supplied the turbines, not from China.¹⁷ China's grip on South Africa's generating equipment is, in other words, a development of the past decade, not a long-standing fact. Switching from coal kit to solar kit is the easy part of a just energy transition. Switching from coal kit to solar kit is the easy part of a just energy transition. The hard part is what comes next, and a one-line judgment from a Policy Innovation Lab workshop in Pretoria captures the whole question:

'The biggest tragedy would be if we unlock the grid issue and we would need to import the balance of plant materials, as South Africa could produce these.'

Policy Innovation Lab participant, Pretoria, April 2025¹⁸

That sentence, written on a Miro whiteboard, is the throughline of this paper. The relationship between China and South Africa is the most consequential bilateral clean-energy arrangement in the Global South, and it is being negotiated, project by project, in the gap between two stories that share a vocabulary and disagree on the rules. The rest of the paper tells that story across six phases: a systems map of the actors, rules and material that hold the relationship in place; a multi-level reading of where the regime is straining; four scenarios for 2035; a transformative theory of change; 12 transformative outcomes; and a short list of signals a policymaker can monitor from a desk. Appendices A and B document the method and evidence base.

Two stories, one factory floor

¹⁵ Guo, Feng and Yan, "China's Strategic Thoughts".

¹⁶ "[Harnessing the Wind: China's Longyuan Wind Power Projects Lighting 300 000 Homes in South Africa](#)", IOL, July 4, 2023 (combined installed capacity 244.5MW, bid won 2013, commissioned 2017, Longyuan the only Chinese developer in REIPPPP); on the turbines, see Clean Development Mechanism Project, "Design Document Longyuan Mulilo De Aar 2 North Wind Energy Facility" (96 Guodian United Power UP86 1.5MW turbines).

¹⁷ "[Eskom Awards Biggest Contracts in SA's History to Hitachi and Alstom](#)", *Engineering News*, November 13, 2007; Modern Power Systems, "[Medupi and Kusile: Supercritical Giants of South Africa](#)", March 31, 2009.

¹⁸ Participant contribution, Policy Innovation Lab, Pretoria session, April 2025. See Appendix B.

China tells a story of technological transformation and green industrialisation; South Africa tells a story of just transition as distributive justice. These stories share a language but diverge on the rules.

If you have read a Chinese white paper on the energy transition and the South African Climate Change Act, you may think you have read the same document. Both reject externally imposed timelines. Both insist that climate policy must be subordinated to development. And both claim the right to define their own modernisation pathway. Diplomats call this narrative sovereignty,¹⁹ and in the plenary stages of BRICS and the G20 the two governments are useful allies.

Look at the details, however, and the convergence fractures. China tells the story of technological transformation and green industrialisation: the claim that climate action and economic growth are not in tension but mutually reinforcing, demonstrated by deployment at scale and articulated through the myth of 'ecological civilisation' as a distinctive modernisation pathway. South Africa tells the story of just transition as distributive justice: the claim that the transition must be measured not only in megawatts but also in who bears the costs and who captures the benefits, grounded in an Eco-Ubuntu relational ethic and a language of energy sovereignty. Green industrialisation is the terrain where they meet, and the meeting is both a convergence and a collision.

Where they converge

Both assert that narrative sovereignty in the same move: they resist Northern conditionality, the carbon border levy, loan-tied finance and externally set timelines, and claim the right to define their own development story rather than receive and adapt Northern frameworks. The climate-justice and multipolar-governance narratives give them shared ground in demanding financial reform and South–South cooperation. At this level, the partnership's diplomatic language of mutual benefit is substantively true. A research participant from Brazil framed the shared opportunity in the same terms: 'A successful future would be where the entire bloc, not just individual countries, leads in global energy transition.'²⁰

Where they collide

They mean different things by green industrialisation. China's narrative measures success in deployment and manufacturing scale; South Africa's measures it in local benefit, beneficiation and procedural justice. The Chinese developmental sovereignty logic subordinates distribution to aggregate growth; the South African logic makes distribution the test. The collision is captured in the lab participant's comment about

¹⁹ Cloete et al., "The BRICS Energy Compass", Section 4 (the five narratives structuring the bloc's debate, and "narrative sovereignty"); the "ecological civilisation" and "Eco-Ubuntu" framings are discussed there.

²⁰ Strategic interview, SALLA Futures interview programme, 2025.

the balance of plant materials, and in a quieter judgment on community engagement around the JET by a South African research participant who has worked on the Medupi financing study:

'The JET Investment Plan is a fantastic policy framework. However, its impact is undermined by a lack of commitment to implementation, particularly when it comes to coordination between national, provincial and local-government levels. While the national government may drive the policy with ambition, provincial and local authorities often lack the capacity or political will to follow through.'

