IGARAPÉ INSTITUTE
a think and do tank

BRICS IN TRANSITION:
National Pathways, Global Leadership, and the Future of Clean Energy Cooperation

Index

BRICS IN TRANSITION: National Pathways, Global Leadership, and the Future of Clean Energy Cooperation[1]

Executive Summary

In its expanded configuration, the BRICS grouping includes major fossil fuel producers, coal-dependent economies, renewable energy leaders, critical mineral suppliers, clean-tech manufacturers, and increasingly assertive climate-finance actors. This report examines how eight selected BRICS members — Brazil, China, Egypt, Ethiopia, India, Indonesia, South Africa, and the United Arab Emirates (UAE) — are both navigating the shift from fossil fuels to cleaner energy systems and shaping its material foundations. It argues that these selected BRICS countries have the scale, resources, institutions, and market power needed to accelerate the global energy transition, but their cooperation remains fragmented, underfinanced, and constrained by fossil fuel lock-in.

These selected BRICS nations occupy a unique position in the global energy transition. They are major energy consumers and producers while also holding vast reserves of critical minerals essential for global defossilization. Their task is to balance climate commitments with domestic priorities related to energy security, accessibility, affordability, and development. Each country pursues a distinct pathway shaped by its political economy, development priorities, and structural conditions.

Brazil generates most of its electricity from renewables and is a biofuel pioneer yet continues expanding oil production. China leads in renewable energy manufacturing and has set ambitious carbon targets, although coal remains deeply embedded in its economy. Egypt is building large-scale solar parks while reforming energy subsidies and managing debt. Ethiopia relies on hydropower and has banned fossil fuel vehicle imports but faces financing gaps. India is scaling up solar and green hydrogen capacity while addressing development challenges in coal-dependent regions. Indonesia leverages its geothermal potential and nickel reserves for battery production, yet continues to face resistance from the coal industry. South Africa attracts international financing for its just transition but struggles with an aging coal grid and related social complexities. The UAE invests in solar and nuclear power while maintaining its position as a major oil exporter.

Beyond national efforts, these countries also engage in extensive international and South-South cooperation, acting as providers of finance and technology, partners in knowledge and expertise exchange, norm-entrepreneurs, forum leaders, and regional integrators. Brazil shares biofuel experience with Latin American and African nations and, following its COP30 Presidency, is leading a multilateral roadmap to transition away from fossil fuels. China is shifting overseas investments toward green energy projects across Asia and Africa. Egypt attracts financing for solar projects and collaborates with African partners on green hydrogen. Ethiopia participates in trilateral initiatives to expand rural renewable deployment and exports hydropower regionally. India promotes solar deployment and off-grid solutions throughout the Global South. Indonesia secures multilateral funding for coal phase-out efforts while sharing geothermal expertise. South Africa partners with international donors on just transition financing and collaborates with fellow BRICS members on renewable energy projects. The UAE invests in clean energy across emerging markets through its climate funds.

Together, these selected BRICS countries play key roles in the global energy transition as clean-tech manufacturers (China and India), renewable energy and bioenergy champions (Brazil and Ethiopia), laboratories for coal transition strategies (India, Indonesia, and South Africa), and hubs for solar energy, green hydrogen, and climate finance hubs (Brazil, Egypt, India, China, and the UAE).

This report recognizes the diversity of energy transition pathways across these selected BRICS members and highlights the development-oriented nature of climate cooperation and the role that South-South cooperation can play in fostering these transitions within the group and globally.[2] Crucially, it argues that BRICS energy cooperation goes beyond climate diplomacy, linking industrial strategy, infrastructure and development finance, geopolitical influence, and the future distribution of clean-energy value chains. At the same time, it recognizes the many trade-offs and tensions these countries face. Beyond the more simplistic narratives that cast these countries as either as clean-energy *heroes* or climate *laggards*, the report argues that their credibility will depend on their ability to simultaneously expand renewable energy, modernize power grids, protect workers, reduce coal dependence, manage fossil revenues, and move up clean-tech value chains.

Building on existing policy ambition, innovation, and ongoing cooperation efforts, the report recommends a set of immediate and medium- and longer-term actions to expand projects and financing schemes for high-impact energy transition initiatives, strengthen diplomatic and policy coordination on multilateral processes, foster an aligned approach to critical minerals that can help BRICS countries move up value chains, and promote policy and technical dialogue to enable systemic exchange of best practices across the bloc.

Immediate Actions:

- Launch a New Development Bank (NDB) green transition window focused on grids, storage, geothermal energy, clean transport, and coal-region transition.
- Establish a working group to advance a BRICS Joint Roadmap for Transitioning Away from Fossil Fuels (TAFF), building on ongoing TAFF-related implementation efforts under the United Nations Convention on Climate Change (UNFCCC) and beyond.
- Create a BRICS just transition facility for coal-dependent regions, providing grants for planning and concessional finance for implementation.
- Establish a critical minerals and clean-tech standards compact covering Environmental, Social and Governance (ESG) standards, mineral processing, batteries, hydrogen certification, and electric vehicles (EV) infrastructure.
- Build a pipeline of clean energy bankable projects for the 2026 BRICS summit, building on the 2025 Leaders' Framework Declaration on Climate Finance.
- Set up a BRICS Energy Transition Policy Observatory as a lean energy transition delivery tracker to monitor commitments, finance, and implementation gaps.

Medium- and Longer-term Actions:

- Establish joint research centers focused on each member's technological strengths.
- Coordinate cross-border power grids to enable renewable energy trade.
- Expand structured trilateral energy transition-related partnerships and projects that combine the comparative advantages of BRICS countries to support green energy transition across the Global South.
- Present a coordinated voice in global climate negotiations, grounded in a shared sense of urgency, ambition and equity that further advances the Paris Agreement and Mission 1.5.

Main Takeaways

- BRICS countries are indispensable to the global energy transition.
- The selected BRICS countries assessed in this report have the scale, resources, institutions, and market power needed to accelerate the global energy transition, but trade-offs remain. The main challenge is not target-setting; it is implementation under constraint.
- BRICS energy cooperation ranges from climate diplomacy to industrial strategy, infrastructure, development finance, geopolitical influence, and the future distribution of clean-energy value chains. Yet it remains fragmented, underfinanced, and constrained by fossil fuel lock-in.
- The NDB, the BRICS-led international financial institution, remains underused.
- Cooperation can gain scale through prioritizing a set of politically and policy-salient common energy transition issues and addressing them through technological exchange, policy learning, and collaborative financing mechanisms.

Introduction

At the center of global climate policy lies the complex challenge of transforming energy systems. For BRICS countries, which are simultaneously major consumers and producers[3] of both fossil fuels and renewable energy, and home to vast reserves of critical minerals, this transition presents a complex balancing act.[4] They must reconcile the urgent imperative of decarbonization, or, as some scientists suggest, *defossilization* (see **Glossary**), with equally pressing domestic concerns related to energy security, accessibility, affordability, and sustainable development. Key segments of the global clean energy value chain are heavily dominated by China and India, but the bloc has adopted differentiated positions in international forums, including under the United Nations Convention on Climate Change (UNFCCC), reflecting different national circumstances and varying levels of dependence on fossil fuels. This internal diversity highlights both the bloc's collective impact as well as the complex political economy shaping BRICS' role in the world's transition away from fossil fuels. Crucially, energy transition, together with low-fossil carbon development and industrial cooperation, remains fundamentally a development issue for BRICS countries, offering one of the largest industrial opportunities in decades.[5]

This report focuses on a subgroup of BRICS members — Brazil, China, Egypt, Ethiopia, India, Indonesia, South Africa, and the United Arab Emirates (UAE).[6] These countries were selected on the basis of their visible renewable energy deployment, formal transition strategies, and near-term cooperation potential. The report does not claim to represent all BRICS members equally; rather, it examines a purposive sample of countries where opportunities for cooperation are especially visible. By concentrating on this subset of eight BRICS members, the report is better positioned to identify cross-cutting challenges, transferable policy lessons, and concrete entry points for international cooperation — whether intra-BRICS or with third-country partners — in support of a just and inclusive energy transition.

The report is organized thematically to cover, as comprehensibly as possible, the various dimensions of energy transition pathways across the eight selected BRICS countries, including trade-offs and implementation constraints related to infrastructure limitations, economic trade-offs, social tensions, political and institutional barriers, and external dependencies. It begins with a country-level assessment of energy transition profiles, followed by a mapping of domestic policy tools, flagship projects, and international and South-South clean energy cooperation initiatives. It concludes with a set of policy recommendations designed to leverage collective BRICS strengths, overcome shared barriers, and build global leadership for a fair and just energy transition.

> *"BRICS countries must reconcile the urgent imperative of decarbonization with equally pressing domestic concerns related to energy security, accessibility, affordability, and sustainable development."*

Glossary

Term	Definition
Nationally Determined Contribution (NDC)	A country's climate pledge under the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC), outlining how it plans to reduce greenhouse gas (GHG) emissions and adapt to climate change.[7]
Emissions targets, Business-as-Usual (BAU), Climate Neutrality and Net Zero	Emissions targets are planned limits or reductions for GHG emissions that an organization, company, or country aims to achieve within a specified timeframe. The Paris Agreement underlines the need to achieve global net zero, a state in which greenhouse gas emissions are balanced by removals from the atmosphere; global net-zero CO_2 emissions represent the point at which further warming from carbon dioxide emissions effectively stops. Net zero is closely related to concepts like 'carbon neutrality' or 'climate neutrality', which differ in how emissions sources and sinks are accounted for in context. BAU refers to a scenario in which current emissions-related policies, practices, and trends continue without major changes.[8]
Decarbonization and Defossilization	Decarbonization is the process of reducing greenhouse gas emissions and decreasing dependence on fossil fuels in energy and production systems. Increasingly, scientists and policymakers use the term "defossilization" to enphasize that achieving net zero means eliminating fossil fuels, not carbon itself.[9]
Transitioning Away from Fossil Fuels (TAFF)	The process of shifting energy systems and economies away from coal, oil, and gas toward cleaner alternatives. In international climate negotiations, the commitment to transition away from fossil fuels in a just, orderly, and equitable manner was first included in the COP28 outcome in 2023.[10]
Just Transition	A transition to a low-carbon and sustainable economy that is fair, inclusive, and supportive of workers and affected communities.[11]
Green Taxonomy and Sustainable Taxonomy	Official classification systems that define which economic activities qualify as green or sustainable.[12]
Carbon Emissions Trading System (ETS), Carbon Credit Trading Scheme (CCTS) and Carbon Tax	An ETS sets a cap on emissions and allows regulated emitters to trade emissions. A CCTS enables the trading of carbon credits generated through emissions-reduction projects to offset or compensate emissions. Carbon taxes impose a charge on carbon emissions to encourage lower pollution.
Carbon Capture and Storage (CCS)	A technology that captures carbon dioxide emissions from industrial sources and stores them underground.

continuation

Term	Definition
Asset Retirement	The process of removing a fossil-fuel-based energy asset from service and closing it down, usually through a planned phase-out as part of the transition to a lower-carbon energy system.
Power Purchase Agreements (PPAs), Feed-in Tariffs (FiTs) and Renewable Energy Procurement Obligations (RPOs)	Countries use a variety of mechanisms to support the adoption and expansion of renewables. PPAs are long-term contracts for the purchase of electricity from a producer, often used to finance renewable energy projects. FiTS is a policy that guarantees renewable energy producers a fixed payment for the electricity they supply. RPOs are rules requiring electricity buyers or suppliers to source a certain share of their power from renewable energy.
Electrification and Battery Storage	Replacing fossil-fuel use with electricity in transport, heating, and industry. Electrification requires battery storage, the fastest-growing power technology globally, which allows electricity to be stored for later use.
Electric Vehicles (EVs)	Vehicles powered by electricity instead of gasoline or diesel.
Solar energy and photovoltaic (PV) panels	Solar energy is power generated from sunlight, and photovoltaic panels are devices that convert sunlight directly into electricity.
Sustainable Aviation Fuel (SAF)	Aviation fuel produced from sustainable materials that can lower greenhouse emissions compared with conventional jet fuel.
Decentralized Energy, Smart Grid and Energy-saving Certificates (ESCerts)	Energy efficiency and emissions reduction are closely linked. Decentralized energy refers to small-scale systems located close to where energy is consumed. Smart grids are electricity grids that use digital technologies to improve the management of electricity supply and demand. ESCerts are tradable certificates issued for verified energy savings achieved under an energy-efficiency programs.
Energy Accessibility, Energy Affordability and Energy Poverty	Energy accessibility and affordability refer to the extent to which people can obtain reliable energy services and pay for them at a reasonable cost. Energy poverty refers to a condition in which a household lacks access to sufficient, reliable, and affordable energy services to meet basic needs.[13]
Land use, land-use change and forestry (LULUCF) and Agriculture, Forestry, and Other Land Use (AFOLU)	International climate accounting uses two land-related categories defined by the Intergovernmental Panel on Climate Change (IPCC): LULUCF and AFOLU. LULUCF covers greenhouse gas emissions and removals associated with land use, land-use change, and forestry activities. AFOLU covers emissions and removals associated with farming, forests, and land use. Approximately a quarter of global annual GHG emissions come from the AFOLU sector, with agricultural production contributing to N_2O and CH_4 emissions and land use, land-use change, and forestry with CO_2 emissions.[14]

1. National Energy Transition Landscapes within BRICS

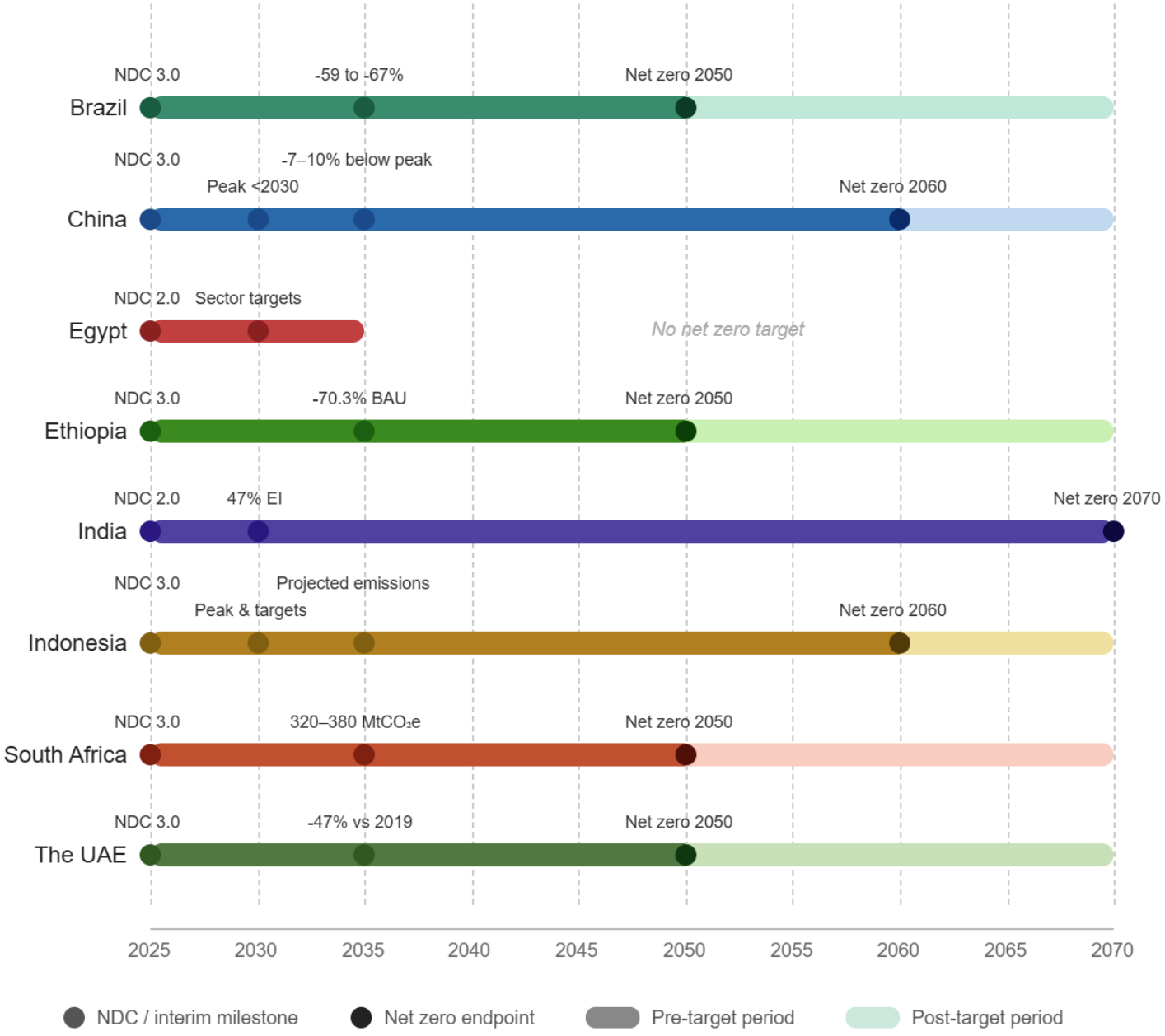
This section offers a comprehensive mapping of domestic policy tools and flagship projects currently in place to support energy transitions across the eight selected BRICS countries. It provides a national level assessment of energy transition profiles based on countries' latest Nationally Determined Contributions (NDCs) under the UNFCCC (see **Glossary**).

NDCs are the central instruments under the Paris Agreement through which countries collectively address climate change by translating commitments into concrete mitigation targets, implementation timelines, and strategic policy directions.[15] NDCs provide an important reference point for understanding national energy transition landscapes across the selected BRICS countries examined in this study, as they frame transition pathways, influence investment signals, and shape the scope for international cooperation. NDCs operate on a five-year submission cycle, with each update typically setting targets for the following ten years. Tracking NDC updates is therefore particularly relevant in the current cycle, as Parties to the Paris Agreement were invited to submit, ahead of COP30 in 2025, new and more ambitious emission reduction targets extending to 2035.

