SNAPSHOT OF BRAZIL'S ENERGY TRANSITION DYNAMICS

SUMMARY

Brazil stands out globally for its clean energy sector, with over 88%[1] of its electricity sourced from renewables. Yet fossil fuels still comprise 50% of Brazil's overall energy matrix, with oil and its derivatives accounting for 34% of those fossil fuels. To achieve a full clean energy transition, it is essential for Brazil to decarbonise its transport and heavy industry, expand its renewable capacity in these sectors beyond power generation and strengthen governance and investment in storage, grids and efficiency.

Key recommendations for a complete energy transition:

- ***Accelerate progress towards 100% clean power**, with stronger governance, ambitious renewable targets and storage solutions integrated into energy policy from the outset.*
- ***Scale up energy efficiency and modernise grids** to reduce curtailment and absorb more renewables.*
- ***Expand decentralised clean energy** for remote and vulnerable communities, replacing diesel and using biomass produced under robust sustainability standards as a transitional fuel.*
- ***Decarbonise hard-to-abate sectors** such as transport and industry through electrification, sustainable aviation fuel (SAF) and green hydrogen leadership.*
- ***Strengthen international collaborations and partnerships, by leveraging coalitions** such as the Energy Transition Council (ETC), the Global Coalition for Energy Planning (GCEP) and the Global Clean Power Alliance (GCPA) – and by adopting regional energy integration and just transition strategies, while also tapping into new finance options to replace fossil revenue.*

***Key current energy statistics**[1]*

- ***Over 88% of electricity from renewable sources** (2024), mainly from large hydropower projects.*
- ***Even split in the energy mix of 50% renewables and 50% non-renewables** – 34% oil, 9.6% fossil gas, 4.5% coal, 1.3% nuclear and 0.6% other sources (2024).*
- ***23.7% of all power from wind and solar** (2024).*
- ***68% growth in solar and 17% in wind generation** between 2022 to 2023.*

[1] Empresa de Pesquisa Energética (EPE), May 2025, Brazilian Energy Balance 2025 (Reference year 2024)

BRAZIL'S CLIMATE AMBITIONS, PLANS AND COP30

Brazil's clean power remains a global benchmark: **over 88% of its electricity is generated from renewable sources**, mainly hydropower. However, solar and wind power have recently grown rapidly and significantly, with solar increasing by 68% and wind 17% respectively in just one year, between 2022 and 2023, indicating a significant year-over-year trend.

Brazil's energy development is guided by its Ten-Year Energy Expansion Plan (PDE),[2] with the current version covering the outlook to 2035. This plan provides critical input for achieving Brazil's energy targets and feeds into its National Energy Plan (PNE) up to 2050.[3]

Ambitious and concrete targets for the whole energy sector – not only electricity generation but also other sectors including transportation and industry – remain critical. The narrative of Brazil's Nationally Determined Contribution (NDC), updated in 2024, is ambitious and equity-oriented, emphasising justice and regeneration. It is bolstered by emerging regulatory and financial tools but lacks sectoral detail and a clear pathway for the transformation of the whole energy system.

Its NDC therefore raises concerns about Brazil's readiness to translate its aims into action, even more so in the run-up to COP30, which Brazil will host. That said, the draft Climate Plan (Plano Clima), together with its Sectoral Plan for Climate Change Mitigation in the Energy Sector,[4] provides some indication on how Brazil plans to deliver. However, the targets and trajectory remain conservative: the plan emphasises the need to electrify wider economic sectors (including transportation and industry), using renewable and low-carbon energy sources, and its **targets for the proportion of renewable electricity generation (82.7% by 2030 and 86.1% by 2035) are lower than what is currently achieved in the power sector (88%)**, reflecting the projected increase in overall energy demand. It also requires bringing forward the battery storage regulatory framework, currently scheduled for 2030, and significantly increasing the planned installed capacity of 800 MW by 2035 to meet grid resilience needs.