Strategic interview, 2025²¹

On the ground, the words are shared; the meaning is contested. The same panel, when counted in the country's renewable-energy total, can deepen sovereignty or reproduce dependency. Which story it tells depends on the rules written around it, and that is the question the five sections take up.

The lock-in and the incorporation risk

Two pathologies sit atop the narrative collision. The first is narrative lock-in: in several BRICS contexts, renewable energy is framed as a foreign or elite-led agenda, which can stall technically sound projects regardless of their economics. Lab participants in Pretoria were blunt: the 'just transition' framing, divorced from visible local benefit, can be read as the language of the donor table, not the coal-belt village.

The second is incorporation: green industrialisation is the niche most exposed to absorption by the regime rather than displacement. Critical-mineral beneficiation defaults to raw export, because Chinese processing is the path of least resistance. Green hydrogen is rebranded from coal-derived 'blue' and slipped into the same gas-utility balance sheet. Community ownership is folded back into the centralised utility model. The fix is not more technology; it is the rules that decide where the value stops.

The bloc's central contradiction, in microcosm

China and South Africa are not exceptional cases. They are the BRICS energy and climate dynamic made visible.

²¹ Strategic interview, SALLA Futures interview programme, 2025.

China: The pivot that cuts both ways

China is the structural pivot of the global clean-energy system. It manufactures over 80% of the world's solar panels, a majority of its wind turbines and most of its storage batteries,²² and its overcapacity is driving clean-technology costs below fossil-fuel economics in most BRICS contexts. By the close of 2024, China had installed roughly 1.4TW of wind and solar, six years ahead of its own 2030 target,²³ and only in September 2025 adopted its first absolute emissions target, a 7–10% cut from peak, with the peak itself left undefined.²⁴ In 2022 and 2023, Chinese authorities approved more than 100GW of new coal each year.²⁵ The same country is the dominant niche innovator through renewable manufacturing and the most powerful regime maintainer through coal expansion and fossil finance. The dependency South Africa must manage is the flipside of the affordability the rest of the Global South now enjoys.

South Africa: The normative leader constrained by its own grid

South Africa emits less than a 10th of China's CO₂ but ranks among the world's highest per-capita emitters.²⁶ It was the first country to sign a just energy transition partnership, and the framing it pioneered has since been exported to Indonesia, Vietnam and Senegal.²⁷ As the bloc's normative entrepreneur, it uses a language – Eco-Ubuntu, energy sovereignty, distributive justice – that the rest of the bloc borrows when it suits and forgets when it does not.

The numbers behind the language are unforgiving. The 2023 JET Investment Plan prices the transition at roughly ZAR²⁸ 1.48 trillion (about \$98.7 billion).²⁹ International pledges peaked at \$13.8 billion, then fell to \$12.8 billion after the US withdrew in early 2025.³⁰ By 2024, only about 4% of that financing was in the form of grants, and roughly three-quarters of grant funds flowed to foreign implementing entities rather than

²² Ember, *China Energy Transition Review 2025*; IEA, *Solar PV Global Supply Chains*.

²³ Lewis, "China Installed a Record Capacity".

²⁴ Climate Action Tracker, "China: 2035 NDC", accessed June 2026,

<https://climateactiontracker.org/countries/china/2035-ndc/>. The target, submitted on 3 November 2025, reduces net greenhouse-gas emissions 7–10% from peak levels.

²⁵ Proctor, "China Approves 106 GW".

²⁶ Climate Transparency, "[South Africa](#)", in *Climate Transparency Report 2022* (Climate Transparency, 2022). South Africa's per-capita emissions are about 1.2 times the G20 average, and the carbon intensity of its energy sector is the highest in the G20, reflecting an electricity mix roughly 85% reliant on coal. See also Climate Action Tracker, "South Africa," accessed 8 October 2026, <https://climateactiontracker.org/countries/south-africa/>

²⁷ Selvaraju, *Just Energy Transition Partnership Grants*.

²⁸ Currency code for the South African rand.

²⁹ Republic of South Africa, "Just Energy Transition Investment Plan".

³⁰ Creamer, "US Withdrawal of JETP Pledge".