As of March 2026, a total of 134 countries had submitted updated NDCs.[16] Within the BRICS group surveyed in this report, most members have aligned their submissions with the new 2035 timeframe; Egypt is the only country that has not yet submitted its revised NDC by that date.[17] Across the group, NDCs reflect diverse mitigation approaches and target structures. Several countries, including Brazil, China, Ethiopia, Indonesia, South Africa, and the UAE, have submitted updated NDCs extending to 2035 and linked to mid-century climate neutrality goals (see **Glossary**), referring either to economy-wide greenhouse gases (GHG) neutrality or specifically to CO2 neutrality, depending on the country. Commitments therefore vary in form, ranging from economy-wide absolute or peak-relative targets (China) to emissions ranges (Brazil and South Africa) and business-as-usual (BAU)-based reduction pathways (Ethiopia and Indonesia).

Figure 1 below presents a timeline of NDCs submissions, distinguishing NDC 3.0 submissions (those updated with targets extending to 2035) from NDC 2.0 submissions (which remain anchored in 2030 targets).[18]

Figure 1. BRICS Countries Emissions Targets and Net Zero Commitments Timeline



Across the selected BRICS members, the energy transition unfolds against a backdrop of persistent energy poverty and deep structural asymmetries — ranging from geography-related comparative (dis)advantages to grid infrastructure deficits, capital scarcity, fossil fuel subsidy dependence, and industrial lock-in — that simultaneously heighten the urgency of defossilization and shape the pace and equity of its implementation. The current geopolitical landscape, marked by shifting multilateral alliances, energy security imperatives, and intensifying great-power competition, complicates and catalyzes energy transition efforts across the group. While geopolitical fragmentation can disrupt technology transfer, climate finance flows, and coordinated policy action, it also creates incentives for members to accelerate domestic clean energy development as a strategic hedge against fossil fuel price volatility and import dependence.

Brazil

Brazil was among the first countries, alongside the UAE, to submit its updated NDC in November 2024. The country's latest target for 2035 is a 59-67% reduction in GHG emissions relative to 2005 levels.[19] Brazil is a major oil producer and exporter, but the majority of its GHG emissions comes from Agriculture, Forestry, and Other Land Use (AFOLU, see **Glossary**), rather than from the energy sector.[20] With 89.2% of its electricity generation and nearly half of its total energy mix already sourced from renewables, Brazil aims to expand clean energy generation and progressively replace fossil fuels by scaling up industrial electrification and advanced biofuel production, including Sustainable Aviation Fuels (SAF, see **Glossary**) linked to carbon capture. Brazil took a leadership role at COP30 in 2025 by advancing discussions on a multilateral Roadmap for Transitioning Away from Fossil Fuels (TAFF, see **Glossary**).[21] In late 2025, President Lula instructed[22] the Ministries of Mines and Energy, Finance, Environment, and the Chief of Staff to develop, by February 2026, national guidelines for a just and planned energy transition roadmap aimed at gradually reducing the country's dependence on fossil fuels, to be submitted for consideration by the National Energy Policy Council (CNPE). As of May 2026, the guidelines had yet to be developed.[23]

For decades, Brazil has been a global leader in biofuel production,[24] particularly bioethanol and biodiesel, positioning itself as a major supplier of low in fossil-carbon commodities and green industrial technologies to international markets. Blend mandates, financial incentives, and sustainability standards have been central to expanding a secure biofuel supply. In aviation, Brazil is developing SAF programs such as *ProBioQAV*, supported by partnerships between major producers to pilot SAF projects[25]. The country is also positioning itself in green hydrogen, leveraging abundant solar and wind resources in northeastern states like Ceará and Piauí to power electrolysis projects aimed at both domestic defossilization and export markets.

Brazil also prioritizes energy efficiency, the development of low-carbon hydrogen markets, investment in advanced CO_2 removal technologies, and the deployment of a comprehensive suite of **national plans and programs**, including the *Ten-Year Energy Plans (PDEs)*,[26] the *National Energy Plan 2050*,[27] *National Biofuels Policy (RenovaBio)*,[28] the *Fuel of the Future Program*,[29] the *National Hydrogen Program* (PNH2)[30] and the *Green Mobility Program*.[31] Together, these policies and programs demonstrate Brazil's multi-track strategy to diversify its clean energy portfolio and reinforce its role as a renewable energy leader.

Brazil's success in advancing its energy transition is largely attributable to an array of policy instruments that create an enabling environment for renewable deployment, innovation, and sustainable development. Central to this is the use of **market-based**

mechanisms such as competitive auctions organized by the National Agency of Electricity (ANEEL). These auctions establish long-term power purchase agreements (PPAs) for renewable projects, setting price signals that attract private investment and enable the government to efficiently meet renewable energy targets. The auction system incentivizes project developers by ensuring a stable revenue stream, fostering competitive prices, and encouraging technological innovation.[32]

Additionally, **regulatory instruments** play an important role. Feed-in tariffs (FiTs, see **Glossary**) and renewable energy quotas under the *Proinfa Program*[33] have shaped the energy landscape, with fixed tariffs initially supporting certain renewable projects, while large-scale auctions now allocate renewable energy contracts based on price and capacity. Brazil's biofuel policy has evolved from the *Proálcool Program*,[34] launched in 1975 to reduce oil dependence replacing gasoline with ethanol, to *RenovaBio*, adopted in 2017 as a modern, climate-oriented framework, and more recently to the *Fuel of the Future Bill,* enacted in 2024 to promote low-fossil carbon mobility, regulate biofuel usage, and integrate carbon capture mechanisms.[35] While Proálcool established Brazil as a global leader in biofuels and energy security, RenovaBio built on this legacy by introducing decarbonization, or rather defossilization, targets and a market-based credit system (known as CBIOs),[36] with the 2024 Bill further consolidating and expanding this policy architecture. This trajectory was further reinforced in 2025 by a decision to increase mandatory blending levels to 30% ethanol in gasoline and 15% biodiesel in diesel, strengthening domestic bioenergy demand and reducing transport sector emissions.[37]

Tax incentives and subsidies are also crucial policy tools, reducing the costs and risks associated with renewable energy projects. Reduced import tariffs on advanced renewable energy equipment and fiscal incentives for innovation help attract investment in clean technology R&D and deployment. Moreover, public financing and support programs provided by institutions like the Brazilian Development Bank (BNDES) play a pivotal role in funding large-scale infrastructure projects, innovative startups, and technological advancement.[38]

Policy and legal frameworks related to energy efficiency form another pillar of Brazil's energy transition strategy. Since the early 2000s, the country has continuously updated its legal and policy planning frameworks[39] while investing heavily in infrastructure modernization projects such as smart grids, which improve energy efficiency, enable the integration of intermittent renewable energy sources, and enhance the reliability of power supply. The government also supports innovation through partnerships with academic institutions and private enterprises, promoting technological progress in energy storage technology, digital application and intelligent metering. These measures encourage technological upgrading and behavioral change across industry, transportation and residential sectors. Policies including mandatory energy efficiency standards, certification systems and financial incentives aim to reduce overall energy demand, thus reducing emissions and dependence on fossil fuels.

Brazil's integrated energy planning framework further connects these instruments with broader policy goals articulated through strategic documents and national plans, although alignment with the country's climate commitments remains uneven. This policy architecture is reinforced by **targeted legal frameworks** such as micro- and mini-generation of distributed renewables, offshore wind power, and low-carbon hydrogen,[40] which together enhance legal certainty for investors and support the expansion of new clean energy sources. By ensuring alignment across sectors and levels of government, this framework aims to provide clarity and consistency while galvanizing industry efforts toward a low-carbon energy transition.

This policy architecture is also reinforced by a set of **comprehensive national planning and financing tools**. The Ministry of Environment-linked, BNDES-managed *Climate Fund* has supported since 2010 the implementation of projects, the acquisition of machinery and equipment, and technological development related to the reduction of GHG emissions and adaptation to climate change and its effects. This Fund includes several energy-related funding schemes related to urban mobility, sustainable cities, energy efficiency, and renewables.[41] Since 2023, a new set of instruments were introduced, including the *Sustainable Taxonomy*[42] (see **Glossary**) that guides capital allocation toward low-fossil carbon and nature-positive activities; the *Ecological Transformation Plan* (PTE)[43] that aligns fiscal, industrial, and climate policies under a unified transition strategy; *Eco Invest*[44] that deploys risk-sharing and blended-finance mechanisms to crowd in private capital; and the *Brazil Climate and Ecological Transformation Investment Platform* (BIP)[45] that serves as Brazil's official country platform to mobilize private and blended finance and structure pipelines of bankable clean energy and low-carbon projects.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

As both a clean energy power and an oil producer and exporter, Brazil faces constraints in advancing its energy transition. One major set of challenges relates to the rapid expansion of renewable energy (particularly distributed solar generation), which has exposed the country's structural constraints in the electricity system, including transmission bottlenecks and rising levels of curtailment during periods of oversupply,[46] especially in renewable-rich regions such as the northeastern states of Bahia, Ceará, and Rio Grande do Norte. Adding to transmission bottlenecks, the curtailment of wind and solar, and the expansion of renewables without matching grid upgrades, Brazil's energy transition is also constrained by fiscal limits and social-environmental challenges related to deforestation, land-use pressure, and environmental degradation in the context of expansion of clean energy projects.

A second set of challenges relates to Brazil's continued role as an oil producer and exporter. This is a role it intends to maintain, advocating (also through BRICS) that an orderly and fair global energy transition must be led by developed countries phasing out fossil fuels first.[47] Equally important, Brazil's NDC and transition strategy rests on three structurally fragile dependencies that expose them to significant governance, market, and geopolitical risks. First, climate targets rely heavily on reducing deforestation and afforestation and reforestation measures for carbon removal — without sustained progress on both, the energy sector would need to defossilize at a considerably faster pace. Second, the country's urban and freight transport matrix remains critically exposed to imported diesel, yet no instruments of sufficient scale exist today to drive the systemic shift that the intended biomass substitution and efficiency measures aim to achieve. Third, Brazil's broader reliance on bioenergy and AFOLU carries a critical vulnerability: large-scale dependence on imported nitrogen fertilizers — urea and ammonia — whose costs have surged amid the current geopolitical crisis, putting pressure on the very agricultural and bioenergy systems underpinning the country's overall mitigation strategy.

A Closer Look into Brazil's Flagship Initiatives: Strengthening the Ecosystem of Renewable Energy

Brazil's energy transition is supported by several flagship initiatives aimed at improving renewable energy capacity, notably the ***Energy Transition Acceleration Program (Paten),*** *approved in 2025, and its supporting low-fossil carbon project financing green fund. At the same time, with support from the* ***Renewable Energy Integration program (REI)*** *of the* ***Climate Investment Fund (CIF),***[48] *along with strong government policies and market mechanisms, Brazil is expanding renewable energy facilities such as wind and solar energy while strengthening grid integration. These measures aim to diversify Brazil's energy structure, reduce dependence on hydropower, alleviate energy shortages, and accelerate the country's transition to a green economy, with the ambitious target of achieving net zero GHG emissions by 2050.*

Parallel to that, Brazil has implemented ***RenovaBio****, which promotes the sustainable production and use of ethanol and biodiesel. RenovaBio has set ambitious goals for biofuel production, introduced a credit trading system, promoted sustainable practices in rural areas, and improved the fossil carbon footprint of transport fuels. The policy builds on Brazil's historical bioenergy advantages, consolidating its global leadership while supporting rural economic development and reducing emissions.*

Additionally, Brazil's ***Ecological Transformation Plan (PTE)*** *outlines the government's strategy to align fiscal policy, green credit, and incentives for the expansion of renewable energy, biofuels, low-carbon industry, and the bioeconomy. As an institutional innovation, the* ***Pact for Ecological Transformation****, signed in 2024 by the Executive, Legislature, and Judiciary, provides political backing to the Plan, creating an unprecedented inter-branch commitment. PTE is tracked through a Monitoring Platform,*[49] *where Axis IV – Energy Transition lists 36 actions, of which 21 have already been implemented, covering initiatives to expand renewables, modernize infrastructure, and accelerate the energy transition. Complementing these efforts, Brazil has also launched the* ***Brazil Climate and Ecological Transformation Investment Platform (BIP)****, an initiative designed to expand investment in the country's ecological transformation, advance the decarbonization, or rather defossilization, of the economy, promote the sustainable use of natural resources, and improve the population's quality of life.*

Together, these measures show Brazil's comprehensive transformation path which integrates technological innovation, policy support and market mechanisms towards a cleaner and more sustainable energy future. The country has emerged as a pioneer in the Latin American energy transition, setting an example for balancing economic growth and climate commitments.

China

China's updated NDC[50] reaffirms its commitment to peak carbon emissions before 2030 and proposes a new target to reduce net GHG emissions by 7% to 10% from peak emissions by 2035, while striving to do better. The plan also strengthens the energy transition goals, including increasing the proportion of non-fossil energy in primary energy consumption to around 25% by 2030, surpassing the total installed capacity of wind and solar power by 1,200 gigawatts (GW), and continuously reducing the carbon intensity per unit of GDP, as important steps in achieving carbon neutrality before 2060. The realization of China's climate ambitions is based on the accelerated expansion of renewable energy sources such as wind and solar power;[51] the installed capacity has already exceeded the target of 1,200 GW ahead of schedule. However, dependence on coal remains a challenge. To advance the transition process, China has established a National Carbon Emissions Trading System (ETS, see **Glossary**) and vigorously invested[52] in clean energy technologies such as electric vehicles (EVs), solar panels, advanced batteries, and nuclear energy. In the process of achieving the 2030 carbon peak target, the next five years — the next national planning cycle — will be crucial as coal and oil remain the core of the energy system and will become key areas for China's climate action.[53]

China's domestic innovation in energy transition is mainly reflected in the rapid and large-scale deployment of green technologies led by the state, especially in the manufacturing of solar panels, wind turbines and EV batteries that dominate the global supply chain.[54] This process is driven by strategic long-term green industrial policies[55] and public investment — including *Made in China 2025*[56] and other plans — aimed at establishing China as a global green technology power. China has cultivated a deeply vertically integrated supply chain system and achieved significant cost reductions, enabling large-scale production and establishing a leading position in the global market.[57]

Recent innovations include the development of new-generation battery chemical systems suitable for long-range EVs, and pioneering technologies in the fields of green hydrogen production, smart grid integration, and carbon capture and storage (CCS, see **Glossary**). These measures are shifting China's focus from gradual manufacturing upgrades to technological breakthroughs,[58] further consolidating its key position in the global clean energy revolution.

Regulatory frameworks form the backbone of China's emission reduction strategy, especially through the implementation of the 15th five-year plan. The government has introduced strict energy efficiency standards across industry, construction, transportation and other sectors. For example, power plants, manufacturing facilities, and household appliances must meet mandatory energy efficiency benchmarks, compelling industries to adopt cleaner and more efficient technologies. In 2024, China issued special emission control regulations for high-pollution industries such as cement, steel and petrochemicals.[59] In recent years, the Environmental Protection Law has been continuously strengthened, reinforced by the adoption of a new Ecological and Environmental Law Code, in March 2026[60] providing a robust legal foundation for the strict implementation of environmental standards.

Financial instruments play a key role in guiding investment flows towards sustainable development. China has established a pioneering green financial market system, covering financial instruments such as green bonds and green

loans, dedicated to supporting renewable energy projects, energy efficiency upgrading and ecological environment restoration.[61] These funds help to reduce investment risks and attract private capital to green industries. In addition, the inclusion of environmental, social and governance (ESG) standards in financial decision-making is receiving increasing attention,[62] encouraging banks and investors to prioritize renewable energy projects.

Subsidies remain a core tool to accelerate the deployment of renewable energy and clean transportation. The government provides substantial financial support for solar, wind, hydropower and biomass energy projects.[63] For example, solar photovoltaic (PV) systems and wind turbines are usually eligible for internet electricity price subsidies or direct subsidies. In transportation, subsidies, tax incentives and purchase rebates support consumers and manufacturers. Additionally, industries adopting energy-saving measures or investing in renewable energy infrastructure also benefit from tax breaks, subsidies and preferential financing schemes.

Market mechanisms provide economic incentives to promote emission reductions. China's ETS, launched in 2021, initially covered the power generation industry, aiming to create economic incentives for clean production. In March 2025, the Chinese government expanded its ETS to include cement, steel and aluminum industries, increasing the proportion of national carbon dioxide emissions covered by the market from 40% to 60%.[64]

Research and Development (R&D) and pilot projects are driving the development and large-scale adoption of low-carbon technologies across multiple sectors. The government actively invests in R&D for new-generation solar panels, wind turbines, battery energy storage and CCS technologies. At the same time, special pilot projects and demonstration areas[65] are established to test low-fossil carbon technologies and business models before large-scale deployment.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

The main implementation challenge of China's energy transition lies in the deep economic and social dependence on coal. Accelerating the pace of its transition would require the Chinese government to stop issuing new permits and optimize the utilization of existing assets, while balancing these politically sensitive tasks with the continued expansion of renewable energy. Crucially, China must manage the socioeconomic dimensions of coal phase-down, including the regional economy, employment, and power grid stability of coal-dependent provinces[66] such as Shaanxi, Shanxi, and Inner Mongolia. To this end, policy support has been extended to capacity building, workforce training and standard setting to promote the popular application of advanced low-fossil carbon technologies across multiple industries and regions. Besides coal dependence and the risk of long-term carbon lock-in, China also faces other implementation challenges related to balancing its rapid renewable expansion with its energy security needs, industrial policy aspirations, economic stability imperatives, as well as system integration challenges.[67]

A Closer Look into China's Flagship Initiatives: Implementing the "Dual Carbon Goal" Policy Framework

China's renewable energy trajectory is not merely a story of deployment scale, but of deliberate institutional architecture — encompassing long-term strategic planning, pilot-based policy experimentation, vertically integrated manufacturing ecosystems, carbon market construction, and green finance innovation — that has collectively enabled the buildout of a new power system capable of absorbing high shares of variable renewables.

The flagship policy of China's energy transition is the commitment to achieving carbon peaking before 2030 and carbon neutrality before 2060, known as the "Dual Carbon Goal".[68] The target covers almost all sectors of China's economy, with a focus on the energy sector, which accounts for about 60-70% of the country's carbon emissions, while covering manufacturing, transportation, and urban development.

