Executive Summary

Maturity of Public Policies for Energy Transition in Brazil

TCU FEDERAL COURT OF ACCOUNTS

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Brasília, 2025

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INTRODUCTION

In August 2021, the United Nations Intergovernmental Panel on Climate Change (IPCC) released an alarming report on climate change, underscoring **the unequivocal influence of human activity on global warming and its devastating effects**, such as heat waves, droughts, heavy rains, cyclones, and other extreme weather events.

In response, the International Energy Agency (IEA) outlined a pathway to achieve net-zero greenhouse gas (GHG) emissions by 2050, emphasizing the urgent need to **drastically reduce fossil fuel consumption and increase investments in renewable energy and low-carbon technologies**.

Brazil is well-positioned to decarbonize its economy, leveraging its natural resources—rivers, arable land, minerals, wind, and solar potential—to expand its renewable energy matrix.

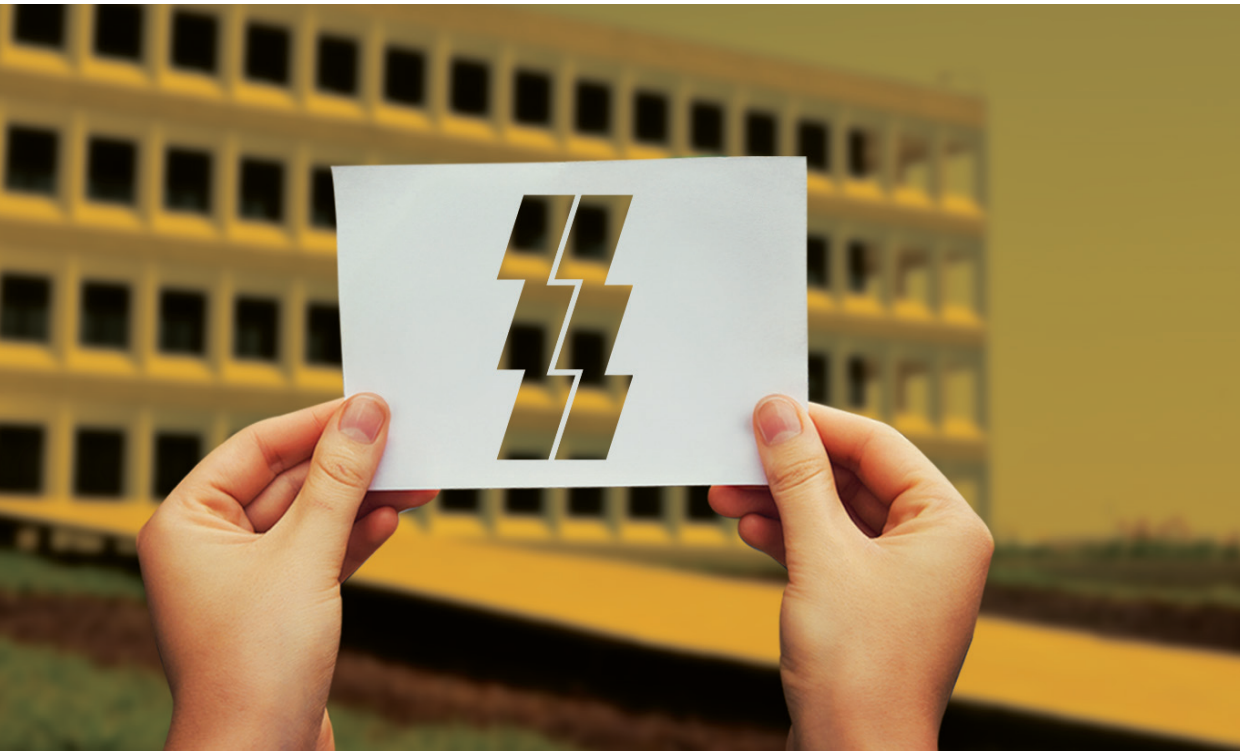
Despite already **having one of the cleanest energy matrices in the world**, the country faces significant challenges, particularly in the use of fossil fuels in industrial and transportation sectors, especially road transport, which accounts for a substantial share of Brazil's carbon emissions. Brazil's commitment to the Paris Agreement and its Nationally Determined Contribution (NDC) at the time of the audit reinforces its goal of reducing carbon emissions by 50% by 2030 and achieving carbon neutrality by 2050.