South African ones.³¹ The Climate Change Act 22 of 2024, in force from March 2025, introduced binding carbon budgets;³² the draft Integrated Resource Plan 2023 nonetheless retains coal, postpones decommissioning and adds new coal to the grid in 2024 alongside a fresh gas auction.³³ The Climate Action Tracker rates the country's policies 'Almost Sufficient' and its fair-share contribution 'Insufficient'.³⁴ South Africa is a norm entrepreneur internationally and a regime maintainer domestically.

It is from this domestic bind that the country reaches for China. The opportunity is real: accelerated technology and finance at the moment of the worst Eskom crisis thus far. The risk is no less real: new dependency, and the kind of terms the workshop participants in Pretoria were asked to imagine rewriting.

Section 1: The rules that govern the practice

Map the bilateral relationship as a single system: actors, rules and material across five dimensions.

The first section reads the relationship through three lenses, actors, rules and material, across five dimensions: Science, Technology and Infrastructure; Policy and Governance; Investment and Finance; Society and Culture; and Market Dynamics. Actors are those who act. Rules are the formal and informal standards and cognitive assumptions that govern the practice. Material is the physical and financial stock that flows. Read down the Rules column and the paper's thesis becomes visible: in nearly every dimension, the operative rule favours deployment-by-import over industrialisation-by-localisation.

Table 1. Actors, rules and material across the five dimensions

Dimension	Actors	Rules	Material
Science, Technology & Infrastructure	Dongfang and Harbin (coal); Goldwind and Longyuan (wind); Jinko, LONGi and Trina (solar); BYD and CATL (storage); Eskom and NTCSA; the CSIR and SEDI	Chinese technical standards entering South African procurement; grid codes; the Integrated Resource Plan; certification and type-approval regimes	Imported modules, turbines and cells; transmission build-out; coal and gas plant still anchoring the stack

³¹ Kidane, "Dependency by Design".

³² Republic of South Africa, Climate Change Act 22 of 2024, in force March 17, 2025, see Centre for Environmental Rights, "[Climate Change Act Signed into Law. But Not Yet Operational](#)", Press Release, July 26, 2024.

³³ OECD, [OECD Economic Surveys: South Africa 2025](#) (OECD Publishing, 2025); Climate Action Tracker, "South Africa". South Africa added 800MW of new coal capacity in 2024; the draft IRP 2023 retains coal and postpones decommissioning.

³⁴ Climate Action Tracker, "South Africa".

Dimension	Actors	Rules	Material
Policy & Governance	The dtic, the DMRE, the Presidency and JET PMU, the Presidential Climate Commission; China's NDRC, NEA, and MEE; the Bi-National Commission sub-commissions	Climate Change Act carbon budgets and sectoral targets; NDCs; the near-absence of local-content rules for solar and storage; BNC and Strategic Dialogue protocols	Plans, MoUs and policy instruments; the institutional time and capacity consumed by coordination
Investment & Finance	China Eximbank, China Development Bank and SOEs; the New Development Bank; the DBSA and IDC; IPG and JETP donors	Loan-based, contractor-tied finance norms; concessional versus commercial terms; debt-sustainability limits; transition-finance instruments at the NDB	Loan and grant flows; foreign direct investment; the panel and battery import bill; capital outflow
Society & Culture	Organised labour, coal-belt communities, civil society, households adopting rooftop solar	The just-transition social compact; procedural-justice expectations; Eco-Ubuntu relational ethics; in China, an elite-led, low-public-salience model	Jobs at risk and created; energy access and affordability; rooftop installations as distributed material change
Market Dynamics	Chinese manufacturers; South African assemblers and would-be producers; off-takers; PGM suppliers	Free-trade default with no manufacturing requirement; intellectual-property and proprietary-control norms; beneficiation-policy ambitions	Clean-tech value chains concentrated in China; South Africa's mineral endowment; the missing local balance of plant

Source: Compiled by authors

Table 2. What the partnership says against what the data shows

What the partnership says	What the data shows
Technology cooperation and transfer underpin a modern, low-carbon industrial base	Chinese firms supply roughly three-quarters of South Africa's solar market, and the De Aar wind project was the first under the renewables programme to use entirely Chinese units. Engagement has concentrated on equipment supply and construction, with limited local manufacturing.
A just, well-financed transition partnership is mobilising at scale	The JET Investment Plan prices the need at about US\$98.7bn. International pledges peaked near US\$13.8bn, then fell to US\$12.8bn after the US withdrew in early 2025. By 2024 only about 4% of JET-IP financing was grant-based, and most grant funds flowed to foreign implementing entities.
Renewable deployment is accelerating the move beyond coal.	Wind and solar shares have more than doubled, yet the draft IRP 2023 retains coal, decommissioning has been postponed and new coal capacity was added to the grid in 2024 alongside a new gas auction.
South Africa's minerals and location position it to climb the green value chain.	Clean-tech value chains remain concentrated in China; record panel and battery imports represent capital outflow; and the EU's Carbon Border Adjustment Mechanism now exposes carbon-intensive exports rather than rewarding beneficiation.
The relationship is a partnership of equals within a South–South frame.	Power asymmetries structure terms: China holds capital, technology and manufacturing capacity; South Africa supplies minerals, project access and offtake. The asymmetry is the system, not a friction within it.