***Expand the scale of renewable energy and reduce dependence on fossil fuels**: The core of the Dual Carbon Goal is the large-scale expansion of renewable energy production capacity. China plans to add hundreds of GW of installed capacity every year and strives to lead the world in solar and wind power generation. Hydropower remains an important pillar, especially in regions such as Sichuan and Yunnan. At the same time, the goal emphasizes reducing dependence on coal, which has traditionally been the backbone of China's energy system.*

***Reform of traditional fossil fuels**: Although coal continues to play an important role, China plans to achieve cleaner and more efficient use of coal through technological upgrading and gradually eliminate high-pollution power plants. At the same time, China is promoting natural gas as a transitional fuel and investing in clean combustion technology and infrastructure construction.*

***Accelerate electrification and green transportation**: The main measures include promoting EV adoption, expanding charging infrastructure, and improving public transportation systems such as high-speed railways. In 2024, China's EV sales increased significantly, accounting for about 11 million of the world's 17.3 million newly sold EVs that year,[69] while total annual EV production reached 12.4 million. The policy goal is for EVs to become the main mode of personal travel in urban areas by 2030.*

***Upgrade industrial and green manufacturing**: The plan supports the transformation of industry and manufacturing towards low-carbon production through technological innovation. Specific measures include deploying energy-saving equipment, adopting digitally enabled manufacturing processes, and developing new low-carbon materials and processes.*

***Promote urban green development:** Recognizing that cities are the major sources of emissions, China promotes green urban planning, energy-saving buildings, and renewable energy deployment. Smart grids, renewable energy regional heating, and green building standards are the core elements of this plan.*

Egypt

Egypt's current NDC[70] commits to generating 42% of electricity from renewable sources by 2030, alongside sector-specific emission reduction targets in electricity (37%), oil and gas-related (65%) and transportation (7%). Compared with a BAU trajectory, Egypt's strategy prioritizes large-scale deployment of solar and wind energy. At the same time, policy support is provided through the implementation of the *Feed-in Tariff Scheme* and the *Renewable Energy Law.*[71] As part of this effort, Egypt has developed the *Benban Solar Park,*[72] with an installed capacity of 1.8 GW, one of the largest solar parks globally, and expanded wind farms along the Red Sea coastline.[73]

Egypt's energy transition also emphasizes the development of local manufacturing capacity for solar panels and wind turbine components, supported by public-private cooperation and technology transfer agreements. The New Energy and Renewable Energy Authority (NREA) plays a central role actively promoting renewable deployment, grid integration pilot projects, and energy storage solutions. Simultaneously, research institutions and start-ups are exploring opportunities for off-grid solar energy applications, smart grid systems (see **Glossary**), and green hydrogen development, positioning Egypt as a regional renewable energy innovation hub.[74] Egypt also aims to export renewable energy technology, components and technical expertise to neighboring countries and European markets.

Egypt relies on a **comprehensive policy toolkit** to promote the transformation of the energy sector in line with national goals and international commitments. The cornerstone is the *Renewable Energy Law*[75] promulgated in 2014, which simplified licensing procedure, introduced price support mechanism, and established a legal framework for the private sector investment in renewable energy projects. The Egyptian Electricity and Consumer Protection Authority (EgyptERA) is responsible for supervising pricing and grid access policies to ensure fair competition and facilitate the grid-connected integration of renewable energy.

An important mechanism is to support the development of **large-scale projects** through transparent competitive bidding processes and PPAs, which have attracted a large amount of domestic and foreign investment,[76] notably the *Benban Solar Park*.[77] In 2008 Egypt launched the *National Renewable Energy Strategy*, which currently aims to achieve 20% of renewable energy in the energy structure by 2022 and 42% by 2035.[78]

Supporting **financial mechanisms** include preferential loans, grants and cooperation with international development institutions, such as the World Bank and the African Development Bank (AfDB), as well as bilateral partners, including BRICS members like China, India, and the UAE.[79]

Implementation Under Constraints: Limits, Trade-offs, and Tensions

Energy transition in Egypt faces acute constraints related to energy access and affordability in a context where the power sector remains heavily reliant on fossil fuels. In this context, Egypt has the challenge to balance a new, and growing, renewable ambition with the socioeconomic and infrastructural legacy of gas and financing constraints. While the Egyptian government is exploring innovative mechanisms such as green bonds and carbon trading to mobilize private capital, it faces major challenges at the implementation level. Egypt must attract sufficient private investment for asset retirement as well as grid modernization and energy storage to manage instability from large-scale new solar and wind power projects, while also navigating subsidy reform and high sovereign debt. Another important challenge lies in securing a just transition and balancing the affordability of electricity prices with fiscal consolidation. In line with the International Monetary Fund (IMF) reform programs, Egypt has mandated elimination of subsidies,[80] increasing pressure to support households and energy intensive industries facing high inflation.

A Closer Look into Egypt's Flagship Initiatives: Combining Structural Reforms and Large-Scale Projects

Egypt has developed its renewable energy, especially wind and solar energy, through strategic partnerships with international consortiums, multilateral development banks, sovereign wealth funds, and BRICS members (such as China, India, and the UAE). The ***Benban Solar Park*** *with an installed capacity of 1.8 million kW is a flagship example of successful large-scale energy deployment. Another flagship project is the* ***Gabal El-Zeit Wind Farm*** *which has made a significant contribution to the country's renewable energy capacity and demonstrates Egypt's strategic importance in developing wind energy resources along the Red Sea coast.*

Together, these flagship projects and supporting policy frameworks position Egypt as a regional renewable energy hub, integrating large-scale infrastructure deployment, regulatory reform, international finance, and industrial development to achieve its 42% renewable electricity target by 2035.

Ethiopia

Ethiopia's NDC 3.0[81] commits to a 70.3% conditional reduction in GHG emissions by 2035 compared to BAU levels, an increase from 68.8% in the previous update, alongside an unconditional reduction target of 30.7%. Agriculture remains the largest emitting sector, followed by energy and the LULUCF sector (see **Glossary**).[82] In 2023, Ethiopia published its *Long-Term Low Emissions Development Strategy (LT-LEDS)*[83] outlining multiple pathways to achieving net zero between 2035 and 2050. A country on the United Nations' list of Least Developed Countries (LDC), Ethiopia's climate targets are broadly aligned with the 1.5°C pathway and it has been recognized as a leader on climate ambition in Africa.[84]

For over a decade, Ethiopia has worked to mainstream climate change mitigation and adaptation into its national development goals. Ethiopia's energy mix is almost entirely renewable, mainly through large-scale hydropower investments. The *Grand Ethiopian Renaissance Dam* (GERD)[85] is a major project expected to add 6,450 MW of installed capacity, positioning Ethiopia as a regional leader in hydropower.[86] The GERD exemplifies Ethiopia's use of **large-scale infrastructure as a strategic policy tool**, not only to expand domestic electricity supply and export revenues but also to position the country as a regional energy hub in East Africa.

Alongside GERD, Ethiopia is expanding grid infrastructure while upgrading existing national grid (with support from multilaterals like the AfDB and other partners like China and the European Union), updating the national standard for energy efficient appliances, and state led distribution of energy efficient appliances. Ethiopia is also promoting small hydro and wind projects and integrating solar energy into rural electrification programs. Part of the national electrification program is a *National Clean Cooking Road Map* (2024-2034)[87] aimed at conserving nature and forests with modern cook stoves. Wind projects with China and geothermal Public-Private Partnerships (PPP) projects have equally been added to the energy mix, while additional hydropower plants are under construction, including Koysha Dam, Gibe III, and Gibe IV.

Ethiopia's **energy policy framework** is centered on sustainable development and climate resilience leveraging its abundant renewable resources. The *National Electrification Program (NEP)* serves as a core policy tool, which aims to achieve universal electricity access (initially by 2025, now by 2030) mainly through renewable energy generation, with hydropower playing a central role[88]. Complementing this, the 2011 *Climate-Resilient Green Economy Strategy (CRGE)*[89] integrates climate mitigation and adaptation objectives across sectors prioritizing the deployment of renewable energy and the promotion of energy efficiency improvements, alongside other afforestation goals. More recent policy frameworks, such as the 2015 *Climate Resilience Strategy for Energy and Water,*[90] the *Ten Year Development Plan (2020-30),*[91] and the *National Sustainable Energy Development Strategy (N-SEDS)* (2024-30)[92] have effectively updated the CRGE in practice, though the CRGE is not outdated yet.

Financial mechanisms are a key policy instrument. Ethiopia both self-funds and raises external funds. Its self-funding includes state-led public investment such as direct budget allocations through the state to large infrastructure projects, most notably the GERD. Since 2013, the CRGE Facility[93] acts as a central climate finance pool under the Ministry of Finance to mobilize resources. External funding sources include vertical climate funds (like the Green Climate Fund - GCF and the Adaptation Fund - AF), multilateral development partners (like the World Bank and the United Nations Development Program - UNDP), bilateral assistance (from countries like the United Kingdom - UK), and concessional loans to accelerate renewable energy development.

The government is also promoting PPPs through a risk sharing framework to attract private capital investment in small-scale hydropower, wind and solar power projects. The decentralized energy access policy prioritizes the deployment of microgrids, solar home systems and innovative financing schemes to provide services to remote communities. Ethiopia has also invested in off-grid systems, including the agricultural use of solar power systems such as generators and water pumping.[94]

Additionally, Ethiopia is also investing in **domestic innovation** by supporting research on renewable energy technologies, including solar equipment and energy storage solutions. The country's policy and regulatory environment encourage local manufacturing of solar PV panels, lamps and institutional furnaces through incentives for industrial parks and local enterprises. At the same time, universities and technical colleges provide special training courses in solar installation, power grid management, and microgrid maintenance, building the foundational skill base required for supporting the ecosystem of energy transition. In 2024, Ethiopia issued its EV Charging Systems Directive[95] and became the first country in the world to ban the import of internal combustion engine vehicles (ICEVs),[96] following the removal of value-added tax, surtax, and excise taxes on EV imports and the reduction of import tax on partially assembled EVs since 2022.[97] Those measures, coupled with broader initiatives to electrify urban public transport[98] and advance on its *Non-Motorized Transport Strategy* (2020-2029,)[99] illustrate Ethiopia's strong commitment to **transport decarbonization**.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

Ethiopia combines strong renewable energy potential with persistent infrastructure weaknesses, climate exposure, and highly unequal access to electricity. Indeed, Ethiopia faces a dual energy poverty challenge, with a significant share of its population still lacking reliable electricity access and the vast majority remaining dependent on traditional biomass for cooking, exposing households — particularly women and children — to acute health and environmental burdens.

As for the country's renewable energy, implementation remains constrained by foreign exchange shortages, limited financing, insufficient long-term investment in power transmission infrastructure, and technical vulnerabilities, particularly due Ethiopia's exposure to severe drought in a hydropower-dependent system. In addition, security and geopolitical tensions in East Africa continue to hinder regional clean energy cooperation, including in hydropower and wind development.[100]

A Closer Look into Ethiopia's Flagship Initiatives: Balancing Access to Clean Energy and Green and Resilient Development

*The **Grand Ethiopian Renaissance Dam (GERD)** is Ethiopia's flagship project for energy access, transition and hydropower development. Once the project is fully operational, approximately 6,450 MW of renewable energy installed capacity will be added, making Ethiopia one of Africa's largest hydropower producers. GERD is also exemplary for its self-financed infrastructure and local mobilization, connection to the cross-border grid supplying green energy to neighboring countries for regional power integration, as well as for integrated livelihood support to local communities. Complementary initiatives launched under The National Electrification Program (NEP) aim to expand power grid coverage and scale off-grid solar solutions.*

Together, these flagship initiatives illustrate Ethiopia's renewable-led development model, integrating large-scale hydropower expansion, decentralized electrification, industrial policy, and climate resilience within a broader green growth strategy.

India

India approved its updated NDC with 2035 targets in March 2026, committing to reducing the emissions intensity of its GDP by 47% by 2035 relative to 2005 levels, achieving 60% of cumulative installed electric power capacity from non-fossil fuel-based energy resources by 2035, and creating a carbon sink of 3.5–4.0 billion tonnes of CO_2 equivalent through forest and tree cover by the same year.[101] The government presents these commitments as aligned with its broader development strategy, including its growing energy needs and its net-zero target for 2070. Although India's coal economy continues to grow,[102] clean-energy capacity expanded by a record 25.1 GW, up 69% year-on-year, generating nearly 50 terawatt hours (TWh) of electricity per year, nearly sufficient to meet the average increase in demand overall.[103] Despite substantial progress in electricity access through grid expansion and off-grid solutions, India continues to grapple with the quality and reliability of supply, while clean cooking transitions remain incomplete, with hundreds of millions still relying on solid biomass fuels in ways that disproportionately burden women and drive significant indoor air pollution.

The domestic innovation of India's energy transition is driven by public policies, private investment, and a growing start up ecosystem. **Solar technology** is an important area of innovation with India leading in the deployment of large-scale and distributed solar solutions. Policies such as *AatmaNirbhar Bharat*[104] (*Self-Reliant India*) promote local manufacturing of solar PV modules and advanced cells, which are key components in the global clean energy supply chain. In addition, India is developing **innovative financial instruments**, such as sovereign green bonds for renewable infrastructure and state-level compliance carbon markets,[105] to support the transition process while addressing challenges such as ensuring a just transition for coal-dependent communities, improving public health issues, and shifting fiscal policies away from solid biomass and subsidized fossil fuels such as liquefied petroleum gas (LPG).[106]

India employs various policy instruments for its energy transition, including direct support, market mechanisms, and regulatory changes. **Direct budgetary support and incentives** include demand incentives for electric and hybrid vehicles under the *Faster Adoption and Manufacturing of Electric Vehicles (FAME)* scheme,[107] and subsidies for residential rooftop solar via the *PM Surya Ghar Yojana*.[108] The *Production-Linked Incentive (PLI)* scheme[109] offers financial rewards for domestic manufacturing of solar PV modules and battery cells. *Viability Gap Funding (VGF)*[110] supports large-scale projects like offshore wind and battery storage.

Various **market-based mechanisms** complement these efforts. The Carbon Credit Trading Scheme (CCTS) (see **Glossary**) for energy-intensive industries, which is based on the 2022 revised *Energy Conservation Law*, incentivizes efficiency improvements. The *Performance, Standard and Transaction (PAT)* mechanism improves industrial energy efficiency through target setting and energy-saving certificates (ESCerts) (see **Glossary**) transactions[111]. Likewise, the Renewable Energy Procurement Obligations (RPOs) (see **Glossary**) require power distribution companies to source a percentage of electricity from renewable sources, increasing from 29.91% in 2024-25 to 43.33% by 2029-30.[112]

Fiscal policies further support India's energy transition. While fossil fuel subsidies still exist, funds through goods and services tax compensation surcharges have been redirected to clean energy programs. The government has also invested in the construction of green energy corridors,[113] smart grid infrastructure, and the integration of renewable energy into the national power grid. These policies combine government investment and market innovation to jointly promote India's energy transition.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

India's energy transition is defined by a central tension: expanding energy access while reducing dependence on fossil fuels. Coal dependence and energy security concerns, including heavy fossil-fuel imports, continue to shape the pace of change even as renewables gain ground in the energy mix.

Beyond the technical task of modernizing power distribution and coordinating multiple policy and regulatory frameworks, the transition is fundamentally socio-developmental. It requires scaling up affordable renewable energy, protecting industrial competitiveness[114], and managing the unequal distributional effects of transition across states and communities, particularly in coal-dependent regions such as Jharkhand, West Bengal, and Chhattisgarh[115]. India therefore serves as a major test of whether growth, energy security, and affordability can be reconciled with decarbonization and just transition objectives.

A Closer Look into India's Flagship Initiatives: Integrating a Myriad of Strategic Programs

India has launched several flagship programs to address energy poverty and accelerate the transition to a low-fossil carbon economy, while enhancing energy independence. Among them, the key initiative is the ***National Green Hydrogen Mission***[116] *launched in 2023, which aims to establish India as a global hub for the production, use, and export of green hydrogen energy. The plan is implemented by the Ministry of New Renewable Energy (MNRE), which plans to achieve an annual production capacity of at least 5 million tons of green hydrogen energy by 2030. Its* ***Strategic Interventions for Green Hydrogen Transition (SIGHT)*** *supports electrolytic cell manufacturing and green hydrogen energy production through the* ***Production-Linked Incentive scheme (PLI)*** *targeting decarbonization of hard-to-abate sectors such as steel, shipping and heavy transportation, reducing fossil fuel imports, and creating export opportunities. To expand access to clean cooking fuels and improve health, especially the health of rural women, India has implemented* ***Pradhan Mantri Ujjwala Yojana (PMUY)****, a subsidized LPG connection to low-income households. Since its inception in 2016, the program has provided more than 100 million LPG connections, improving energy access, health outcomes, and women's social and economic empowerment.*[117] *Another major initiative is the* ***Faster Adoption and Manufacturing of Electric Vehicles*** *(FAME) program, which encourages the purchase of electric and hybrid vehicles through subsidies and the development of charging infrastructure. Currently in its second phase, the FAME plan focuses on electrifying public and shared transportation, targeting electric buses, tricycles and two-wheelers.*

In terms of residential energy, ***PM Surya Ghar: Muft Bijli Yojana*** *provides subsidies for rooftop solar installation in 10 million households, providing up to 300 units of free electricity per month and promoting distributed energy power generation. Launched in February 2024 with a budget of INR 750.21 billion by fiscal year 2026-27, the program aims to reduce household electricity bills while expanding clean energy.*

*Finally, for the deployment of large-scale solar energy projects, the **Solar Parks Scheme** and **Ultra-Mega Solar Power Projects** have promoted the creation of concentrated areas with common infrastructure (such as land and transmission systems). The plan was strengthened in 2017 with a target of generating 40,000 megawatts (MW), providing a plug-and-play model, reducing the risk of developers and accelerating the installation of large-scale solar projects.*

Together, these flagship initiatives constitute a comprehensive, multi-sector strategy integrating technological innovation, policy support, and market mechanisms to advance energy transition in India.