Unlike many other nations, Brazil's energy transition is more an **economic growth and social inclusion opportunity** than merely an environmental obligation. The country's major challenge is determining the best way to manage its **abundant energy resources** while meeting the diverse demands of society.

According to the World Bank, Brazil has the potential to become a high-income country by promoting inclusive and sustainable economic growth. Renewable energy plays a crucial role in this scenario, not only because of its low-carbon intensity but also for ensuring energy security, job creation, and income generation.

With Brazil assuming the rotating presidency of the G20 and hosting COP 30 in Belém, the country is at the center of global attention, with the opportunity to lead by example. Brazil plans to finalize its Climate Plan by 2025, outlining its climate policies through 2035, emphasizing the importance of a well-defined national strategy for energy transition.

In this context, the Brazilian Federal Court of Accounts has the opportunity to monitor and influence the energy transition as a state policy, ensuring that planning and governance are effectively structured and continuously improved.



PERFORMANCE AUDIT ON PUBLIC POLICIES FOR THE ENERGY TRANSITION

Audit Objective, Scope, and Questions

The objective of this audit was to assess the maturity level of public policies and government initiatives aimed at Brazil's transition to a low-carbon economy. This included analyzing different dimensions of these policies and evaluating the coherence between various government interventions.

The audit sought to identify the governance structures in place, the legal and regulatory frameworks, and Brazil's strategic positioning in the global energy transition landscape.

To achieve these objectives, the following key audit questions were formulated:

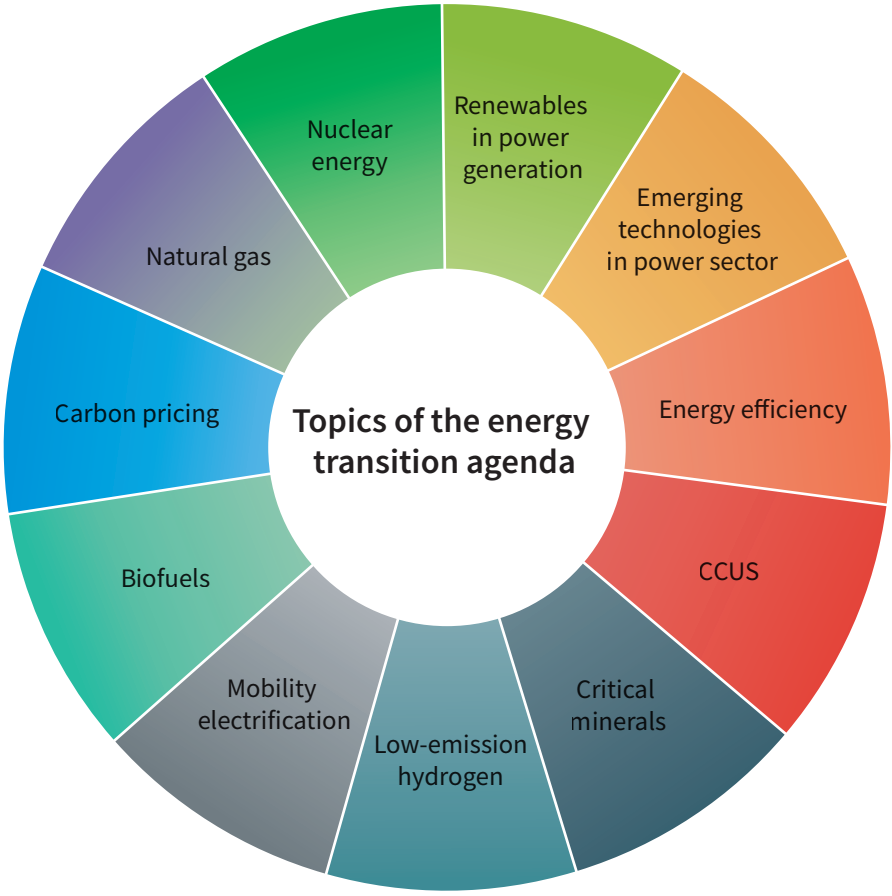
1. To what extent are the governance and management structures of the Federal Government prepared to implement Brazil's energy transition?