Source: Compiled by authors

What the table says, in one line: the diplomatic narrative is true at the level of intent, and false at the level of outcome. The rules are doing the work, not the intentions. The next section reads the relationship as a transition in progress and asks where the regime is straining.

Section 2: The transition in three layers

The multi-level perspective: read the bilateral relationship as a transition in progress, with landscape pressures, a vulnerable incumbent regime and carrying niches.

The landscape: Slow forces no one controls

Landscape forces are the slow, exogenous pressures that no single actor can steer. For the China–South Africa system, four of them matter most. The first is geopolitical realignment: US retrenchment from climate finance, unilateral trade measures and BRICS enlargement are reshaping the field within which both countries act. The second is the EU's Carbon Border Adjustment Mechanism, which prices the carbon content of exports and raises the cost of an import-dependent, coal-heavy industrial base.³⁵ The third is Chinese clean-tech overcapacity and the resulting export surge, which lowers world prices (good for deployment) while crowding out nascent local manufacturing (bad for industrialisation). The fourth is the decarbonisation of global capital, as finance and insurance migrate away from coal regardless of domestic policy.

The regime: Centralised, coal-anchored, Eskom-centric

The South African electricity regime is governed by three load-bearing rules. The first is a security-of-supply logic that has historically equated reliability with coal baseload. The second is a state-procurement model for new capacity, run through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) window and now being widened under the Electricity Regulation Amendment Act.³⁶ The third, and the one that matters most for this paper, is the near-absence of binding local-manufacturing requirements for solar and storage. As set out above, the draft IRP 2023 retains coal and, unlike its 2019 predecessor, schedules no plant closures; decommissioning has been postponed and new coal was added to the grid in 2024 alongside a fresh gas auction.³⁷ Layered over this national regime is a bilateral deployment-and-offtake regime: Chinese capital and equipment in, South African minerals and project access out.

³⁵ Lengahan, “CBAM and South Africa's Metals Sector”; Arp, “CBAM”.

³⁶ Energy Council of South Africa, “The Electricity Regulation Amendment Act 2024”. The Act amends the Electricity Regulation Act of 2006 and paves the way for a competitive electricity market and an independent transmission system operator.

³⁷ OECD, *Economic Surveys*.

Where the regime is most vulnerable

The most exposed element is the deployment-by-import rule itself, because it is policy, not physics, and could be changed through local-content conditions, beneficiation-linked procurement or reciprocal localisation clauses. The second is Eskom's generation monopoly, already eroding under unbundling, rooftop solar and the lifting of small-scale licensing restrictions. The third is coal's cost position, which expert advice rates as uncompetitive against new renewables.³⁸ These are the seams along which niches can enter.

The niches, and what they need

Four niches carry the alternative configuration. The first is local module and battery assembly, with balance-of-plant manufacturing to follow. The second is platinum-group-metal (PGM) beneficiation for fuel cells and electrolyzers. The third is green-hydrogen and ammonia clusters (Boegoebaai is the flagship, with the IDC and Sasol leading and a separate Chinese SOE feasibility track in the Northern Cape), structured for domestic value capture.³⁹ The fourth is community and municipal energy, which operationalises the energy-sovereignty narrative as distributed, locally owned generation. These map onto the wider bloc's two highest-potential niches – green-hydrogen industrialisation and critical-minerals beneficiation – and onto the coalescence pathway the BRICS analysis calls green industrial sovereignty: minerals, hydrogen and transition finance combined into value chains that challenge supply-chain dominance without reproducing extraction.⁴⁰

Protection today is thin. It comes from auction certainty under the renewables procurement programme, rooftop rebates, transition finance from the New Development Bank (NDB) and the Development Bank of Southern Africa (DBSA), and Special Economic Zone (SEZ) designations. The custodians are the Presidency and the JET Project Management Unit (PMU), the Department of Trade, Industry and Competition (dtic), the Department of Mineral and Petroleum Resources (DMPR) and the Department of Electricity and Energy (DEE), development finance institutions and provincial governments, the last of which is a recurring capacity bottleneck.