As the COP30 presidency, Brazil has a pivotal opportunity to accelerate its domestic energy transition while shaping the global climate agenda. By showcasing concrete domestic progress that aligns with its strengths – such as its high renewable share – and its international responsibilities, Brazil can reinforce its credibility and elevate its leadership in global climate negotiations.

CHALLENGES AND OPPORTUNITIES

Although there has been positive progress in the power sector, with Brazil reporting 49.1%[5] of its total energy matrix as coming from renewables, **Brazil's broader energy supply remains fossil-heavy.** Even with significant growth in solar and wind – 68% in

[2] Ministério de Minas e Energia (MME), Empresa de Pesquisa Energética (EPE), April 2025, Ten-Year Energy Expansion Plan 2034 (PDE 2034) (in Portuguese)
[3] Ministério de Minas e Energia (MME), Empresa de Pesquisa Energética (EPE), June 2020, National Energy Plan 2050 (PNE 2050) (in Portuguese)
[4] Ministério do Meio Ambiente e Mudança do Clima, July 2025, The draft Climate Plan Mitigation - Sectoral Plan Energy (in Portuguese)
[5] Empresa de Pesquisa Energética (EPE), May 2025, Brazilian Energy Balance 2025 (Reference year 2024)

solar and 17% in wind generation between 2022 and 2023 – the share of renewables in the energy matrix grew by just 0.9%. While this is in line with the current PDE, it reflects a slow transition inconsistent with the urgency and obligations set by the Paris Agreement.

Beyond the slow increase of renewables in the overall energy supply, structural reliance on fossil fuel revenues persists. In particular, some states and municipalities depend on oil and gas royalties or fossil fuel industries for local jobs. They could benefit from both domestic and international expertise in designing just energy transition strategies; these can help identify sustainable revenue sources, diversify local economies and safeguard jobs and public services. Such strategies also support and facilitate decarbonising fossil-dependent sectors such as transport and heavy industry, creating a significant opportunity to meet clean energy ambitions and contribute to inclusive and sustainable development. In addition to sectoral decarbonisation, just transition strategies also present an opportunity to tackle regional disparities in clean energy access and development, particularly in remote areas.

Building on these opportunities and addressing these challenges, Brazil's 2050 PNE can set the stage for a full, fair and fast transition. To do so, it will need to go beyond sectoral goals, setting clear system-wide targets, indicators and investment frameworks for climate neutrality while unlocking opportunities for sustainable economic growth.

RECOMMENDATIONS FOR BRAZIL'S GOVERNMENT TO ACHIEVE 100% CLEAN ENERGY

ALIGN POLICY GOALS AND FINANCING

- **Align governance and long-term planning:** Brazil should strengthen coordination between federal and subnational authorities, tackle bureaucratic inertia and clearly define the role of state-owned enterprises and other key market actors. Long-term planning must align with its NDC and 2050 climate neutrality target.
- **Diversify and balance financing:** Brazil has actively issued green bonds to capitalise its National Climate Change Fund (FNMC),[6] its primary financial instrument for supporting mitigation initiatives. To maintain fiscal stability and ensure the transition's long-term viability, these should be complemented by introducing further sustainable and balanced financing mechanisms.
- **Strengthen climate and development goals:** the Brazil Climate & Ecological Transformation Investment Platform (BIP) is designed to align climate priorities with development goals and attract international support.[7] This platform has great potential if its governance, transparency and strategic direction can be clarified. To fully meet its intended role, the BIP could evolve into a structured institutional governance mechanism with robust analytical capacity and sustained technical support from international partners; it would also help to display the pace at which projects under its umbrella advance. This would ensure alignment with both national priorities and global climate commitments.