Indonesia

Indonesia's updated NDC commitment[118] emphasizes a major transformation toward renewable energy, aiming to increase the share of renewables in the national energy mix to 19%-23% by 2030, 36%-40% by 2040, and 70%-72% by 2060. The country has set a target of reducing GHG emissions by 32% without international support and up to 43% with international support. As part of its pathway to achieving a net zero emission by 2060 or earlier, Indonesia plans to peak national emissions by 2030. Meanwhile, Indonesia faces an energy poverty challenge that is shaped by its archipelagic geography, which constrains grid expansion and leaves remote and rural island communities with unreliable or no electricity access, while reliance on traditional biomass for cooking persists across significant segments of the population, compounding household health risks and gender inequalities.[119]

Key policies such *as National Energy General Plan (RUKN)*[120] and *Electricity Supply Business Plan (RUPTL)*[121] include the development of geothermal, solar and wind energy projects, focusing on expanding clean energy access in rural areas. At the same time, Indonesia has invested in upgrading its energy infrastructure as the electricity system faces structural challenges including oversupply, aging infrastructure, and underutilized coal-fired power plants, many of which operate below optimal capacity.[122] The government is also promoting biomass and hydropower development to diversify the energy mix and reduce dependence on coal, which currently accounts for more than 60% of power generation.[123]

Indonesia's energy transition is closely linked to **geothermal technology** as the country possesses the world's largest potential for geothermal resources. The government has launched a *Geothermal Energy Upstream Development Plan (GEUDP)*[124] and other related initiatives to accelerate deployment targeting more than 23 GW of geothermal power capacity by 2030. Additionally, Indonesia is actively building a **renewable energy innovation hub** in Southeast Asia by strategically leveraging its world-leading reserves of critical minerals such as nickel and copper.[125] Through integrated EV battery ecosystems and downstream processing industries, Indonesia aims to anchor higher value-added segments of the global green supply chain. At the same time, geothermal and biomass resources are being developed to supply power to green industrial parks and support exports of certified low-carbon products such as biofuels and aluminum to regional and global markets.

To stimulate investment in renewable energy, Indonesia has introduced Feed-in Tariffs (FiTs), power purchase agreements (PPAs), and competitive bidding processes to attract private sector participation in solar, wind and geothermal energy projects. The government also **provides tax incentives and subsidies** for renewable energy developers to reduce project costs and encourage technical innovation.

Under the *Electricity Law* enacted in 2009, market liberalization has progressed and encouraged independent power producers and easing the market for renewable energy developers. **Financial mechanisms**, such as concessional loans and climate funds provided by international donors, further support project development. A prominent example is Indonesia's *Just Energy Transition Partnership (JETP)* and its *Comprehensive Investment and Policy Plan (CIPP)*, which aims to mobilize international capital for ambitious energy transition. The Ministry of Energy and Mineral Resources (MEMR) plays a crucial role in coordinating policy implementation, monitoring progress, and updating strategies in response to technological advancements and market conditions.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

Indonesia's energy transition is currently slowed by the strong political and economic influence of the domestic coal industry. Price caps under the Domestic Price Obligation, contracting rules, and tariff-setting mechanisms keep coal artificially cheap, reduce the attractiveness of renewable investments, and reinforce the country's dependence on fossil fuels.[126] As a result, early coal plant retirement becomes more difficult, [127] and financing grid modernization and renewable baseload options such as geothermal energy remains challenging.

At the same time, the expansion of low-carbon energy is shaped by structural tensions between energy security and clean power growth, as well as between Indonesia's centralized governance model and the more decentralized infrastructure needs of renewables. Political pressure has recently led to a reversal of previous decarbonization commitments under the new National Energy Policy, launched in September 2025, that postponed the 23% renewable energy target from 2025 to 2030.[128]

Indonesia's transition is also exposed to geopolitical and geoeconomic risks, particularly from carbon regulations and climate-related trade measures such as the EU Carbon Border Adjustment Mechanism and the EU Battery Passport regulation, which may affect the competitiveness of Indonesian exports in nickel, cement, iron, and steel.

A Closer Look into Indonesia's Flagship Initiatives: Restructuring a Coal-dependent Power System

One of the prominent flagship initiatives to accelerate Indonesia's energy accessibility and transition is the ***National Energy General Plan (RUKN)****, established in 2017 as an overarching strategic framework. RUKN sets clear targets for increasing the share of renewable energy in the national energy mix to 23% by 2025 and 31% by 2030. Complementing this, the* ***Electricity Supply Business Plan (RUPTL)*** *outlines investment priorities for expanding electricity access, particularly across rural and underserved areas. The RUPTL promotes decentralized renewable solutions such as solar mini-grids and solar home systems that are crucial for improving energy equity.*

Together, these policies and flagship initiatives reflect Indonesia's dual strategy of expanding renewable capacity while restructuring its coal-dependent power system, balancing energy security, industrial development, and decarbonization goals.

South Africa

South Africa's current NDC commits to limiting the country's GHG emissions to a range of 350 - 420 million tons of CO_2 equivalent (MtCO2-eq) by 2030. The latest draft NDC revision released in October 2025 proposes more ambitious goals for the 2031-2035 period and introduces stricter restrictions on major emission sources under the newly promulgated *Climate Change Act*.[129] South Africa is also committed to achieving net zero emissions by 2050. Together these commitments provide the foundation for the government to get rid of dependence on coal-fired power generation, while repositioning the mining industry and Special Economic Zones (SEZ) within the global supply chain of key minerals and green hydrogen energy and upgrading, aiming to export high value-added products and engineering services across Africa. However, South Africa presents a paradoxical energy poverty profile, where near-universal formal electricity access coexists with severe and chronic supply unreliability driven by the structural challenges faced by the state utility Eskom, while a substantial share of low-income households — particularly in informal settlements — continues to depend on coal, paraffin, and biomass for cooking and heating, with well-documented consequences for indoor air quality and household welfare.[130]

The pace of innovation in South Africa's domestic energy transition has accelerated, driven by **policy reform** and the urgent need to address the country's persistent energy crisis. The key driving force has been the opening up of power generation market with the government first raising and then completely abolishing the licensing threshold for private power generation projects, unlocking substantial private investment and innovation[131] in renewable energy technologies, particularly solar PVs and wind energy. At the same time, South Africa is advancing **R&D in emerging technologies**, with the *Hydrogen Society Roadmap*[132] outlining a blueprint for green hydrogen energy production. In addition, a *Green Finance Taxonomy*[133] (see **Glossary**) supports capital mobilization by promoting sustainable financing mechanisms.

South Africa employs a combination of regulatory reforms, market mechanisms, and targeted investment plans. The country also places strong emphasis on **Just Energy Transition (JET)** with pilot projects in the Mpumalanga province[134] and other coal dependent areas to transform and upgrade old coal-fired power plants and create green jobs. As one of the first national platforms in the world, the *Just Energy Transition Investment Plan (JET-IP)* serves as a national strategic framework, identifying priority areas like electricity reform, just transition measures and climate finance, aiming to mobilize the international funding[135] to support NDC implementation. Since 2019, **market-oriented regulatory tools** have been implemented through the *Carbon Tax Law* which applies to about 90% of GHG emissions in a phased manner. Although the initial tax-exempt quota is relatively lax, the government plans to gradually raise the tax rate and reduce the quota to strengthen the long-term emission reduction incentive mechanism.

Additionally, **regulatory reforms** have reshaped the electricity sector. The *Electricity Regulatory Amendment Act (ERA)* of 2024 restructured the electricity market, significantly improving private sector participation and accelerating renewable energy deployment. A key reform was the complete removal of licensing requirements for private power generation projects in 2022, which has led to more than 22 GW of capacity in various stages of development.[136] The Act also mandates the establishment of an independent transmission system operator, strengthening the construction of the power grid and enabling a competitive, multi-buyer electricity market. In 2023, South Africa introduced tax incentives for renewable energy investment, providing a 125% tax deduction for corporate renewable energy projects and tax rebates for households installing rooftop solar panels,[137] To mobilize sustainable investment, the country has also formulated its *Green Taxonomy* to establish a classification system for green projects and improve investment transparency.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

South Africa's energy transition is constrained by the challenge of moving beyond coal while maintaining electricity reliability and managing the costs of transition. Coal dependence, and the high social and economic costs of reducing it, remain a structural constraint on the country's energy transition. Although flagship initiatives such as the Just Energy Transition have created important momentum, funding and implementation have moved more slowly than initially expected. This is compounded by infrastructure limitations, including Eskom's financial and operational constraints and ongoing grid reliability problems, bureaucratic barriers and institutional capacity constraints, as well as rising electricity demand, local political economy pressures, and the need to manage just transition impacts on coal-dependent communities and workers.

Implementation is also constrained by geopolitical exposure to shifts in climate finance, which further complicate JET delivery given its reliance on external support. In addition, governance fragmentation and limited institutional capacity continue to slow the rollout of renewable energy and energy efficiency policies and regulations. Despite these implementation challenges, South Africa remains a major testing ground for just energy transitions and ongoing reforms are crucial to guiding South Africa towards a diversified sustainable energy landscape.

A Closer Look into South Africa's Flagship Initiatives: Fostering Structural and Systemic Transformation

South Africa's energy transition is driven by several flagship domestic initiatives aimed at decarbonizing the economy while addressing unique socio-economic challenges. The cornerstone of the strategy is the ***Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)****,*[138] *launched in 2010, which aims to attract private sector investment in renewable energy generation. Through a series of competitive tenders, REIPPPP has played an important role in purchasing new solar and wind production capacity, fostering an independent power sector and significantly reducing renewable energy tariffs.*

Another critical initiative is the ***Just Energy Transition Investment Plan (JET-IP)****, which outlines the five-year investment priorities aligned with the nation's decarbonization goals. The JET-IP prioritizes investments in the electricity sector, the development of a green hydrogen economy, and the expansion of new energy vehicles (NEVs), with the strategic objective of managing the socio-economic impacts of phasing out coal.*

Similarly, the ***Green Hydrogen Commercialization Strategy***[139] *is a strategic initiative aimed at building South Africa as a global green hydrogen production hub by leveraging the country's abundant renewable resources and mineral reserves. This initiative is supported by local incentives for EV production,*

expansion of charging infrastructure, and efforts to address local supply chain problems. Additionally, energy security and market liberalization are guided by the 2025 ***Integrated Resource Plan***[140] *and the 2022* ***Energy Action Plan,***[141] *which outlines the country's long-term energy structure and short-term interventions to reduce load by allowing the private sector to participate in power generation.*

Collectively, these flagship initiatives demonstrate a systemic transformation strategy that balances decarbonization, energy security, and socio-economic stability.

The UAE

The UAE's NDC 3.0[142] sets an absolute emissions reduction target of 47% by 2035 compared to 2019 levels, while maintaining its status as a major oil producer and exporter. The country has also committed to achieving a net zero target by 2050. Key large-scale initiatives to support this include the *Mohammed bin Rashid Al Maktoum Solar Park*[143] which has reached approximately 3.86 GW of installed capacity and is expected to reach 5 GW by 2030, making it one of the largest solar parks in the region.[144] The UAE also invests in nuclear power and explores cleaner coal technology to diversify its energy sources while reducing reliance on natural gas and oil. Its policies focus on fostering sustainable development, improving energy efficiency, and establishing competitive renewable energy markets.

The domestic initiatives of the UAE include advanced **R&D** of solar PVs and carbon capture technologies, as well as the development of green hydrogen energy projects promoted in accordance with the *National Hydrogen Strategy*.[145] The country has also established innovative clusters and research centers focusing on climate-friendly technologies, such as the *Masdar City Project*,[146] an eco-friendly urban development project that focuses on renewable energy, sustainable transportation and intelligent infrastructure. The government actively promotes **PPPs**, start-up incubations, and international cooperation to accelerate clean energy technology deployment. At the same time, leveraging its logistics and financial sectors, the UAE aims to become a global trade hub, financing center and transit hub for low-carbon fuels such as green hydrogen energy and sustainable aviation fuel supplying markets in Asia, Europe, and beyond.

The UAE adopts a multi-level policy framework, integrating regulatory instruments, national strategic planning, and financial mechanisms to promote energy transition. The most representative policy tool is the *Updated UAE 2050 Energy Strategy*,[147] which aims to diversify the energy mix and achieve 50% of clean energy by 2050, alongside improvements in energy efficiency. The strategy integrates policies that promote investment in renewable energy, nuclear energy and clean fossil fuels. To implement this strategy, the UAE has launched **large-scale projects** such as *Mohammed bin Rashid Al Maktum Solar Park* to promote private sector participation and attract domestic and foreign investment through measures like feed-in tariffs, auction mechanisms, and grid access. The policy framework also includes measures to improve energy efficiency in the fields of industry, construction and transportation, supported by regulatory standards and financial incentives.

The *National Hydrogen Strategy*[148] launched in 2023 is another key mechanism supporting the development of green hydrogen production, aiming to position the UAE as a regional leader in hydrogen energy technology. In addition, the government has also established institutions such as Masdar,[149] which act as incubators for renewable energy innovation and clean technology investment.

Implementation Under Constraints: Limits, Trade-offs, and Tensions

The UAE's energy transition is shaped by a distinctive tension: it is pursuing change from a position of fossil-fuel strength, while diversification, regulation, and demand-side pressures influence the pace of reform. Although the country has launched several defossilization initiatives, implementation remains constrained. Green hydrogen and renewable energy projects alone cannot drive the transition; the country must also confront domestic energy-intensive demand, particularly for cooling and desalination, alongside continued dependence on oil and gas, all while preserving economic growth and competitive energy prices.

Fossil-fuel lock-in remains therefore the central constraint. Because oil and gas are still abundant and relatively inexpensive, the UAE risks facing a credibility gap between its green leadership ambitions and its ongoing fossil-fuel expansion. In practice, the country is working to decarbonize domestic consumption while maintaining its position as a major hydrocarbon producer and channelling more hydrocarbons into exports and petrochemical value chains.

A Closer Look into the UAE's Flagship Energy Transition Initiatives: Research, Innovation and Large-Scale Projects to Diversify Energy Sources

The UAE is planning its ambitious path to achieve a diversified and sustainable energy future. The ***Mohammed bin Rashid Al Maktoum Solar Park*** *is expected to become one of the largest solar parks in the world, with the potential to reach 5 GW by 2030. This flagship project illustrates the UAE's leadership in large-scale solar deployment and technological innovation. The country's clean energy portfolio also includes nuclear power, with the* ***Barakah Nuclear Power Plant***[150] *now operational and expected to supply a substantial share of the nation's electricity demand. Together, these flagship projects form the cornerstone of the* ***UAE Energy Strategy 2050****, a national framework designed to systemically diversify the energy mix by integrating advanced solar, nuclear, and lower-carbon energy technologies to support long-term sustainability.*

Figure 2. BRICS Energy Transition: Strategies, Challenges and Mechanisms

Strategies

Manufacturing-Led Transition

Scaling domestic clean tech manufacturing (solar PV, EVs, batteries) alongside rapid renewable deployment.

China Egypt India

Biomass & Hydro-Anchored

Leveraging existing hydro and bioenergy assets as transition backbone; green hydrogen an emerging priority.

Brazil Ethiopia

Coal Phase-Down Focused

Just transition frameworks as central; managing socioeconomic impact of coal dependency.

China India Indonesia South Africa

Solar & Hydrogen Innovators and Exporters

Targeting regional and global clean energy markets; solar scale, green hydrogen, and clean tech R&D as competitive advantages.

China Egypt India South Africa UAE

Challenges

Fossil Fuel Lock-In

Deep structural dependence on coal, oil, and gas drives economic and political resistance to phase-down, complicating timelines and policy credibility.

Brazil China Egypt India Indonesia South Africa UAE

Financing and Investment Gaps

Limited access to affordable long-term capital and difficulty attracting private investment constrain the pace of renewable scale-up, particularly in lower-income economies.

Brazil Egypt Ethiopia India Indonesia South Africa

Grid and Infrastructure Modernization

Aging transmission networks, limited storage capacity, and inadequate rural electrification infrastructure impede integration of variable renewables at scale.

China Egypt Ethiopia India Indonesia South Africa

Just Transition and Social Equity

Managing the socioeconomic impact on coal-dependent communities, workers, and regions requires coordinated policy, reskilling programs, and credible institutional capacity.