³⁸ Eskom, "NTCSA Announces Commencement of Trade", July 1, 2024; on coal's weakening cost position under a merit-order market, see Climate Action Tracker, "South Africa".

³⁹ "Sasol Takes Lead Role in Feasibility Study for Boegoebaai Green Hydrogen Project", *Engineering News*, October 6, 2021 (Sasol with the IDC; Namakwa SEZ). Separate Chinese SOE (CGN) interest is reported in Guo, Feng and Yan, "China's Strategic Thoughts".

⁴⁰ Cloete et al., "The BRICS Energy Compass", Section 3 (the "green industrial sovereignty" coalescence pathway).

What the niches need to consolidate is not more technology. It is demand-side certainty through local-content and beneficiation-linked procurement; patient, grant-weighted rather than loan-weighted capital; reciprocal localisation clauses written into Chinese investment agreements; and a coordinating actor able to align national ambition with provincial and municipal delivery.

Which shocks would open the regime

Three shocks would most plausibly bend the regime toward the niches. The first is a CBAM-type trade shock combined with sustained Chinese price deflation: together they make import dependence expensive at the border while making local content attractive. The second is a fiscal shock that makes further loan-tied finance untenable, forcing a pivot to localisation and grants. The third is an Eskom supply crisis, high-impact but ambiguous, since it can entrench coal as readily as accelerate renewables. Lab participants in Pretoria, asked to imagine the openings for experimentation, converged on a list: BRICS twinning and joint beneficiation pilots, NDB local-currency and transition-finance instruments, municipal and wheeling-enabled distributed generation, and a green-hydrogen demonstrator designed for domestic value capture rather than commodity export.⁴¹

'To produce renewable energy, for example, wind and solar, just for the sake of producing it, without creating meaningful change in terms of economic prosperity and economic development for the Global South will not suffice.'

Policy Innovation Lab participant, Pretoria, April 2025

Section 3: Four futures, one decision

Two uncertainties most shape the trajectory to 2035: the terms of the China relationship and South African state coordination.

Scenarios are generated from the system's own critical uncertainties rather than bolted on. The first is the terms of the China relationship, ranging from extractive deployment and offtake to co-developmental localisation and beneficiation. The second is South African state coordination and delivery capacity, ranging from fragmented and capacity-constrained to coherent and able to align national, provincial and municipal action. Crossing them yields four plausible futures for 2035.

⁴¹ Participant contribution, Policy Innovation Lab, Pretoria session, April 2025.

Table 3. Four scenarios for the relationship in 2035

Scenario	Terms × capacity	The relationship by 2035	Early signal to watch
Solar Vassal	Extractive × Fragmented	Rapid renewable deployment, near-total import dependence, minerals exported raw, jobs in installation rather than manufacture. The just transition narrative survives rhetorically while the industrial base hollows out.	No local-content rules; a rising panel and battery import bill; beneficiation studies that stall.
Beneficiation Breakthrough	Co-developmental × Coherent	Reciprocal localisation clauses, PGM beneficiation feeding fuel-cell and electrolyser output, a green-hydrogen cluster with domestic value capture, BRICS twinning operationalised.	Local-content conditions entering procurement; a flagship joint-manufacturing plant reaching financial close.
Stalled Sovereignty	Co-developmental × Fragmented	The right rules exist on paper, but provincial and municipal capacity cannot deliver; localisation ambitions outrun implementation; investors hedge.	Strong national policy paired with worsening provincial delivery metrics and repeated missed milestones.
Managed Dependence	Extractive × Coherent	A capable state optimises a fundamentally import-led model: cheap, fast grid decarbonisation, but industrial and distributive ambitions deferred. Stable and quietly path-dependent.	Efficient deployment with no manufacturing pivot; finance staying loan-heavy and contractor-tied.

Source: Compiled by authors

The scenarios convert analysis into strategy. The operative question is not what the relationship is, but which future current choices are selecting for, and which levers move the system from Solar Vassal or Managed Dependence towards Beneficiation Breakthrough. From the interview programme, the urgency was put most cleanly by a research participant from Brazil:

‘The danger is that BRICS countries will be left behind. The world is moving toward a decarbonised economy, and even though some countries still invest in fossil fuels, the energy transition is inevitable. If BRICS countries delay, they will find themselves economically and technologically behind when they finally have to transition.’ Strategic interview, 2025⁴²

Section 4: From dependency to co-development

A transformative theory of change: from demand to long-term impact, and the assumptions that double as failure modes.