[6] IEA, 2024, National Climate Change Fund (FNMC), accessed August 2025
[7] Ministério da Fazenda, Brazil Climate and Ecological Transformation Platform, accessed August 2025

DECARBONISE KEY SECTORS

- **Target 100% renewables generation in the power sector:** this will be the foundation for Brazil's broader energy transition. Electrification, generated by low-carbon sources, is key to deep decarbonisation in fossil-fuel-dependent sectors like transport and industry.
- **Electrify and decarbonise transport and industry:** electrifying light-duty vehicles, expanding net zero public transport and deploying charging infrastructure are essential. As the examples of the cities of Curitiba and São Paulo show,[8] Brazil has the expertise to decarbonise public transport networks with recognised results and attracting global interest. Greenhouse gas emissions in São Paulo could be further reduced by 15% if 25% of its public fleet were electric vehicles.[9]
- **Ensure sustainable use of transitional fuels:** such fuels may serve as a bridge towards a secure energy transition, as recognised in paragraph 29 of the first Global Stocktake. When sourced from biomass that avoids deforestation, does not compete with food production and safeguards soil health, biofuels can support decarbonisation, enhance carbon sequestration, restore ecosystems and strengthen energy security. Scaled within these guardrails, they could contribute to a nature-based, resilient and equitable energy transition. In Brazil, biofuels can play a role specifically in hard-to-abate sectors such as aviation and heavy industry if pursued under robust governance. Building on its experience with bioethanol, Brazil is well positioned to lead in sustainable aviation fuel (SAF) – for both export and domestic markets – as well as green hydrogen for hard-to-abate sectors such as, again, aviation and long-haul freight.[10]
- **Scale up energy efficiency:** energy efficiency is one of Brazil's least explored opportunities. Despite its cost-effectiveness and potential to reduce emissions, progress has been limited. Support should focus on designing and scaling national programmes for industry, residential buildings and public infrastructure with emphasis on retrofits, building standards and updated appliance standards.

MODERNISE GRID INFRASTRUCTURE

- **Promote whole-system integration:** energy provision can be made more efficient and economical by connecting different loads and resources, for example through district or communal cooling and heating networks, heat recovery and waste-to-energy. New regulations and relevant market design can facilitate such integration, with pilot projects set up to demonstrate the effectiveness of this approach in Brazil.

  Expand battery storage and increase grid flexibility: the planned battery storage auction in the second half of 2025 by the Ministry of Energy and Mining[11] should be supported by transparent cost frameworks, robust regulations and investment in

[8] Examples of efforts to decarbonise the public transportation sector in these two cities include:
- São Paulo expands electric bus fleet - electrive.com
- Curitiba's electric vehicle initiative | Knowledge Hub | Circle Economy Foundation

[9] Grandinetti, F. J., et al., 2025, Analysis of the impact on GHG emissions from the adoption of electric vehicles in the vehicle fleet of the state of São Paulo, Brazil: Systematic review and ridge regression analysis, *Energy Strategy Reviews*, 61, https://doi.org/10.1016/j.esr.2025.101803

[10] IEA, 2023, The Role of E-fuels in Decarbonising Transport

[11] The Ministry of Energy and Mining will run the auction as a part of the government strategy to modernise the energy sector: Brazil to hold first battery auction in December, says MME

storage capacity and digital infrastructure to enable greater renewables absorption. Updated energy legislation should promote grid flexibility, integrate this new storage and send clearer signals for private investment. Large-scale grid modernisation and digitalisation will also be required, along with secure access to critical minerals for manufacturing battery storage solutions.

- **Address rising curtailment:** curtailment is increasing rapidly and risks undermining the integration of renewable energy sources into Brazil's electricity matrix. As renewable generation expands, urgent measures are needed to preserve system efficiency and grow investor confidence.
- **Expand decentralised clean energy:** many remote and vulnerable communities – especially in the Amazon – still rely on costly and polluting diesel power. Moreover, while 99.8% of households had electricity in 2019,[12] energy poverty persists, with some relying on lower-quality alternatives[13] such as firewood, contributing to deforestation and poor internal air quality, or kerosene. Clean decentralised energy solutions are urgently needed to improve reliability and sustainability.

LEAD ON REGIONAL ENERGY INTEGRATION

- **Strengthen regional energy integration:** integration across a wider region can reduce infrastructure costs and make power supply more resilient. Hydropower – where implemented close or on the border with neighbouring countries – already plays an important role in many regional electricity systems.[14] Expanding solar and wind deployment alongside cross-border electricity trading will complement hydropower, diversify the energy mix and support the creation of more climate-resilient renewable systems. Brazil could also spearhead the development of a regional clean hydrogen market with partners such as French Guiana, Suriname and Uruguay, positioning South America as a green hydrogen hub.