Brazil China Egypt India Indonesia South Africa UAE

Policy Instruments and Initiatives

Brazil

PDEs & PNE Paten RenovaBio ProBioQAV
Fuel of the Future PNH2

China

15th Five-Year Plan ETS Dual Carbon Goal

Egypt

National Renewable Energy Strategy
Gabal El-Zeit Wind Farm
Benban Solar Park

Ethiopia

National Electrification Programme (NEP)
LT-LEDs GERD

India

PLI (PV/Battery) PM Surya Ghar (Solar) Fame
AatmaNirbhar Bharat VGF Solar Parks
National Green Hydrogen Mission PMUY

Indonesia

RUKN RUPTL JETP GEUDP

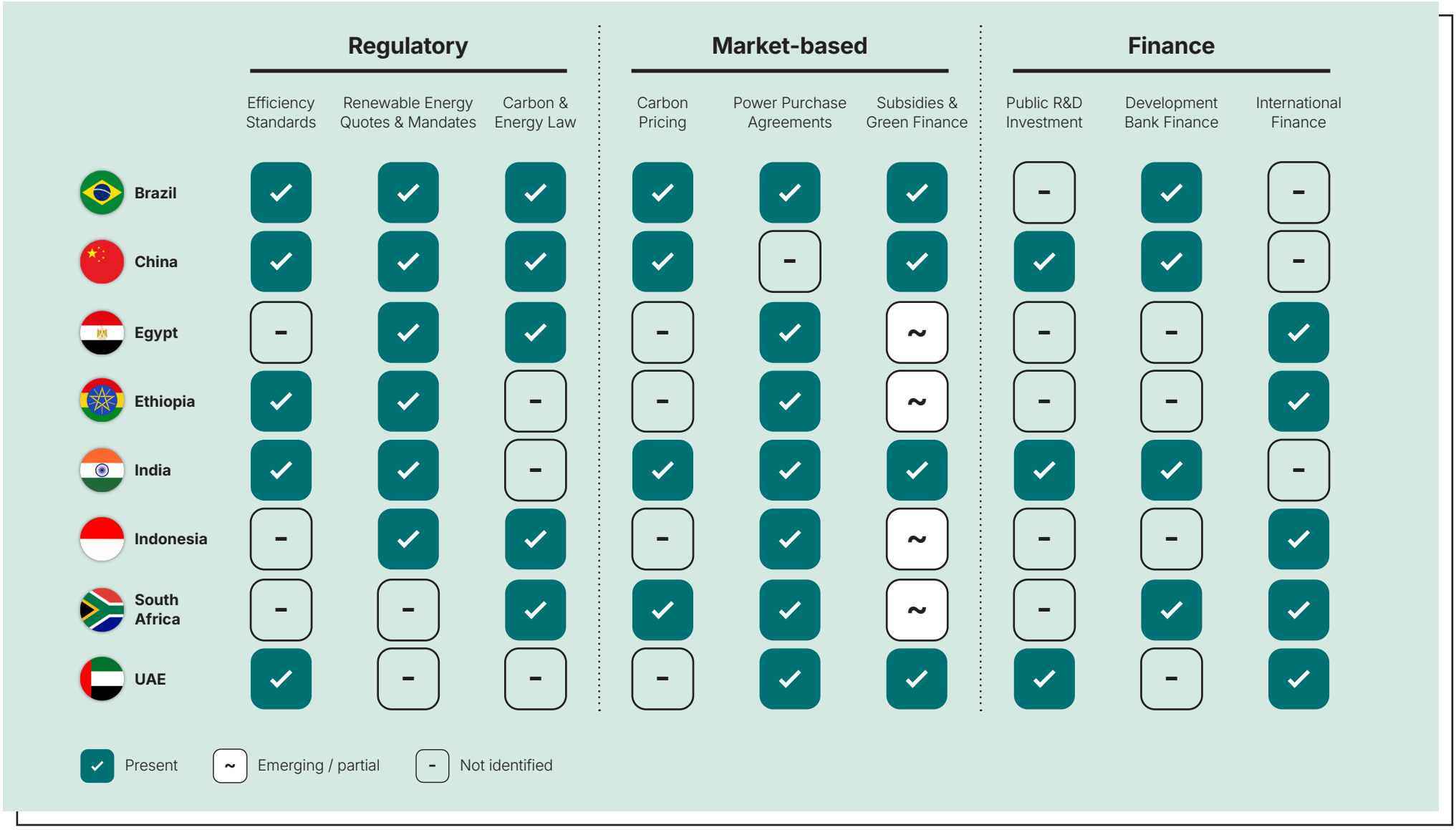
South Africa

JET-IP Green H2 Commercialization Strategy
REIPPPP

UAE

2050 Energy Strategy Masdar City Project
Mohammed bin Rashid Al Maktoum Solar Park
Barakah Nuclear Power Plant H2 Strategy

Figure 3. A deeper look into energy transition mechanisms within BRICS countries



2. International and South-South Energy Transition Cooperation Landscapes across BRICS

After surveying the national landscapes, this section turns to existing international cooperation initiatives in which the eight selected BRICS countries participate or lead. This includes multilateral, bilateral, and regional initiatives — with other BRICS countries and beyond — that support energy transition, technology transfer, and sustainable development objectives.

Brazil

Brazil strategically uses international cooperation to promote the innovation and acceleration of energy transition processes, including by **hosting multilateral processes**, such as the G20 Summit in 2024 as well as the BRICS Summit and COP30 in 2025.

A key example lies in its leading role in the G20, advocating for accelerating clean energy financing and technological innovation, including the development of innovative sustainable fuels. Brazil's G20 presidency in 2024 launched the Task Force for the Global Mobilization against Climate Change (TF-CLIMA), bringing together the Sherpa and Finance Tracks and coordinating the discussion on climate, economic and financial issues. Its outcome document[151] reaffirms the global goal to triple the installed capacity of renewable energy and double the energy efficiency by 2030, calling for USD 4 trillion in annual clean energy investment, and gradually phasing out unreduced coal emissions. The document also recommends the use of national transformation plans and platforms to develop a pipeline of financing projects and expand public and private investment in the field of clean energy through financial instruments such as green bonds, foreign exchange risk mitigation, and multilateral development bank reform.

Additionally, by establishing **international partnerships** with regional and extra-regional partners such as China and the EU, Brazil is promoting cooperation in key areas such as hydropower (notably with neighbors like Paraguay in South America), clean industry development, green hydrogen energy manufacturing and EV technologies. Likewise, Brazil's cooperation with international organizations such as the International Energy Agency (IEA) and the World Bank has focused on sharing expertise, mobilizing sustainable financing through bonds, and developing innovative policies to support clean energy development. This multidimensional diplomatic and financial strategy positions Brazil as a leader in shaping the global clean energy transition. Alongside India and the United States, Brazil supported the G20-led Global Biofuels Alliance, in 2023[152]. It has also leveraged its "dual Presidency"[153] of both BRICS and COP30 in 2025 to elevate biofuels and SAF within multilateral energy discussions, [154] identifying them as pragmatic areas of cooperation in transport and energy transitions. During the second BRICS Ministerial Meeting on Transport,[155] under Brazilian leadership, a BRICS joint declaration explicitly included SAF among key areas for collaborative action, alongside resilient infrastructure and transport defossilization. Meanwhile, during COP30, Brazil championed and launched the Belém Commitment for Sustainable Fuels.[156]

Brazil is also actively promoting its energy transition model in multilateral, regional and cross-regional fora, and through **South-South cooperation initiatives**, often using its own experience to address the specific needs of Global South countries. Its flagship biofuel program, RenovaBio, reflects this diplomatic and technical assistance approach, through which Brazil shares decades of experience and agricultural expertise with other developing countries. Relying on its successful experience in sugarcane ethanol and biodiesel, Brazil has provided technical assistance and capacity-building training to Central American, Caribbean, and African countries.[157] This cooperation aims to foster local biofuel markets, enhance energy autonomy, and provide sustainable alternatives for fossil fuels, positioning Brazil as a key partner in the defossilization of transport and energy systems across the Global South.

In addition, Brazil co-hosted the Brazil-Africa Ministerial Dialogue on Energy Transition in 2024, focusing on strengthening South-South cooperation for equitable energy transition. Brazil also plays a key role in the international discussion on climate financing, urging developed countries to support the energy transition efforts in developing countries. This leadership extends to its role in the Community of Portuguese-speaking Countries (CPLP), where Brazil demonstrates its commitment to building a coordinated, sustainable and resilient energy future for Portuguese-speaking partners by participating in seminars on energy transition and carbon market regulation.

Within the expanded BRICS framework, Brazil has played a key role in promoting a common **BRICS energy transition agenda** with a fair and inclusive transition. During its 2025 presidency, Brazil raised the priority of climate issues within BRICS[158], leading on the first BRICS Leaders' Framework Declaration on Climate Finance. It also launched a seminar on strategic energy transition in BRICS countries, bringing together experts to discuss major challenges such as clean energy financing and resilient power system development. This cooperation has contributed to the formulation of a new version of the BRICS Energy Cooperation Roadmap for 2030,[159] which explores emerging new technologies and strategies such as sustainable fuels.

Brazil has leveraged BRICS financial institutions, particularly the New Development Bank (NDB) (see below), to support clean energy investment. The NDB approved a USD 300 million loan with BNDES to finance at least five renewable energy and associated transmission projects, expected to add around 600 MW of renewable capacity.[160] The NDB also signed a MoU with the State Grid Brazil Holding (SGBH) to improve electricity transmission capacity, supporting wind and solar projects with estimated financing of USD 300 million.[161] Additionally, the NDB approved a loan to the Companhia Paulista de Força e Luz (CPFL Paulista) to modernize electricity distribution infrastructure, further strengthening Brazil's energy transition and renewable energy deployment.[162]

The New Development Bank and Energy Transition in BRICS Countries

The NDB was established by the founding BRICS countries — Brazil, China, India, Russia, and South Africa — in July 2015 as a multilateral development institution to finance infrastructure and sustainable development projects in developing countries. The Bank is headquartered in Shanghai, China, with regional offices in Johannesburg, South Africa, Moscow, Russia, São Paulo, Brazil, and Gandhinagar, India. The NDB was created both to complement existing global financial institutions and to give BRICS countries a stronger and autonomous voice in development finance,[163] serving as a major tool for the bloc's objective of advancing emerging economies' influence in international financial systems.[164]

The NDB began operations in 2015 with an initial subscribed capital of USD 50 billion, with the potential to expand up to USD 100 billion as membership grows. The UAE and Egypt became members of the Bank in 2021 and 2023, respectively, before their formal acceptance into BRICS. As of March 2026, the NDB has approved 139 projects totaling USD 42,9 billion.[165.] The Bank is targeted to direct 40% of total financing to projects contributing to climate change mitigation and adaptation over 2022-2026. As at the end of 2024, NDB's portfolio included a total of USD 8,1 million in climate finance: around USD 6,5 million to climate mitigation and USD 1,6 million to climate adaptation.[166]

By supporting sustainable, resilient, and inclusive projects, the Bank plays a crucial role in translating BRICS' political agenda into tangible outcomes. In recent years, the NDB has become a key financier of energy transition within its members, supporting national and regional efforts to scale up clean energy deployment and accelerate defossilization. Notably through its Green Bonds, the Bank has mobilized capital for projects in areas such as clean transportation, energy-efficient buildings, energy efficiency, and renewable energy. A significant part of NDB's two green bond proceeds (due in 2026 and 2027, respectively) were allocated to clean transportation projects. In the first round, 59% of the USD 1.25 billion proceeds went to clean transportation (in projects such as the Qingdao Metro, in China, and the Delhi-Ghaziabad-Meerut Regional Rapid Transit System, in India). As for the second round, which reached 88%, or 1.09 billion, as of the end of 2024, the NDB allocated 75% for clean transportation (in projects such as the Mumbai Metro Rail, in India, or the Huangshi Modern Tram Project, in China).

Going forward, the NDB could further explore the BRICS Multilateral Guarantee Mechanism launched in 2025[167] as well as other practical financial tools such as local currency financing, blended finance, project preparation facilities, exchange-rate risk mitigation mechanisms, and approaches to mobilizing private capital for sustainable infrastructure and transition investment.

NDB Lending to Energy Transition

Evolution of the Portfolio by Area of Operation (USD Million, at December 31, 2024)*

Area of Operation	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Clean energy & energy efficiency	1,194	1,218	1,937	3,039	3,016	3,441	3,026	2,994	3,303	**23,168**
Transport infrastructure**	350	419	2,735	6,204	8,419	9,399	10,479	11,672	13,958	**63,635**
Water & sanitation	0	1,122	1,426	2,380	2,191	2,258	2,684	2,902	3,866	**18,829**
Environmental protection	0	200	700	1,180	880	680	680	680	300	**5,300**
Social infrastructure	0	460	460	960	1,010	1,310	810	810	810	**6,630**
Digital infrastructure	0	0	0	0	300	300	300	373	300	**1,573**
Multiple areas	0	0	570	1,170	2,588	2,554	3,235	3,519	3,697	**17,333**
COVID-19 emergency assistance	0	0	0	0	6,070	9,201	9,016	8,970	8,918	**42,175**
TOTAL	**1,544**	**3,419**	**7,828**	**14,933**	**24,474**	**29,143**	**30,230**	**31,920**	**35,152**	**178,643**

Source: Authors' elaboration, based on NDB (2024) Report on Sustainable Development Financing for 2024. Shanghai.

*Data is presented based on the portfolio of active projects, which refers to the cumulative approvals net of cancelled and fully repaid loans.

**This area includes both clean transportation projects that use the proceeds of green, social and sustainability bonds alongside infrastructure projects.

China

China has promoted high-level exchanges of clean energy policies and technical standards by participating in bilateral and multilateral forums, such as the China-EU Energy Dialogue and the recently launched energy platform of the Shanghai Cooperation Organization (SCO),[168] contributing to broader discussions on global energy governance. South-South cooperation is also an important part of China's international climate and energy engagement strategy. China assists developing countries in adopting green technology by providing **technical training and financial support**. As of the end of 2024, China had signed 53 climate cooperation agreements with 42 developing countries to provide technical support and equipment assistance for renewable energy projects, smart grid construction and green transportation programs.[169] The cooperation also covers targeted capacity-building and vocational training projects that support sustainable development and climate-resilient livelihoods, such as mushroom cultivation and sewage treatment technology.

While these initiatives are not exclusively focused on energy systems, they contribute indirectly to sustainable development and are often integrated into broader climate cooperation frameworks. Through such mechanisms, China promotes green development models, strengthens its influence in multilateral forums, and helps shape energy transition pathways in several developing countries.[170] Its strategic trade and investment activities, ranging from key mineral extraction, processing, and financing to participation in the global electric vehicle supply chain has further consolidated its position as an important economic and technical partner in the global clean energy transition, including in other BRICS countries like Brazil and Indonesia.[171]

China actively promotes international **cooperation in energy transition, especially through the Belt and Road Initiative (BRI),**[172] which has increasingly incorporated clean energy cooperation in partner developing countries. Since President Xi Jinping announced at the United Nations General Assembly in September 2021 that China would stop supporting new coal-fired power plants overseas,[173] Belt and Road energy cooperation has shifted significantly toward green projects, including wind, solar, and hydropower.[174] Such cooperation usually involves Chinese enterprises providing equipment and expertise at competitive prices, helping reduce global renewable energy deployment costs and accelerate energy transitions in partner countries, especially in Southeast Asia, Africa, and the Middle East.

Xi's commitment marked a major shift in the pattern of Chinese overseas energy investment in coal projects compared to the early days of the BRI.[175] However, despite the promises made, debates remain regarding the full implementation of the pledge, with some analyses suggesting that previously approved projects, or projects with ambiguous classifications, have continued to progress in certain cases.[176] Since 2021, the Chinese government has promoted the "small and beautiful" BRI investment model, which emphasizes smaller-scale, environmentally sustainable, and lower-risk projects. This approach prioritizes investments that are financially viable, technologically scalable, and aligned with green development objectives, particularly in sectors such as renewable energy, digital technologies, and sustainable infrastructure.

According to statistics from the China-based Green Finance & Development Center (GFCD), China's **green energy investment** in countries along the BRI reached a record high of USD 18.3 billion in 2025.[177] The data do not yet cover major investments in green technologies such as battery manufacturing and energy transition-related mineral development, including lithium and nickel mining in Indonesia, South Africa, and other countries.

Financial and technical assistance also plays a central role in China's South-South cooperation approach. China established the **South-South Climate Cooperation Fund (SSCCF)**[178] in 2015 to provide financial and technical support to developing countries. Through this fund and other initiatives, China supports climate mitigation and adaptation activities in developing countries, including renewable energy deployment, low-carbon infrastructure development, and technical capacity building. Additionally, within BRICS, China led the creation of the BRICS Energy Group, in 2018 and was a key force behind the establishment of the BRICS-led NDB, headquartered in Shanghai. The NDB has financed several renewable energy infrastructure projects in China. For example, the Bank approved an USD 800 million loan to support green development projects in Chinese provinces like Fujian, Hunan and Jiangxi,[179] demonstrating the role of multilateral BRICS financial institutions in supporting domestic and international energy transition initiatives (see box above).

Egypt

Egypt's international cooperation strategy focuses on **mobilizing investment in large-scale renewable energy projects**, utilizing green finance, and positioning itself as an energy hub in the Middle East and North Africa. The strategic partnership with the EU at COP27 supports investment, infrastructure construction, and trade development in energy sectors. As part of its national climate strategy, Egypt has established the Nexus of Water, Food and Energy (NWFE) Program,[180] which mobilizes international capital to support the retirement of gas-fired power plants and the deployment of renewable energy generation. For example, the large-scale Benban Solar Park was completed with the significant support of multilateral development banks such as the European Bank for Reconstruction and Development (EBRD) and the International Finance Corporation (IFC).

Egypt leverages its flagship renewable energy projects and diplomatic platforms to promote **South-South cooperation on energy transition across Africa and the Middle East**. As a founding member of the African Green Hydrogen Energy Alliance (AGHA),[181] Egypt collaborates with Kenya, Mauritania and other countries to develop a shared green hydrogen energy roadmap and investment framework. Through cross-border infrastructure such as the Egypt-Saudi Arabia electricity interconnection project, Egypt promotes regional renewable energy trade and grid stability. Egypt also uses its institutional expertise to conduct capacity-building projects through the New and Renewable Energy Administration (NREA), providing solar and wind energy project management training for engineers across Africa and Arab countries. Additionally, initiatives such as the Africa Just and Affordable Energy Transition Initiative (AJAETI), launched during Egypt's Presidency of COP27, advocate collective financing and technology transfer, while platforms such as the Eastern Mediterranean Natural Gas Forum are increasingly exploring the integration of renewable energy and hydrogen within regional energy systems. This multi-dimensional strategy positions Egypt as an emerging hub for knowledge exchange, project development and policy coordination in the Global South's energy transition.

Ethiopia

In Ethiopia, international cooperation focuses on **promoting hydropower development and off-grid solar energy deployment through bilateral and multilateral partnerships** focused on rural electrification. The country collaborates with the World Bank on initiatives such as the Accelerating Sustainable and Clean Energy Access Transformation (ASCENT) program, which links funding to measurable outcomes to expand electricity access. It has also mobilized green finance for clean energy projects through multilateral funds such as the Global Environment Facility (GEF), the GCF, and the AF. For off-grid areas, the Ethiopian Power Company signed a MoU with Chinese technology provider Huawei in 2024 to jointly develop alternative energy solutions. Ethiopia also hosts the Chinese-built Aysha II Wind Power Plant in the Somali Regional State and has attracted significant Chinese investment in large wind and green hydrogen projects.[182]

China is also a partner, under a trilateral partnership[183] alongside the UNDP, in providing Ethiopia with technical and financial support for sustainable energy initiatives focused on promoting biogas, biomass, and solar technologies for rural households. By **exporting surplus hydropower to other African countries,** including Kenya, Djibouti, Sudan, and Tanzania, Ethiopia also strengthens economic ties and regional integration while providing clean energy produced electricity. Besides acting as a regional renewable energy hub,[184] Ethiopia also acts as a **regional climate champion** that regularly shares sustainable development strategies in regional fora such as the African Climate Summit and provides experiences and practices that other African countries may adapt to their own energy transition strategies.