The theory of change makes explicit the causal chain by which an anticipatory, participatory foresight intervention could move the relationship towards just localisation. It is built from the bottom up: the demand at the base, the supply of methods and convening power, the enablers already in the architecture, the activities, the outputs, the outcomes, the mid-term signals and the long-term impact, and finished with the assumptions, which double as the failure modes and the scenario branches.

Table 4. Transformative theory of change for the bilateral relationship

Stage	For the China–South Africa case
Demand (problem)	Deployment-by-import is decarbonising the grid while deepening industrial dependency and deferring distributive justice; the diplomatic narrative obscures the gap.
Supply (capacities)	Anticipatory-governance and participatory-foresight methods; Causal Layered Analysis and systems mapping; convening power across BRICS, the AU and SADC; a Policy Innovation Lab evidence base.
Enablers	Climate Change Act carbon budgets; BNC and Strategic Dialogue channels; NDB transition and local-currency finance; South Africa's G20 and BRICS platforms; beneficiation and localisation policy openings.
Activities	Participatory scenario and CLA processes with stakeholders from both countries; systems and narrative mapping; policy-lab co-

⁴² Strategic interview, Maria Beatriz Peixoto Mello, BRICS Policy Center, 2025.

Stage	For the China–South Africa case
	design; direct engagement with the dtic, the DMRE, the JET PMU and Chinese counterparts.
Outputs	This paper and a scenario set; shared narrative and systems maps; recommendations on local content, reciprocal localisation and beneficiation-linked procurement; a convened bilateral foresight network.
Outcomes	Shared problem framing across the asymmetry; uptake of localisation logic in procurement design; transition finance shifting towards grants and local currency; provincial–national coordination strengthened.
Mid-term impact (signals)	Local-content conditions entering tenders; a joint-manufacturing or beneficiation project at financial close; the import bill plateauing; just transition language operationalised rather than rhetorical.
Long-term impact	A co-developmental relationship in which decarbonisation, industrialisation and distributive justice advance together: the Beneficiation Breakthrough future.
Assumptions	That the import-dependence rule is changeable by policy; that China will accept reciprocal localisation where it secures mineral access and offtake; that the state can lift provincial delivery capacity; that finance can be re-weighted towards grants.

Source: Compiled by authors

The assumptions are also the failure modes. If China does not accept reciprocal localisation, the system tends towards Managed Dependence; if provincial capacity does not lift, it tends towards Stalled Sovereignty; if both hold, the system can converge on Beneficiation Breakthrough. From the interview programme, the Chinese perspective on the same question is more cautious. He Xiaobei, who leads the Macroeconomics and Green Finance Lab at Peking University's National School of Development, was blunt about the risk of delay: 'A 10-year delay is entirely plausible, especially if economic or geopolitical pressures increase,' and warned that the world may be entering a 'race to the bottom', where countries scale back

efforts simply because others are doing the same.⁴³ That warning is not a reason to stand still; it is a reason to write the rules before the next round of panels arrives.

Section 5: Twelve outcomes that move the system

Strategic niche management outcomes across three processes: building niches, mainstreaming them and opening up the regime.

The 12 outcomes below give the relationship a concrete vocabulary for how niches displace the regime. The first four are about building and protecting the niches. The next four are about expanding and mainstreaming them. The last four are about opening up and unlocking the regime. Read them in order, and the through line is the same: rewrite the rules, not the rhetoric.

Building and nurturing niches

- **Networking.** A bilateral foresight and beneficiation network linking the dtic, the DMRE, the Department of Forestry, Fisheries and the Environment, the NDB, Chinese SOEs, labour and research institutes, with BRICS twinning made operational.
- **Learning.** Testing the assumption that import-led deployment must precede industrialisation and surfacing the rules, not intentions, that drive dependency.
- **Navigating expectations.** A shared, credible narrative of co-developmental localisation that competes with both cheap-and-fast import and rights-first delay framings.
- **Shielding.** Local-content conditions, beneficiation-linked procurement, SEZ protections and grant-weighted finance that give local manufacturing room to start.

Expanding and mainstreaming niches

- **Upscaling.** Moving a beneficiation or manufacturing pilot from demonstrator to commercial scale via NDB and DBSA finance and guaranteed demand.
- **Replication.** Extending the localisation model across BRICS and SADC, learning from JETP replication in Indonesia, Vietnam and Senegal.