COLLABORATING FOR IMPACT: SCALING UP BRAZIL'S CLEAN ENERGY TRANSITION

OPPORTUNITIES FOR STRATEGIC PARTNERSHIP

The guiding principles for any cooperation should be to **prioritise accelerating renewable power generation and storage deployment, strengthening grid capacity and modernisation, and expanding clean energy in sensitive regions** such as the Amazon. Shared priorities – such as decarbonising transport and industry – should also guide joint action.

As COP30 host, Brazil has a strategic opportunity to deepen policy and economic cooperation with key international and regional partners:

- **Germany and the United Kingdom (UK)**: both face pressures to transition away from fossil fuels - gas in Germany, and oil and gas in the UK, following its

[12] Empresa de Pesquisa Energética (EPE), May 2024, Residential Energy Consumption by Income Class
[13] Silva, Lucas Adriano, 2024, Essays on energy poverty in Brazilian households, PhD dissertation, Universidade Federal de Viçosa (in Portuguese)
[14] The Santo Antônio and Jirau hydropower plants on the Madeira River in Brazil, close to the border with Colombia, together account for over 6,000 MW. The Garabí-Panambi complex on the Uruguay River represents a potential source of shared capacity with Argentina.

successful phase out of coal power generation[15]. Cooperation could focus on renewable technology deployment, such as energy storage solutions, grids modernisation and decentralised energy systems, and clean energy finance.

- **Colombia and Mexico**: as other regional climate leaders, cooperation with these two countries could accelerate cross-border energy integration and policy alignment for regional decarbonisation and advance a just and equitable transition across the region.

These opportunities create a window for coordinated leadership and, if taken, would demonstrate that a rapid, successful transition from fossil fuel to clean energy is feasible.

OPPORTUNITIES FOR INTERNATIONAL LEADERSHIP

Brazil has a unique opportunity to accelerate its energy transition and cement its leadership on the global stage by engaging more actively with international coalitions as co-chair of the Global Coalition on Energy Planning (GCEP) and the Global Clean Power Alliance (GCPA) Finance Mission, as well as leveraging its COP30 presidency.

Brazil has already restructured the COP action agenda into more pragmatic, solution-oriented and scalable initiatives, with multilateralism at the core of all agendas. Deepening partnerships across coalitions would multiply these gains and unlock new avenues for influence, investment and innovation.

One clear opportunity is engaging with the Energy Transition Council (ETC) which facilitates national and high-level dialogues to accelerate the energy transition in specific countries. For example, the Brazilian COP30 presidency co-hosted the ETC Ministerial, bringing ministerial-level representatives from partner countries together to coordinate and discuss priorities for energy transition. To deliver on the priorities established in these dialogues, it coordinates the provision of expertise and of technical assistance through its Rapid Response Facility (RRF).

By joining the ETC, Brazil could gain stronger access to coordinated international support to accelerate domestic actions, potentially reducing investment risks for clean energy projects – including storage. It would also enhance its just transition planning, industrial decarbonisation and its strategy development to reduce fossil fuel dependency – while showcasing Brazil's existing clean energy expertise, strong progress to date and leadership role in the region and beyond.

[15] Powering Past Coal Alliance (PPCA), 30 Sept. 2024, The UK's coal exit forges a path to a coal-free future globally

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ABOUT THE ETC

The Energy Transition Council (ETC), co-chaired by the UK and the Philippines, supports collaboration with partner countries to identify, coordinate and implement solutions for a more rapid energy transition, including technical assistance through the ETC's RRF.

More information is available at https://energytransitioncouncil.org/

ABOUT TALANOA

The Talanoa Institute is an independent climate change think tank that emerged in Brazil with a focus on improving decision making and accelerating climate action through a combination of data, science and dialogue.

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