India

India actively participates in international climate and energy fora and advocates for cooperation grounded in principles of equity and common but differentiated responsibility (CBDR). Through **multilateral initiatives** such as the International Solar Alliance (ISA),[185] the Coalition for Disaster Resistance Infrastructure (CDRI),[186] and the Global Biofuels Alliance, India promotes the development of clean energy and the construction of disaster-resilient infrastructure in developing countries. While serving as G20 president in 2023, India advocated the goal of tripling renewable energy capacity by 2030. **International partnerships**, such as the EU-India Trade Technology Council (TTC), have promoted collaboration in areas including green technology, finance, hydrogen energy, and battery recycling. Such cooperation has helped India attract international funds and improve its diplomatic influence, positioning the country as a leader in advancing low-carbon transitions across the Global South.

India's international cooperation strategy in the field of energy transition focuses on knowledge sharing, capacity building, and tailoring sustainable energy solutions for developing countries. Based on India's practical experience as a large, rapidly industrializing economy, this strategy provides a practical development model for other emerging countries. The ISA, co-founded by India and France, is a flagship initiative that brings together solar-rich countries to promote the expansion of solar energy applications. The initiative aims to mobilize investment, support research and development of cost-effective solar technology, and assist its members in establishing regulatory frameworks. Through ISA, India helps developing countries deploy solar applications by providing technical expertise, training programs, and joint research initiatives.

India also **shares its expertise in biofuels and decentralized energy solutions** with developing countries through South-South cooperation, particularly across Africa through multilateral platforms and bilateral partnerships. These partnerships support distributed solar energy applications such as solar pumps and microgrids, which are important for rural electrification. Additional measures include technical assistance and capacity building for local biofuel markets and off-grid renewable energy projects. For example, India has supported the establishment of solar desalination plants in Pacific Small Island Developing States (PSIDS), such as Fiji and Tuvalu, helping address the latter's freshwater shortages through renewable energy solutions. Through the India-United Nations Development Partnership Fund,[187] India has also supported projects in Malawi, Gambia and other African countries to promote climate-resilient agriculture and aquaculture technologies, strengthening food security and livelihood resilience. By **demonstrating successful examples** such as the clean cooking fuel project Pradhan Mantri Ujiwara Plan, India provides developing countries with replicable models for expanding energy access and improving livelihoods. These initiatives reinforce India's role as a key development partner and advocate for an equitable energy transition in the Global South.

India has received financial support for energy transition projects from the NDB. In 2016, India received a USD 250 million loan for a renewable energy program,[188] one of the first renewable energy projects approved by the NDB. This initial financing helped catalyze subsequent investments, including a USD 50 million loan to SAEL Solar MHP1 in 2025 to develop a 300 MW solar power plant in the state of Andhra Pradesh. These investments aim to increase the proportion of renewable energy in India's energy mix and improve energy security. Such projects demonstrate how India has leveraged BRICS financial institutions to mobilize capital for ambitious renewable energy infrastructure and accelerate its transition toward a low-carbon economy.

Indonesia

Indonesia's international cooperation mainly focuses on ensuring **mobilizing finance and promoting technology transfer**, with its JETP initiative. Working with international partners, including the U.S., Japan and Canada, the initiative aims to mobilize USD 20 billion to accelerate the retirement of coal-fired power plants and expand renewable energy capacity. Indonesia is also exploring financial solutions through the Energy Transition Mechanism (ETM) of the Asian Development Bank (ADB) to support the gradual transition away from coal. In addition to large-scale projects, Indonesia collaborates with organizations such as Germany's GIZ to develop national energy planning frameworks, hydrogen regulations, and sector-specific decarbonization programs, including initiatives targeting the fisheries sector.

Indonesia plays a leading role in regional climate diplomacy and has promoted **energy transition through South-South and trilateral cooperation**,[189] engaging Southeast Asia countries through ASEAN and Global South partners through bilateral and multilateral partnerships. It has provided technical training, feasibility studies, and policy advisory support to countries such as Kenya[190] and South Africa,[191] sharing expertise in renewable energy development. In 2024, Indonesia and China agreed to deepen bilateral cooperation in sustainable energy, through investments in wind, solar, and geothermal energy technologies. Meanwhile, China has a significant critical mineral extraction and processing footprint in Indonesia.[192] Indonesia also plays a key role in the Southeast Asian Energy Transition Partnership (ETP), which mobilizes financial and technical resources to strengthen regional green energy policies and investment frameworks. In addition, during its G20 Presidency in 2022, Indonesia promoted the Bali Compact,[193] providing a broader framework for expanding South-South cooperation in support of clean and inclusive energy transition.

South Africa

South Africa's international cooperation in the field of energy transition is characterized by **innovative partnerships and collaborative financial frameworks** aimed at addressing the country's complex transition away from coal-dependent energy systems. The most prominent example is the Just Energy Transition Investment Plan (JET-IP), launched at COP26 in 2021. The partnership was established by the International Partner Group (IPG), consisting of France, Germany, the UK, the United States and the EU, with an initial commitment to provide USD 8.5 billion in funding. This cooperation model integrates financial and technical support to help South Africa decommission coal-fired power plants, expand its renewable energy capacity, and ensure a socially just transition for affected workers and communities. South Africa has also collaborated with the World Bank, the AfDB, and the NDB to secure financial support for strategic energy transition projects. One example is the Eskom Battery Energy Storage System (BESS) Project, which aims to enhance grid stability and enable the integration of variable renewable energy sources. In addition, South Africa actively **participates in global and regional fora** such as the G20, where it advocates for fair energy transition policies and seeks to attract sustainable foreign investment.

South Africa has secured financing for several energy transition projects through the NDB while simultaneously advocating broader energy cooperation within BRICS countries, strongly emphasizing just transition frameworks. For example, the NDB has approved significant loans for financing battery energy storage that support grid stability in the country.[194] South Africa also cooperates closely with BRICS members, particularly China, whose state-owned enterprises have invested in and constructed large-scale wind and solar power projects in the country, facilitating technology transfer and supply chain collaboration in critical mineral and EV manufacturing.[195]

The UAE

With its robust financial resources and significant investment capacity, the UAE has promoted numerous **international energy transition initiatives**. During its presidency of COP28, the country contributed to the landmark UAE Consensus adopted during the first UNFCCC Global Stocktake (GST), which committed to tripling the installed global capacity of renewable energy and doubling energy efficiency by 2030. Its state-owned energy company Masdar has invested billions of dollars in solar and wind energy projects worldwide, frequently partnering with local governments and multinational enterprises in regions such as the Caribbean and Central Asia.

The UAE has used its **financial resources and technical expertise** to promote South-South cooperation. A notable initiative is the ALTÉRRA fund,[196] a USD 30 billion catalytic private investment fund launched during COP28 to mobilize financing for climate projects in emerging markets and developing countries. So far, ALTÉRRA and its partners have committed approximately USD 6.5 billion to climate-focused funds, including a planned USD 1.2 billion co-investment fund with the Spanish bank BBVA.[197] The fund has also allocated capital for over 6 GW of clean energy capacity in India, as part of broader deployment efforts in the Global South. The UAE is involved in the Partnership for Accelerating Clean Energy (PACE), which aims to deploy 100 GW of clean energy globally by 2035, with specific targets for emerging countries. In addition, as the host country of the International Renewable Energy Agency (IRENA), the UAE has become a **major hub for global energy cooperation**, technology transfer, and knowledge sharing, contributing to many Global South energy transition projects.

Figure 4. BRICS Cooperation and Multilateral Leadership in Renewable Energy

Finance & Technology Exporters

Deploying capital and clean tech globally via state-backed vehicles.

China India UAE

- Project capital into emerging markets through large-scale funds and state-owned enterprise investments.
- Technology transfer via global and bilateral agreements.

Knowledge & Expertise Partners

Sharing replicable transition models and capacity building.

Brazil China Egypt Ethiopia India

- Export proven domestic models as replicable frameworks to Africa, Latin America, and the Caribbean.
- Focus on technical assistance, training programs, and South South knowledge sharing.

Norm-Empreneurs & Forum Leaders

Shaping global climate governance through multilateral leadership.

Brazil China Egypt India UAE

- Host or co-lead landmark multilateral moments (Climate COPs and G20 Presidencies).
- Launch and anchor new energy transition-related multilateral coalitions.

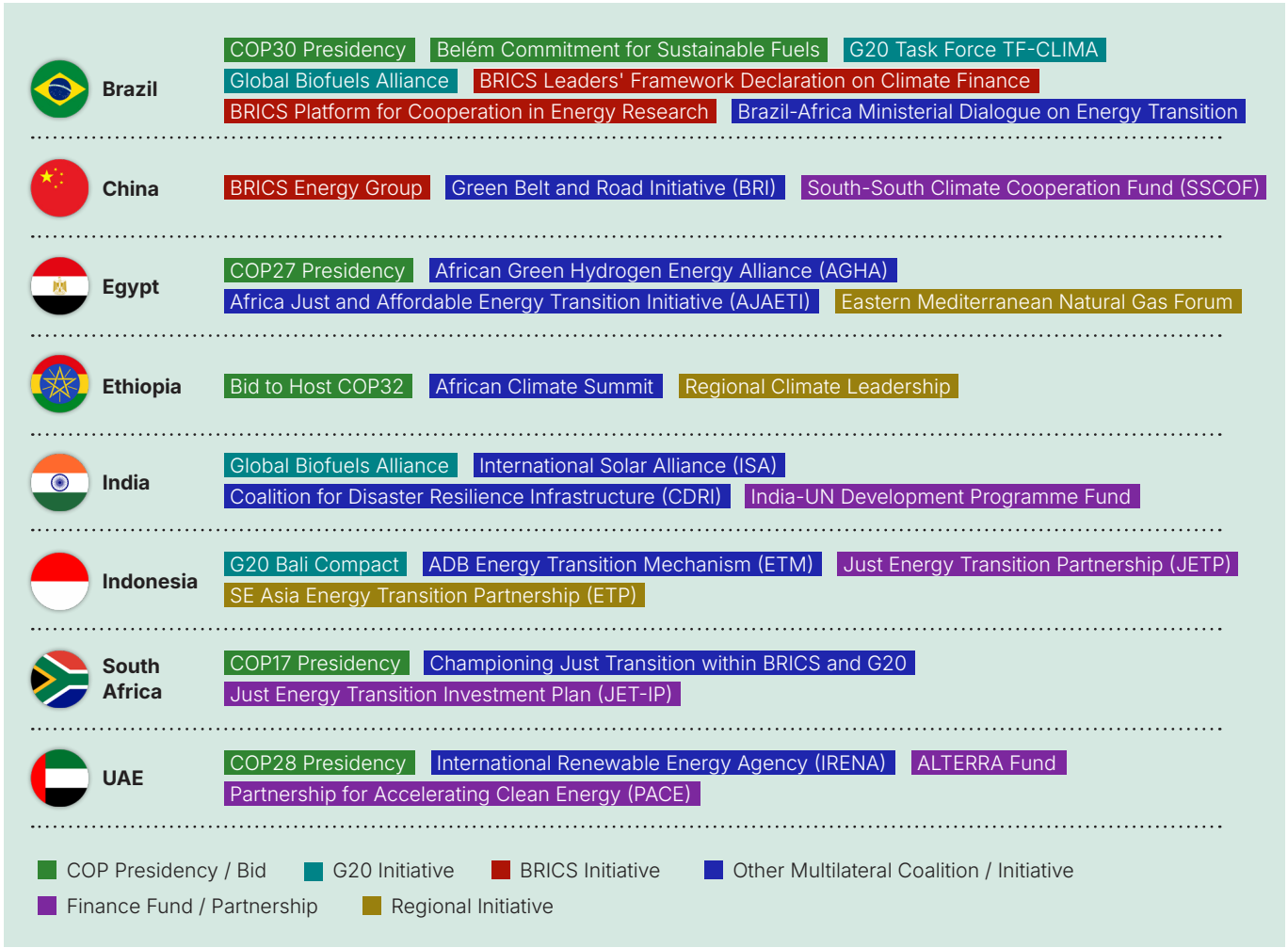
Regional Integrators

Anchoring energy transition through regional infrastructure and trade.

Brazil Egypt Ethiopia Indonesia South Africa

- Drive cross-border renewable energy trade, regional grid interconnection, and sub-regional cooperation.

*Note: These archetypes capture the most prominent international roles each country is playing in the global energy transition, based on their cooperation strategies and multilateral engagement. They are non-exclusive — most countries fulfil more than one role simultaneously, reflecting the multi-dimensional nature of their international engagement.



3. Fostering Clean energy Cooperation within BRICS and Beyond

The national and international cooperation landscapes mapped across the eight selected BRICS members — Brazil, China, Egypt, Ethiopia, India, Indonesia, South Africa, and the UAE — highlight existing policy ambition and innovation, as well as growing energy transition cooperation efforts across the group.

Domestically, their trajectories are shaped by a growing commitment to decarbonizing the energy sector and a significant expansion of clean energy policy instruments (regulatory, market-based, and finance), alongside persisting implementation constraints. These include fossil industry interests and revenue dependence, fiscal space limitations, and pressing social issues such as energy affordability, and local job losses. Internationally, the eight selected BRICS countries examined here play an increasingly important role as providers of technological and policy solutions[198] for the global energy transition, acting as finance and technology exporters; knowledge and expertise partners; norm-entrepreneurs and forum leaders; and regional integrators.

Together, these selected BRICS countries already shape the material foundations of the global energy transition as clean-tech manufacturers (China and India), renewables and bioenergy champions (Brazil and Ethiopia), coal transition test cases (China, India, Indonesia, and South Africa), and solar, hydrogen, and climate finance hubs (Brazil, Egypt, India, China, and the UAE). However, their domestic policy innovation and growing global role has yet to translate into more sustained intra-BRICS clean energy transition cooperation, particularly through the exchange of technological innovations, policy learning, and collaborative financing mechanisms.

In this context, the BRICS Energy Group, established in 2018 during China's BRICS presidency, and the BRICS Platform for Cooperation in Energy Research,[199] launched in 2019 in Brazil, and the 2025 Leaders' Framework Declaration on Climate Finance offer important institutional channels for more sustained and structured dialogue. India's BRICS presidency in 2026 provides an opportunity to build on Brazil's 2025 efforts to strengthen the institutionalization of BRICS climate finance and energy transition cooperation, including consolidating a forward-looking roadmap for joint technology, finance, and infrastructure initiatives along with integrating lessons from national flagship programs.

Effective clean energy cooperation within and beyond BRICS must be firmly grounded in the development dimension of ecological transitions, recognizing that members navigate fundamentally different starting points, structural constraints, and sovereign priorities — and that durable progress depends not on the imposition of uniform pathways, but on the construction of differentiated, equity-sensitive frameworks that allow each country to decarbonize in ways consistent with its broader development trajectory.

Below we detail some entry points for BRICS energy transition cooperation in the years ahead, followed by a set of policy recommendations for immediate and medium- and longer-term actions.

Technology Cooperation (EVs, Solar, Wind, SAF)

To lead the development of a new generation of clean technologies, BRICS countries should jointly establish BRICS clean technology R&D and manufacturing innovation centers, with different members focusing on specific strategic areas and providing technical cooperation for capacity building. For example, China could focus on wind turbines as well as advanced solar and battery R&D and manufacturing, India on green hydrogen production cost optimization and integration, and Brazil on SAF and biomass energy conversion innovation. This structured division of labor will optimize resource use, accelerate breakthroughs, maximize knowledge sharing, and move beyond the temporary cooperation models.

Meanwhile, members should coordinate technical standards and establish mutual recognition agreements on key technologies, including EV charging protocols, green hydrogen certification, and solar module efficiency ratings. Such regulatory coordination would create an internal market across BRICS countries for clean technology integration, reduce trade barriers, give BRICS-led technologies a competitive advantage in global renewable energy deployment, and ensure that innovative results are transformed into large-scale commercial and industrial applications.

Infrastructure Development (Grids, Renewables, Rural Electrification)

BRICS countries should prioritize collaborative large-scale infrastructure planning. A BRICS Green Grid Initiative should be launched to design and fund resilient, intelligent and interconnected cross-border power networks. This would facilitate the exchange of renewable energy between regions, such as using hydropower in Ethiopia or solar energy in Egypt to help stabilize the power grids in South Africa or India. Such efforts should be supported by the NDB through special preferential financing windows and risk mitigation tools.

Distributed renewable energy access initiatives should focus on community solar microgrids, micro hydropower, and clean cooking solutions in rural and underdeveloped areas. By sharing mature models such as India's Solar Water Pump Program, these initiatives will help ensure that infrastructure development directly addresses energy poverty, promotes local economic development, and improves equity in energy access.

Advocacy for a Global Just Transition Agenda

BRICS countries should strengthen their Just Transition-related stances under the UNFCCC and the G20 frameworks, aiming for greater coordination in multilateral fora. This position should be grounded on a shared sense of urgency, ambition, and equity. It should link the global decarbonization goals with increased commitments by large economies within BRICS and binding commitments from developed countries in climate finance, technology transfer, and capacity building, thereby implementing the principle of CBDR and respective capabilities in practice.

The group should lead the development of a BRICS Framework for Just Transition, providing guidance for member countries to address the socio-economic impacts of energy transition. The framework should include social and environmental impact assessment tools, skill development plans for fossil fuel workers, and a fair distribution mechanism for sharing key mineral mining revenues, emphasizing that development and decarbonization are complementary goals rather than trade-offs and ensuring a synergized approach to climate, nature and sustainable development.

Climate Finance & New Development Bank Innovation

The NDB should undergo a strategic transformation to become the main financial engine of BRICS energy transition efforts. A green transition window should be established within the NDB to provide long-term low-interest loans for energy transition projects, and the Bank should issue green bonds in local currency to reduce foreign exchange risks of borrowing member countries. In addition, the NDB should develop hybrid finance mechanisms to leverage its capital to attract more private institutions to invest in cutting-edge markets.

To manage systemic risks, the NDB should also operationalize and expand the BRICS Multilateral Guarantees facility as a dedicated guarantee mechanism for just transitions. The facility should provide first-loss capital and political risk insurance for high-impact projects with limited access to finance (such as the early decommissioning of coal-fired power plants or geothermal exploration). By reducing investment risks, the facility can unlock capital flows that traditional multilateral banks tend to avoid, filling important gaps in the global climate finance system, and accelerating the deployment of energy transition projects.