⁴³ Strategic interview, He Xiaobei, Macroeconomics and Green Finance Lab, National School of Development, Peking University, 2025.

- **Circulation.** Moving narratives, standards and lessons between South African, Chinese and other BRICS networks, including through the G20 and the NDB.
- **Institutionalisation.** Writing reciprocal localisation and beneficiation into BNC protocols, procurement frameworks and investment agreements so they outlast any single project.

Opening up and unlocking the regime

- **Niche–regime interactions.** Bringing Eskom, the DFIs and Chinese SOEs into the localisation network so mainstream actors carry the new practice.
- **Deep learning.** Unlearning the security-of-supply-equals-coal reflex and the deployment-equals-development assumption; relearning industrial policy as a condition of, not a sequel to, decarbonisation.
- **Changing perceptions.** Reframing the relationship from aid-and-offtake to co-development, and from a binary of dependence-or-decoupling to conditional, reciprocal partnership.
- **Destabilisation.** Removing the policy props under import dependence: the absence of local-content rules, loan-tied finance defaults and coal's protected baseload status.

The material trace: Six projects, one story

The bilateral project register is the material evidence of which rules are actually in force.

Beneath the diplomatic language, the project register is the most legible record of which rules are in force. The two corrections from the verification process are worth flagging at the top: the Boegoebaai green-hydrogen programme is led by Sasol with the Industrial Development Corporation, not by a Chinese state-owned enterprise; Chinese SOE interest in South African green hydrogen is a separate track and remains at feasibility stage.⁴⁴

Table 5. Selected China–South Africa energy projects

Project	Period	Character	Status
Medupi and Kusile coal stations	2008–present	Chinese equipment and construction (Dongfang, Harbin)	Operational, with cost overruns and performance issues

⁴⁴ “Sasol Takes Lead Role”.

Project	Period	Character	Status
De Aar wind (Longyuan)	2015–present	Goldwind turbines; first REIPPPP project with entirely Chinese units	Operational
Rooftop and utility solar rollout	2023–present	Jinko, LONGi and Trina imports; Chinese firms around 75% of market	Active; no local-manufacturing requirement
Battery energy storage	2024–present	Chinese lithium-ion imports (BYD, CATL) for grid stabilisation	Procurement ongoing
Boegoebaai green hydrogen	2021–present	Sasol and IDC lead; Namakwa SEZ; export hub feasibility	Feasibility; designated a Strategic Integrated Project
Northern Cape green hydrogen (Chinese SOE interest)	2022–present	Chinese SOE (CGN) feasibility interest, separate from Boegoebaai	Feasibility; unconfirmed financial commitment

Source: Compiled by authors

What to watch between now and 2030

Three signals a policymaker can monitor from a desk in Pretoria, Beijing or Mumbai.

- **A local-content clause in a major South African solar tender.** If the next REIPPPP window, or a JET-PMU procurement, requires a minimum local-content percentage that steps up over the contract life, the regime has started to bend.
- **A flagship joint manufacturing or beneficiation project reaching financial close.** A Chinese–South African module-assembly plant, a PGM-to-electrolyser plant in the Eastern Cape or a balance-of-plant facility in the SEZs would shift the relationship from extractive deployment-and-offtake to co-developmental localisation.
- **A grant-funded, locally implemented transition programme.** If grant flows to South African implementing entities (public, private or community) exceed grants to foreign entities, the JETP's founding asymmetry has been corrected.

What the solar panels will say

China and South Africa do not need a new treaty. They need a small set of rules, written before the next solar panels arrive.

The solar panels will arrive. The question is whether they tell the story of a country that bought its transition, or one that built it. The work of energy diplomacy, on the reading of this paper, is not to soften the asymmetry rhetorically but to rewrite the rules that reproduce it: reciprocal localisation clauses, beneficiation-linked procurement, grant-weighted transition finance, a provincial-national coordinating convener and a standing bilateral foresight network. None of these is a new treaty. All are choices within the existing architecture, and the next procurement window is the moment to make them.

Read together with the companion 'The BRICS Energy Compass: A Framework for Decisionmakers' working paper, this case study is the bilateral microcosm of the bloc's central contradiction. The two narratives, technological transformation and just transition, are not fated to collide. They can converge on the terrain of green industrialisation if the rules are written before the next round of kits is delivered. The choice between Solar Vassal and Beneficiation Breakthrough will be made in the next 36 months, through tenders, finance windows and reciprocal clauses. It is a policymaker's choice, and the policymaker is the one reading this page.