2. How well does the current or planned financing system align with Brazil's energy transition investment needs?

3. To what extent are Federal Government actions designed to promote a fair and inclusive energy transition in Brazil?

4. How advanced is state action on key technological topics within Brazil's energy transition agenda (see Figure 1)?

Figure 1 – Topics of the energy transition agenda



Source: Created by the authors.

The audit scope encompassed the actions led by the National Secretariat for Energy Transition and Planning (SNTEP/MME) in developing the National Energy Transition Policy (PNTE). However, due to the cross-sectoral nature of the energy transition, the audit also examined policies related to economic, industrial, and environmental sectors in connection with the PNTE.

OVERVIEW

This is not the first time the world has undergone an energy transition. Humanity has previously transitioned from firewood to coal, then from coal to oil, and later from oil to natural gas.

While past transitions were driven by the economic efficiency of new energy sources, today's transition is primarily motivated by the need to limit human activities that negatively impact the planet. This shift justifies the adoption of measures that do not always conform to traditional economic rationality.

Historically, energy scarcity has been linked to economic poverty, affecting both household well-being and national economic competitiveness. Energy also impacts the competitiveness of a country's productive sector, representing a significant share of its GDP. Thus, energy plays a central role in both the quality of life of societies and the competitiveness of nations.

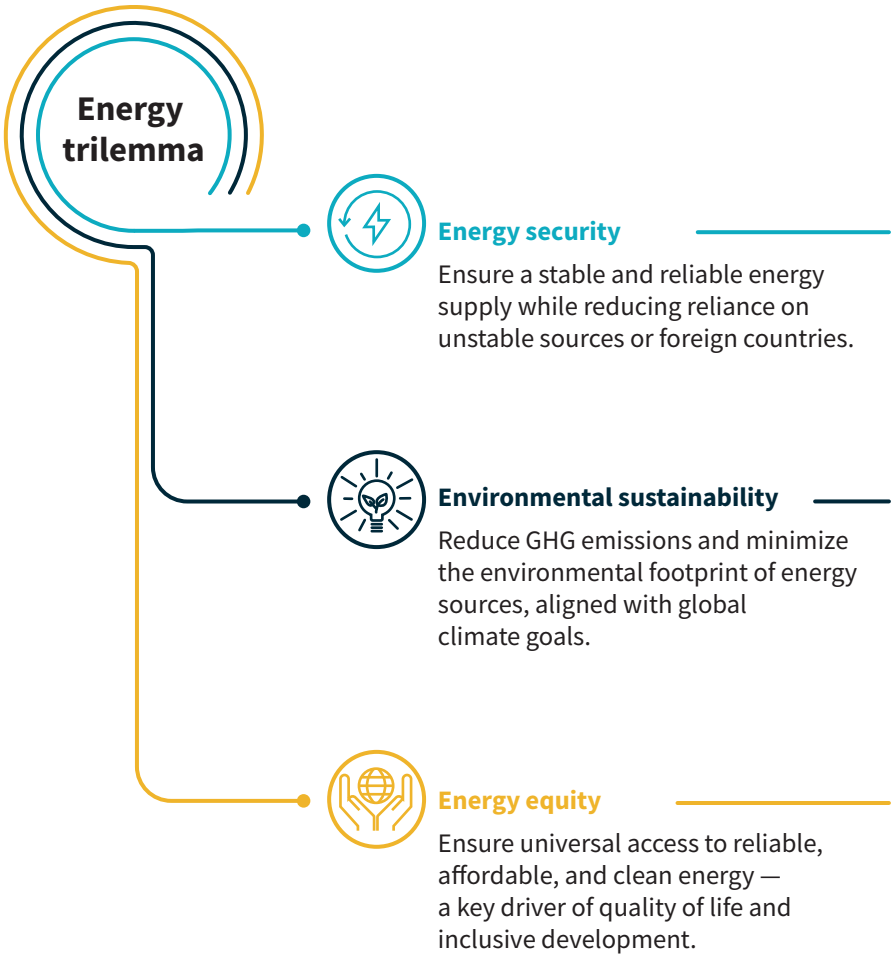
Given this correlation, the energy transition has the potential to be a true "game changer" for the global economy. Public policies and corporate decisions made today will shape the future. The choices made now will have a significant impact on the global economy and people's lives in the medium and long term.