Trilateral Cooperation with Africa and Beyond

BRICS countries should promote trilateral development partnerships, moving beyond the bilateral cooperation models and combining the complementary advantages of the BRICS countries. For example, such partnerships could combine Chinese project financing, Indian technical expertise, and Brazilian agricultural knowledge aligned with the development priorities of African, Latin American and Southeast Asian partners. Such partnerships should be demand-oriented, co-designed with host countries, and focused on building long-term local capabilities, rather than output turnkey projects.

Such partnerships should focus on green industrialization, technology localization, and skills transfer. Specific projects may include using Indian technology and South African financing to establish a solar panel assembly plant in Ethiopia or leveraging Brazilian technology to develop a sustainable biofuel industry across other countries in Latin America, Africa and Asia. Each project should incorporate vocational training programs to cultivate local talent, build institutional capabilities, and promote economic sovereignty.

Trade and Global Value Chains (Critical Minerals, TAFF Roadmap)

A BRICS Key Mineral Partnership should be established to coordinate sustainable mining, processing investment, and the formulation of common ESG standards to ensure a stable and ethical supply chain for energy transition. This partnership should consider member countries' positions in value chains, supporting the transition from raw material exporters to manufacturers of key component processing such as battery precursors.

Additionally, BRICS countries should develop a Joint Roadmap for TAFF to align their actions with the goal of tripling renewable energy capacity. The Roadmap will not only signal the bloc's commitment to leading by example but also provide the platform for countries to exchange and support each other's TAFF planning: politically, technically, and financially. This is particularly important considering the COP30 impasse related to a TAFF roadmap under the UNFCCC, which subsequently led Brazil's COP30 Presidency to take the lead in elaborating a global roadmap, despite the absence of a negotiated mandate in 2026,[200] as well as the leadership of Colombia and The Netherlands in convening the International Conference on Transitioning Away from Fossil Fuels, in April 2026.[201] The BRICS TAFF Roadmap should also promote

coordination on fossil fuel subsidies, establish a unified green commodity trade agreement for clean technology, and accelerate the global decarbonization process by reducing the global cost of solar, wind, and energy storage technologies.

Knowledge Production, Peer Learning and Policy Exchange

Institutionalized knowledge exchange is important. BRICS countries should establish a permanent BRICS Energy Transition Policy Observatory, possibly nested within the BRICS Platform for Cooperation in Energy Research, to operate online and offline across member countries. As a dynamic knowledge exchange center, the Observatory should conduct comparative policy analysis, assess national plans, and publish best-practice and lessons-learned briefs to create a shared evidence base for policymaking.

To convert knowledge into action, BRICS countries should establish a systemic BRICS policy flow and peer review mechanism. The mechanism should hold regular sector-focused ministerial dialogue and technical working-group meetings to allow member countries to submit policy programs for formal peer feedback. For example, reviewing mandatory biofuel blending standards in Brazil or renewable energy challenges in China will enable other countries to learn from successful experiences and reduce risks, helping to cultivate a culture of continuous collaboration to improve governance and implementation.

> *“Effective clean energy cooperation within and beyond BRICS must be firmly grounded in the development dimension of ecological transitions, recognizing that members navigate fundamentally different starting points, structural constraints, and sovereign priorities.”*

Policy Recommendations

To build on existing national policy ambition and innovation, as well as on ongoing international cooperation and leadership efforts by these BRICS countries, the report recommends a set of immediate and medium- and longer-term actions, as follows:

Immediate actions:

- Launch a New Development Bank (NDB) green transition window focused on grids, storage, geothermal energy, clean transport, and coal-region transition.
- Establish a working group to advance a BRICS Joint Roadmap for Transitioning Away from Fossil Fuels (TAFF), building on ongoing TAFF-related implementation efforts under the United Nations Convention on Climate Change (UNFCCC) and beyond.
- Create a BRICS just transition facility for coal-dependent regions, providing grants for planning and concessional finance for implementation.
- Establish a critical minerals and clean-tech standards compact covering Environmental, Social and Governance (ESG) standards, mineral processing, batteries, hydrogen certification, and electric vehicles (EV) infrastructure.
- Build a pipeline of clean energy bankable projects for the 2026 BRICS summit, building on the 2025 Leaders' Framework Declaration on Climate Finance.
- Set up a BRICS Energy Transition Policy Observatory as a lean energy transition delivery tracker to monitor commitments, finance, and implementation gaps.

Medium- and longer-term actions:

- Establish joint research centers focused on each member's technological strengths.
- Coordinate cross-border power grids to enable renewable energy trade.
- Expand structured trilateral energy transition-related partnerships and projects that combine the comparative advantages of BRICS countries to support green energy transition across the Global South.
- Present a coordinated voice in global climate negotiations, grounded in a shared sense of urgency, ambition and equity that further advances the Paris Agreement and Mission 1.5.

Endnotes

1. This report was developed in the context of the Project Accelerating Climate and Nature Commitments of BRICS, led by the Igarapé Institute. The authors acknowledge and thank the representatives of numerous institutions from the BRICS countries and beyond for their contribution to and participation in the project inception, workshops, and overall engagement with the network, namely the Amazon Environmental Research Institute (Instituto de Pesquisa Ambiental da Amazônia — IPAM), the American University in Cairo, the Anwar Gargash Diplomatic Academy (AGDA), the BRICS Policy Center (BPC/PUC-Rio), the Brazilian Center for International Relations (Centro Brasileiro de Relações Internacionais - CEBRI), the Center for International Knowledge on Development (中国国际发展知识中心 - CIKD), the Center of Economic and Law Studies (CELIOS), the Chinese Academy of International Trade and Economic Cooperation (商务部国际贸易经济合作研究院 - CAITEC), the Council on Energy, Environment and Water (CEEW), the Evergreen Environmental Institute, the Institute for Economic Justice (IEJ), the Institute of Development Studies/ University of Sussex, the International Institute of Green Finance/Central University of Finance and Economics (IIGF/CUFE), Maranta, the Ministry of Ecology and Environment of the People's Republic of China (中华人民共和国生态环境部 - MEE), the Open University, the Policy Studies Institute (PSI), Plataforma Cipó, the South African Institute of International Affairs (SAIIA), the Talanoa Institute (Instituto Talanoa), the University of Cambridge, and the Vasudha Foundation.

2. Arond, E., Strambo, C., Corral, F., & Burton, J. (2025). Planning and implementing just transitions: opportunities for South-South cooperation. SEI brief. Stockholm Environment Institute.

3. Institute Igarapé (2025a). BRICS and the Climate Agenda: Brazil's BRICS and COP30 Dual Presidency and What Comes Next. Global Futures Bulletin.

4. Institute Igarapé (2025b). The BRICS and the Decarbonization and Biodiversity Protection Challenges. Global Futures Bulletin.

5. Arbache, J., Canuto, O. (2026). Greening in the Wrong Places: Geography, Policy Distortions, and the Hidden Costs of Misallocated Green Investment Policy. Policy Center for the New South.

6. BRICS members not included were Iran, Russia, and Saudi Arabia.

7. United Nations Framework Convention on Climate Change (UNFCCC) (n.d). Nationally Determined Contributions (NDCs). The Paris Agreement and NDCs; Overholt, M., Gerholdt, R., Srouji, J. & Alayza, N. (2025). What Are Nationally Determined Contributions (NDCs) and Why Do They Matter? World Resources Institute.

8. Oxford NetZero (n.d). What is Net Zero?; Fei, T.; Shuang-Qing, X (2012). Definition of Business as Usual and Its Impacts on Assessment of Mitigation Efforts. Advances in Climate Change Research 3 (4): 212-19.

9. Nature (2026). Defossilize our chemical world, Nature, 2026

10. Thompson, S. & Cronenburg, F. (2026). Santa Marta Explained: What Happened at the First Conference on Transitioning Away from Fossil Fuels. Sciences Po. See also Conference for the Just Transition Away from Fossil Fuels

11. United Nations Development Programme (UNDP) (n.d.). What is just transition? And why is it important?

12. World Bank (2020) Developing a National Green Taxonomy: A World Bank Guide

13. Ye, Y. & Koch, S. F. (2023). Towards Accessibility or Affordability? Multidimensional Energy Poverty across the South African Urban–Rural Divide. Energy Research & Social Science 97 (March): 103002.

14. Climate Policy Info Hub (n.d). LULUCF; United Nations Framework Convention on Climate Change (UNFCCC) (n.d). Reporting of the LULUCF sector under the Convention; United Nations Environmental Programme (UNEP) (2022). Mitigation in the AFOLU sector. Mitigation in the AFOLU sector. Emissions, removals, inventories and reflections on solutions for national policymakers

15. Overholt et al. (2025), op. cit.

16. Climate Action Tracker (2026). CAT 2035 Climate Target Update Tracker

17. Chaudhuri, S. K. (2025). India commits to revised NDC, shifts pressure back to rich nations to deliver on climate finance at COP30 CarbonCopy. India's updated NDC (2031–2035) was announced on 25 March 2026 through an official government press release and had not yet been formally submitted to the UNFCCC NDC Registry at the time. See Press Information Bureau (2026). Cabinet approves India's Nationally Determined Contribution (2031–2035) to be communicated to the United Nations Framework Convention on Climate Change

18. The data is presented according to countries' official commitments and targets and therefore do not differentiate between net zero CO2 and net zero GHG (CO2eq) pledges. This means that some targets may not be directly comparable, not only across countries but also within countries. For example, South Africa reports its 2035 emissions target in CO2eq, while its net zero target applies specifically to CO2 emissions.

19. Ministry of the Environment and Climate Change of Brazil (MMA, 2024). Brazil's NDC: National determination to contribute and transform

20. Timperly, J. (2018). The Carbon Brief Profile: Brazil. Carbon Brief.

21. COP30 Presidency (2026). Twelfth Letter from the President

22. Rodriguez, S. (2025). Brazil's Lula requests national roadmap for fossil fuel transition. Climate Home News.

23. Garfinkel, L. (2026). Setor de biocombustíveis cobra governo por mapa da transição energética. Poder 360; Leal, G. (2026). Transição para longe dos combustíveis fósseis, Jota.

24. International Renewable Energy Agency (IRENA) (2025). Brazil's biofuel industry: Lessons, challenges and opportunities

25. This includes multiple production pathways such as Hydroprocessed Esters and Fatty Acids (HEFA), Alcohol-to-Jet (ATJ), and biogas-to-jet fuel routes.

26. Ministry of Mines and Energy of Brazil (MME, 2025). Plano Decenal de Energia 2034

27. Ministry of Mines and Energy of Brazil (MME) and Energy Research Office (EPE, 2020). Plano Nacional de Energia 2050

28. Klein, B. C., Chagas, M. F., Watanabe, M. D. B., Bonomi, A. & Maciel Filho, R. (2019). Low carbon biofuels and the New Brazilian National Biofuel Policy (RenovaBio): A case study for sugarcane mills and integrated sugarcane-microalgae biorefineries. Renewable and Sustainable Energy Reviews, vol. 113, 109365.

29. Ministry of Finance of Brazil (2025). Fuel of the Future

30. Ministry of Mines and Energy of Brazil (MME, 2023). Programa Nacional do Hidrogênio: Plano de Trabalho Trienal 2023–2025

31. Demarest (2024). National Green Mobility and Innovation Program ("MOVER")

32. Organisation for Economic Co-operation and Development (OECD, 2021). Driving Performance at Brazil's Electricity Regulatory Agency. The Governance of Regulators

33. Ministry of Mines and Energy of Brazil (MME, 2025). The agency establishes the funding and electricity quotas for Proinfa for 2026

34. Alisson, E. (2016). Proálcool, one of Brazil's major science and technology based achievements. Agência FAPESP.

35. IEA Bioenergy (2024). Implementation of bioenergy in Brazil – 2024 update. IEA Bioenergy

36. B3 (2025). CBIO: Decarbonization Credit

37. Ministry of Mines and Energy of Brazil (MME, 2025). Resolução nº 9, de 25/06/2025. Dispõe sobre a mistura obrigatória do etanol anidro à gasolina comercializada em todo o território nacional; Ministry of Mines and Energy (MME) (2025). Resolução nº 8, de 25/06/2025. Fixa o teor obrigatório de biodiesel no diesel comercial em atendimento à Lei nº 13.033, de 24 de setembro de 2014

38. Brazilian Development Bank (BNDES) (2020). Climate and Development: The BNDES's Contribution to a Just Transition

39. This includes the 2001 Energy Efficiency Law, the 2011 National Plan for Energy Efficiency and the 2016 law that sets a new source of funding and governance for the National Program of Electricity Conservation - PROCEL, to name a few.

40. See Law Nº 14.300, from January 6, 2022, on micro-generation, Law Nº 15.097, from January 10, 2025, on offshore wind energy, and Law Nº 14.948, from August 2, 2024, on green hydrogen.

41. Brazilian Development Bank (BNDES) (2017). Climate Fund Program

42. Ministry of Finance (Brazil, 2023). Taxonomia Sustentável Brasileira: Plano de Ação

43. Ministry of Finance (Brazil, 2024). Ecological Transformation Plan

44. National Treasury (Brazil, 2025). Eco Invest Brasil

45. Organisation for Economic Co-operation and Development (OECD, 2025). Eco Invest Brasil

46. Neves, L. (2025). Brazil solar curtailment hits 20% as renewables strain grid infrastructure, PV Magazine.

47. Institute Igarapé (2025b).

48. Climate Investment Funds (CIF, 2023). Renewable Energy Integration in Brazil. Also see, Climate Investment Fund (CIF, n.d) Renewable Energy Integration Program. Shift to Zero Carbon

49. FGV (n.d.). Monitoring Panel – Ecological Transformation Plan

50. National Development and Reform Commission (NDRC) and the Ministry of Ecology and Environment (MEE, 2025). China's 2035 National Determined Contributions. Government of the People's Republic of China.

51. Gupta, A. (2025). China's Renewable Energy Surges, but Coal Expansion Threatens Climate Goals. EQ International.

52. You, X. (2025). They're just so much further ahead': How China won the world's EV battery race. BBC Earth.

53. Xinhua (2025). How will China peak coal, oil use in its climate push. Explainer.

54. Yang, B., Butler-Sloss, S. & Graham, E. (2025). China Energy Transition Review 2025. Ember.

55. Lema, R., Fu, X., & Rabellotti, R. (2021). Green windows of opportunity: latecomer development in the age of transformation toward sustainability. Industrial and Corporate Change, vol. 29, n. 5.

56. Li, L. (2025). Accelerating green transition of 'Made in China. China Daily.

57. Hilton, I. (2024). How China Became the World's Leader on Renewable Energy. Yale E360.

58. Kroeber, A. R. (2024).Unleashing "new quality productive forces: China's strategy for technology-led growth. Brookings Institute.

59. Huld, A. (2024). China's 2024-25 Energy Conservation and CO2 Reduction Plan – Compliance Considerations for Businesses. China Briefing.

60. The State Council (2026). China adopts landmark legislation to propel green modernization. Government of the People's Republic of China.

61. Yue, M. & Nedopil, C. (2025) China green finance: status and trends 2024–2025. Griffith Asia Institute, Griffith University, Brisbane & Green Finance & Development Center, FISF, Fudan University. Shangai.

62. Lin, L. (2025). The rise of sustainable finance in China: ESG funds and regulation. Capital Markets Law Journal, vol. 20, n. 4.

63. Song, D., Jia, B. & Jiao, H. (2022). Review of Renewable Energy Subsidy System in China. Energies, vol. 15, n.19, 7429.

64. ETS-News (2025). China officially expands national ETS to cement, steel and aluminum sectors. International Carbon Action Partnership.

65. Xinhua (2023). China to pilot carbon-peaking in 100 cities, zones. China Daily.

66. Hepeng, J.; Yeheng, P. (2024). A decarbonising China needs to talk about justice. Dialogue Earth.

67. Huang, R., Wang, P. Zhang, S. (2024). Experiences and Lessons for China's Energy Transition: From the Firewood Era to the Low Carbon Era. Energy for Sustainable Development 78 (February): 101368.