Appendix A. Method, data and confidence

A.1 Research approach

This is a qualitative case study, not a quantitative one. It pairs rhetorical and institutional claims about the China–South Africa relationship with ground-truth indicators drawn from verified sources. The analysis is structured as a single integrated stack, not five parallel studies: each section builds on the one before it.

A.2 Six-phase analytical stack

The paper integrates five complementary foresight and transition methods plus an opening narrative–diagnosis phase. Causal Layered Analysis (litany, causes, worldview, myth) reads each country's energy-diplomacy narratives and the gap between rhetorical and structural levels. The five-dimensional Actors–Rules–Material systems map renders the bilateral relationship as one system rather than two national snapshots. The multi-level perspective distinguishes landscape, regime and niche, and frames the relationship as a transition in progress. Scenario analysis derives four futures from the two critical uncertainties identified in the systems and MLP work, using a two-by-two morphology. A transformative theory of change and the strategic-niche-management transformative outcomes translate the analysis into a change logic and an action agenda. The narrative and actor typologies are drawn from the companion BRICS Climate and Energy Transitions working paper and applied here to the bilateral case. Citations follow the Chicago notes style, with full notes on first reference and shortened notes thereafter.

A.3 Evidence base

Three streams were used. First, a literature review of primary policy documents and instruments, including the Climate Change Act 22 of 2024, the JET Investment Plan 2023–2027, the draft Integrated Resource Plan 2023, China's 2035 Nationally Determined Contribution and the joint statements and Bi-National Commission communiqués of the two governments. Second, reputable secondary analysis, including the IEA and specialist trade and energy outlets. Third, the primary qualitative research documented in Appendix B. Verbatim participant and interview responses are used throughout the paper as evidence of how the rules are experienced on the ground.

A.4 Verification and confidence

Quantitative and institutional claims were checked against primary or reputable secondary sources in June 2026. In internal versions of this paper, claims carry one of three markers – Verified, Evidence suggests or

Could not verify – that attach to the underlying fact rather than to editorial judgement. Three corrections from the verification process are reflected in the present text and depart from earlier drafts: the JET pledge figure (a reduction from about \$13.8 billion to \$12.8 billion after the US withdrawal, not growth in spite of it); the term of the 10 Years Strategic Programme on Cooperation (2020–2029); and the lead developer of the Boegoebaai green-hydrogen programme (Sasol with the IDC, not a Chinese state-owned enterprise).

A.5 Limitations

Three limitations bear noting. The relationship is fast-moving, and figures for installed capacity, pledges and disbursements are point-in-time. Chinese-language primary sources were accessed in translation, which constrains nuance. The qualitative inputs reflect the perspectives of those who took part in the Policy Innovation Lab and the interview programme, and are not a representative sample.

Appendix B. The evidence base

This case study is the culmination of 18 months of original research (2024–2025) under the SALLA Futures Programme. Two primary streams supply its qualitative evidence, summarised here and triangulated throughout against the documentary and secondary sources listed in the notes.

B.1 The Policy Innovation Lab

The BRICS Climate and Just Energy Transitions Policy Innovation Lab was convened online under the SALLA Futures Programme on 14, 15 and 17 April 2025. It used Causal Layered Analysis, systems mapping and Three Horizons exercises to surface how participants across the bloc experience the rules of the energy transition, from litany-level complaint to the deeper worldviews and metaphors that hold the rules in place. Verbatim participant contributions are used throughout this paper as evidence of how the rules are experienced on the ground, and are attributed as 'Policy Innovation Lab participant, Pretoria, April 2025'.

B.2 The interview programme

A parallel programme of strategic interviews was conducted in 2024 and 2025 with respondents from South Africa, Brazil, Russia, China, the UAE and Saudi Arabia, spanning research institutes, finance and policy. Interviewees quoted in this paper include Maria Beatriz Peixoto Mello (BRICS Policy Center, Rio de Janeiro), Arina Muresan (South African researcher, energy and just-transition governance) and He Xiaobei (Macroeconomics and Green Finance Lab, National School of Development, Peking University). Quotations are reproduced with each respondent's framing preserved, and are attributed as 'strategic interview, [respondent], 2025'.

B.3 Use and limitations of the qualitative evidence

The Lab and interview inputs are illustrative rather than statistically representative. They were selected to widen the range of perspectives on a contested and fast-moving relationship, not to measure the distribution of opinion within it, and every quantitative or institutional claim they touch is independently corroborated in the notes. Where a respondent's view could not be corroborated, it is presented as a view rather than a finding.

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