68. Song, W., & You, X. (2025). Glossary: Decoding how China talks about energy and climate change. Carbon Brief.

69. International Energy Agency (2025). Global EV Outlook 2025

70. Ministry of Environment (MoE) and the Egyptian Environmental Affairs Agency (EEAA, 2023). Egypt's Second Updated Nationally Determined Contributions

71. Government of Egypt (2014). Presidential Decree-Law No. 203/2014
72. Fleming, S. (2019) Egypt is building one of the world's largest solar parks. World Economic Forum.
73. Zgheib, N. (2023). EBRD and GCF to support largest wind farm in Africa. European Bank for Reconstruction and Development (EBRD).
74. Cohen, J. R. & Helwa, R. (2025). The green gold rush: Why renewable energy is Egypt's next big opportunity. Atlantic Council.
75. Government of Egypt (2014), op. cit
76. Yeganegi, K. (2025). Private capital and financial innovation in Egypt's clean energy transition. Economic Research Forum (ERF).
77. United Nations Convention on Climate Change (UNFCCC, 2021). Largest solar project in Africa heralds a new renewable era
78. Cohen, J. R. & Helwa, R. (2025), op. cit.
79. For India's investments in green hydrogen, see for instance, Embassy of India in Cairo (n.d). Indian Investments in Egypt.
80. International Monetary Fund. (2025) Arab Republic of Egypt: Selected Issues. IMF Staff Country Reports, vol. 2025, no. 187.
81. United Nations Convention on Climate Change (UNFCCC, 2025). Ethiopia's Nationally Determined Contribution 3.0 (2025–2035)
82. Climate Action Tracker (2025). Ethiopia Country Summary
83. Federal Democratic Republic of Ethiopia (2023). Long-Term Low Emission and Climate Resilient Development Strategy (2020-2050). United Nations Framework Convention on Climate Change (UNFCCC).
84. Dagne, A., Corfee-Morlot, J., Elliott, C., Bassi, A. M., Pallaske, G., Payosova, I., Pellerin, M. & Guzzetti, M. (2022). Ethiopia's Path to Net Zero and Climate-Resilient Development: Policies, Costs, and Co-benefits. World Resources Institute.
85. Ali, S. H. (2025) Ethiopia's Hydropower Success Exemplifies 'Convergent Governance'. Forbes.
86. Bernes, G. (2025). Grand Ethiopian Renaissance Dam: Can Ethiopia become Africa's powerhouse? Africa Report.
87. NDC Partnership (2025). Government of Ethiopia Launches Clean Cooking Roadmap to Advance Health and Climate Goals
88. Federal Democratic Republic of Ethiopia (2019). National Electrification Program 2.0
89. Dagne, A. et al. (2022), op. cit.
90. Federal Democratic Republic of Ethiopia (2015). Ethiopia's Climate-Resilient Green Economy. Climate Resilience Strategy: Water and Energy
91. Planning and Development Commission, Federal Democratic Republic of Ethiopia (2020). Ten years development plan 2021-2030.
92. Ministry of Water and Energy, Federal Democratic Republic of Ethiopia (MoWE, 2024). National Sustainable Energy Development Strategy Validation
93. Ministry of Finance, Federal Democratic Republic of Ethiopia (n.d). Climate Resilient Green Economy Facility.
94. International Water Management Institute (IWMI) (2026). Solar irrigation initiative launched with Ethiopian solar energy association
95. Federal Democratic Republic of Ethiopia (2024). Directive Issued to Determine Electric Vehicle Charging System (EVCS) (Directive No. 1034/2024)
96. Climate Action Tracker (2025), op. cit.
97. Hakeenah, N. (2025). Ethiopia's Gasoline Vehicle Ban Boosts Chinese EVs, Local Assembly. China Global South Project.
98. Federal Democratic Republic of Ethiopia (2025). Ethiopia E-mobility Strategy and Implementation Plan (2025-20230)

99. Federal Democratic Republic of Ethiopia (2020). Ethiopia Non-Motorised Transport Strategy 2020-2029
100. African Centre for the Constructive Resolution of Disputes (ACCORD, 2025). Navigating Security Challenges in the Horn of Africa: The Interplay of Climate Change, Resource Scarcity and Regional Stability
101. Press Information Bureau (2026), op. cit.
102. Chandra, R., Pai, S., Nayak, S. & Devagudi, S. H. (2025). India's Coal Conundrum: Decarbonization Amidst A Developmental Legacy. Wiley Interdisciplinary Reviews: Climate Change.
103. Aggarwal, A., Myllyvirta, L. & Sivalingam, N. (2025). India's power-sector CO2 falls for only second time in half a century. Carbon Brief.
104. Press Information Bureau (2022). Initiatives under AatmaNirbhar Bharat including structural and procedural reforms reinforce performance of the industrial sector, expected to grow by 11.8 percent in this financial year
105. Chakravarty, M., Pal, U., Kaur, J., Samal, A. K., Sikka, A. & Sen, V. (2024) Landscape of Green Finance in India: India's green investment flows in FY 2021/22. Climate Policy Initiative (CPI).
106. Climate Investment Funds (CIF, n.d.). Just Transitions in India A study by the Climate Investment Funds. See also Cholayil, N. (2025). Financing a Just Transition in India. WRI India.
107. Press Information Bureau, Government of India (2025). FAME India Scheme Phase-II
108. Press Information Bureau, Government of India (2024). PM Surya Ghar: Muft Bijli Yojana. Ministry of New and Renewable Energy.
109. Sharma, P., Tewani, C. H. & Gupta, A. (2025) Assessing the effectiveness of India's solar Production Linked Incentive scheme: How policy coherence, capital, and upstream integration can power India's path to solar self-reliance. Institute for Energy Economics and Financial Analysis; JMK Research & Analytics.
110. Public Private Partnerships in India (2020).Viability Gap Funding (VGF) Scheme Guidelines
111. Park, S. M. (2023) Underlining framework to support competitiveness in industry via energy efficiency: Highlighting India's Performance, Achieve, Trade (PAT) scheme. European Chair for Sustainable Development and Climate Transition. Sciences Po.
112. Indian Institute of Technology Kanpur (2024). Regulation on Procurement of Energy from Renewable Sources and its Compliance Regulations, 2024
113. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ, n.d.) Grid integration of renewable energy and demand-side energy efficiency
114. Cholayil, N. (2025), op. cit.
115. Habib, M. T.; Khurana, V.; Sen, V. (2024). Just Energy Transition: Economic Implications for Jharkhand. Climate Policy Initiative.
116. Ministry of New and Renewable Energy, Government of India (MNRE, 2023). National Green Hydrogen Mission
117. Press Information Bureau, Government of India (2025). 'Pradhan Mantri Ujjwala Yojana. Nine Years of Empowering Lives Through Clean Energy
118. United Nations Framework Convention on Climate Change (UNFCCC, 2025). Second Nationally Determined Contribution – Republic of Indonesia
119. Saputri, N.K., Setyonugroho, L.D. & Hartono, D. (2024). Exploring the determinants of energy poverty in Indonesia's households: empirical evidence from the 2015–2019 SUSENAS. Humanit Soc Sci Commun 11, 60.
120. Climate Transparency (2023). Implementation Check: General National Electricity Plan (RUKN) 2019-2038 – Policy Assessment Scorecard 2023
121. Menteri Energi dan Sumber Daya Mineral (Kepmen ESDM, 2021). Rencana Usaha Penyediaan Tenaga Listrik (RUPTL) 2023–2032
122. Yustika, M. (2025). Transforming Indonesia's coal dependence into clean energy opportunities. Institute for Energy Economics and Financial Analysis
123. Southeast Asia Information Platform for the Energy Transition (SIPET, n.d.). Indonesia – Country Page

124. The World Bank (2017). Indonesia: Geothermal Energy Upstream Development Project (Project Appraisal Document P155047)
125. Salomon, M., Simanjuntak, F., Shafaie, A., Heller, P. (2025). Indonesia's Energy Transition Ambitions: Nickel Downstreaming and Beyond. Natural Resource Governance Institute.
126. Pradyasti, F. I. (2026). 'Indonesia Stalled ambitions in Indonesia's energy transition'. East Asia Forum.
127. Yustika, M. (2025), op. cit.
128. Pradyasti, F. I., op. cit.
129. Republic of South Africa (2025). South Africa's Second Nationally Determined Contribution under the Paris Agreement
130. Ju, J., Marsh, G., Kiecker, S. (2026). Navigating the Energy Transition in Brazil, Indonesia and South Africa. A political economy snapshot of energy security insights. E3G Briefings.
131. Shariff, T., Gaekwad, R., Mudaly, K. & Allie-Ebrahim, T. (2025) Liberalised Electricity Markets: Lessons from global markets as South Africa transitions to a liberalised electricity system. British International Investment; Boston Consulting Group.
132. DSTI (2021). Hydrogen Society Roadmap for South Africa. Department of Science and Innovation.
133. National Treasury, Republic of South Africa (2022). South African Green Finance Taxonomy - 1st Edition
134. Xaba, N. (2025). South Africa's shift from coal to renewables: how it's going. The Conversation.
135. Lüpke, V. H. (2025) The just energy transition partnership in South Africa: Identification and assessment of key factors driving international cooperation. Earth System Governance, vol. 25, 100274.
136. National Treasury, Republic of South Africa (2025). Energy market reform in South Africa: The path to energy security, affordability and sustainability
137. National Treasury, Republic of South Africa (2023). Media Statement - Invitation To Participate in the Renewable Energy Tax Incentive Review Online Survey
138. NDC Partnership (n.d.). South Africa's Renewable Energy Independent Power Producer Procurement Programme. Good Practice Database.
139. Department of Trade, Industry & Competition (2022). Green Hydrogen Commercialisation Strategy
140. Department of Energy and Electricity, Republic of South Africa (2025). Integrated Resource Plan
141. Republic of South Africa (2023). Energy Action Plan. One Year Progress Report: August 2023
142. Ministry of Climate Change and Environment, the United Arab Emirates' Government (2024). The United Arab Emirates' Third Nationally Determined Contribution (NDC 3.0)
143. Government of Dubai (n.d.). Mohammed bin Rashid Al Maktoum Solar Park.
144. Shah, J. (2024) Top 5: Largest Solar Projects in the Middle East Region. Saur Energy International.
145. Ministry of Energy and Infrastructure (MoEI) (2023). National Hydrogen Strategy
146. PwC (2023). Masdar City: The eco-oasis blueprint for sustainable cities. PricewaterhouseCoopers (PwC).
147. Ministry of Energy and Infrastructure, the United Arab Emirates' Government (2023). Updated UAE Energy Strategy 2050
148. Ministry of Energy and Infrastructure, the United Arab Emirates' Government (2023). National Hydrogen Strategy
149. PricewaterhouseCoopers (PwC, 2023), op. cit.
150. International Atomic Energy Agency (IAEA, 2023). Nuclear Decommissioning. IAEA Bulletin.
151. G20 Presidency of Brazil (2024). G20 Leaders' Declaration
152. See Global Biofuels Alliance
153. Institute Igarapé (2025a), op. cit.
154. Souto, M. (2025). COP30 Presidency mobilizes countries and key sectors to implement commitment to quadruple sustainable fuels. COP30 Brazil.

155. D'Auria, M. (2025). Brasil hosts 2nd BRICS Ministerial Meeting on Transport with a focus on sustainability and International Alliance. BRICS Brasil.

156. Vilela, P. R. (2025). Brazil launches proposal to quadruple use of sustainable fuels. Agência Brasil.

157. Schlesinger, S. (2012). Brazilian International Cooperation and Investments: The internationalization of ethanol and biodiesel. FASE – Solidariedade e Educação.

158. Institute Igarapé (2025a), op. cit.

159. G20 Presidency of Brazil (2025). Roadmap for BRICS Energy Cooperation 2025–2030

160. New Development Bank (2017). NDB signs first loan agreement in Brazil for financing renewable energy projects

161. New Development Bank (2025). New Development Bank and State Grid Brazil Holding Sign Memorandum of Understanding to Boost Brazil's Energy Capacity

162. New Development Bank (2025). New Development Bank and Companhia Paulista de Força e Luz sign Loan Agreement for Electricity Distribution Infrastructure Modernization Project

163. Griffith-Jones, S. (2015). Financing Global Development: The BRICS New Development Bank. German Development Institute. Bonn; Waisbich, L. T.; Borges, C. (2020). The BRICS' New Development Bank at the Crossroads: Challenges for Building Development Cooperation in the Twenty-First Century. In International Development Assistance and the BRICS, edited by Jose A. Puppim de Oliveira and Yijia Jing. Springer Singapore.

164. Molina, L. (2025). BRICS Bank: learn how the financial mechanism that drives developing economies works. BRICS Brasil.

165. New Development Bank (n.d.) Projects

166. New Development Bank (2024). Report on Sustainable Development Financing for 2024

167. Souto, M. (2025). BRICS Moves Forward with Creation of Financial Guarantee Mechanism to Support Sustainable Development. BRICS Brasil.

168. Zi, L.; Kumari, S. & Moazzam, F. Z. (2025). Roundtable: How has the SCO summit impacted the global energy landscape?, Dialogue Earth; Qiang, X. & Cao, J. (2023). China's Initiatives and the Development of Shanghai Cooperation Organization: Conceptual Guidance and Cooperative Vision, Shanghai Institutes for International Studies. Shanghai.

169. Hou, L. (2024). China has signed 53 MOUs on South-South climate cooperation with 42 countries. China Daily.

170. Wang, M. (2025) Build first, break later': How China's green transformation was built to last. World Economic Forum (WEF).

171. Bian, L., Dikau, S., Miller, H., Pierfederici, R., Stern, N. & Ward, B. (2024). China's role in accelerating the global energy transition through green supply chains and trade. Policy Insight. The Grantham Research Institute on Climate Change and the Environment and Energy Foundation.

172. Yu, J. & Wallace, J. (2021). What is China's Belt and Road Initiative (BRI)?, Chatham House.

173. UN News (2021). China headed towards carbon neutrality by 2060; President Xi Jinping vows to halt new coal plants abroad

174. Volcovici, V., Brunnstrom, D. & Nichols, M. (2021). In climate pledge, Xi says China will not build new coal-fired power projects abroad. Reuters.

175. Luthra, G. & Gupta, P. (2023). China's Belt and Road Initiative in the Energy Sector: Progress, Direction, and Trends. Issue No. 677. ORF.

176. Nesan, D., Qiu, C. & Wang, T. (2025). Four Years On: Assessing China's Overseas Coal Power Ban. Center for Research on Energy and Clean Air (CREA) and People of Asia for Climate Solutions (PACS).

177. Nedopil, C. (2025). China Belt and Road Initiative (BRI) Investment Report. Griffith Asia Institute and Green Finance & Development Center, FISF.

178. Weigel, M. (2016). More Money, More Impact? China's Climate Change South-South Cooperation to Date and Future Trends. United Nations Development Programme in China.

179. Zhu, L. (2017). NDB signs $800m loan deals with China for three green projects. China Daily.
180. European Commission (n.d.). Nexus of Water, Food and Energy (NWFE) - Egypt
181. Green Hydrogen Organisation (GH2, n.d.). The Africa Green Hydrogen Alliance (AGHA)
182. Xinhua (2026). Ethiopian PM inaugurates Chinese-built wind farm project; Martin, P. (2026). Mingyang gets go-ahead for colossal wind and green hydrogen project. Recharge.
183. United Nations Development Programme (UNDP, n.d.). MOFCOM-UNDP Trilateral Cooperation on Renewable Energy - Ethiopia
184. Ethiopian News Agency (ENA) (2026). Ethiopia Emerging as Africa's Renewable Energy Hub, Says PMO
185. See International Solar Alliance
186. See Coalition for Disaster Resilient Infrastructure (CDRI)
187. United Nations Office for South-South Cooperation (n.d.) India–UN Fund for Sustainable Development Partnership
188. New Development Bank (n.d.). Canara Renewable Energy Financing Scheme Project
189. Japan International Cooperation Agency (JICA, 2014) Annual Report of Indonesia's South-South and Triangular Cooperation (SSTC)
190. Enviro News Asia (2025). Indonesia, Kenya, and Germany Strengthen Renewable Energy Cooperation through ENTRI SSTC Program in Manado
191. UN PAGE (n.d.). Navigating the green shift: Indonesia and South Africa emphasize skills development on their paths for a just energy transition
192. Ju et al (2026), op.cited; Wijaya, T., Jones, L. (2025). Indonesia, nickel, and the political economy of polyalignment in the Second Cold War. Third World Quarterly, 1–20.
193. G20 Presidency Indonesia (2022). Decade of Actions: Bali Energy Transitions Roadmap
194. New Development Bank (n.d.) Battery Energy Storage Project
195. Chen, Y., Shen, W., Shi, L. & Robb, N. (2025) Breaking the gridlock: Chinese capital in South Africa's energy transition. ODI Global.
196. Garcia, L. (2025). Altérra's Plan to Unlock Climate Investments Targets Developing World. WSJ Pro.
197. Segal, M. (2026). ALTÉRRA, BBVA to Launch New $1.2 Billion Climate Fund. ESG Today.
198. Martins, T. & Medeiros, R. (2025). BRICS are providers of technological solutions in energy. BRICS Brasil.
199. G20 Presidency of Brazil (2025), op. cit.
200. COP30 Presidency (2026), op. cit.
201. 57 countries participated in the Conference. Brazil was the only BRICS country that attended. See Government of the Netherlands (2026). Transitioning Away from Fossil Fuels conference concludes with 5 key deliverables

Institutional Office

Igarapé Institute

Ilona Szabó de Carvalho
Co-founder and President

Robert Muggah
Co-founder and Chief Innovation Officer

Melina Risso
Research Director

Maria Amélia L. Teixeira
Operations Director

Laura Trajber Waisbich
Deputy Director of Research

Credits

General Coordination

Laura Trajber Waisbich

Authors

Laura Trajber Waisbich and **Han Cheng**

Research Assistance

Priyanka Gurung and **Aline Lara Romeu**

Peer Review

Robert Muggah, **Alexandre Szklo**, **Cangshu Li**, **Mulugeta G. Sisay** and **Roberto Schaeffer**

Production Management

Carla Nascimento
Communications Manager

Editing

Débora Chaves
Editor

Graphic Design

Raphael Durão
Creative Coordinator

André Guttierrez
Designer

How to cite:

INSTITUTO IGARAPÉ. BRICS in Transition: National Pathways, Global Leadership, and the Future of Clean Energy Cooperation. Río de Janeiro. Igarapé Institute, 2026. Available at: https://igarape.org.br/en/publications

DOI Number:

10.5281/zenodo.20762570

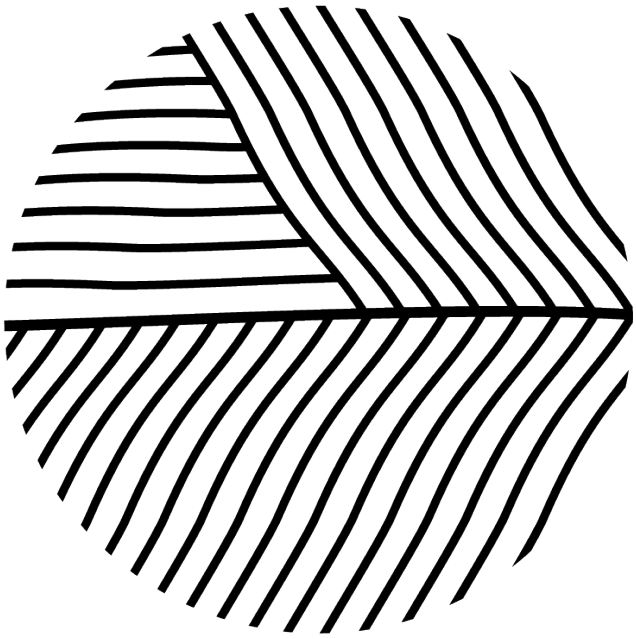
IGARAPÉ INSTITUTE
a think and do tank

The Igarapé Institute is an independent think-and-do tank that designs and delivers evidence-based solutions, strengthens public policies, and scales effective practices in security, nature, and climate while fostering collaboration and positive impact from the local to the global levels.

Rio de Janeiro - RJ - Brazil
Tel.: +55 (21) 3496-2114
contato@igarape.org.br
igarape.org.br

Press Office
press@igarape.org.br

Social Media
facebook.com/institutoigarape
x.com/igarape_org
linkedin.com/company/igarapeorg
youtube.com/user/InstitutoIgarape
instagram.com/igarape_org



igarape.org.br