This complex dynamic can be summarized in the concept known as the energy trilemma.

The Energy Trilemma

At the heart of the energy transition is the concept of the energy trilemma, which encapsulates the challenge of balancing three interconnected objectives: energy security, environmental sustainability, and energy equity (see Figure 2).

Figure 2 – Energy trilemma objectives



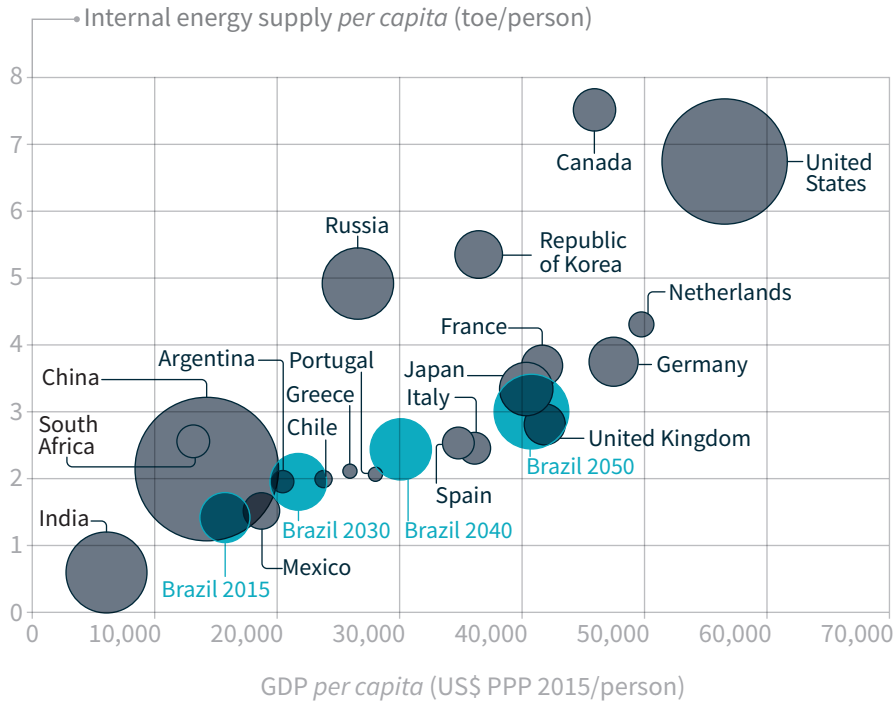
Source: Created by the authors, based on information from the World Energy Council (WEC).

A successful energy transition strategy must harmonize these three objectives, recognizing that what works for one country may not be suitable for another. **Each nation must find its own equilibrium** based on its economic, environmental, and social circumstances.

Brazil's main energy security challenge lies in **increasing its energy supply**, as shortages can drive up prices, disproportionately affecting vulnerable populations.

According to the Energy Research Company's (EPE) National Energy Plan (PNE) 2050, Brazil's per capita energy consumption is lower than that of Europe, the United States, and China. In an optimistic growth scenario, the Energy Research Company (EPE) projects that Brazil's average per capita energy use could more than double by 2050 compared to 2015 levels, driven by strong economic expansion **as a consequence of the expansion of gross energy demand** (see Chart 1).

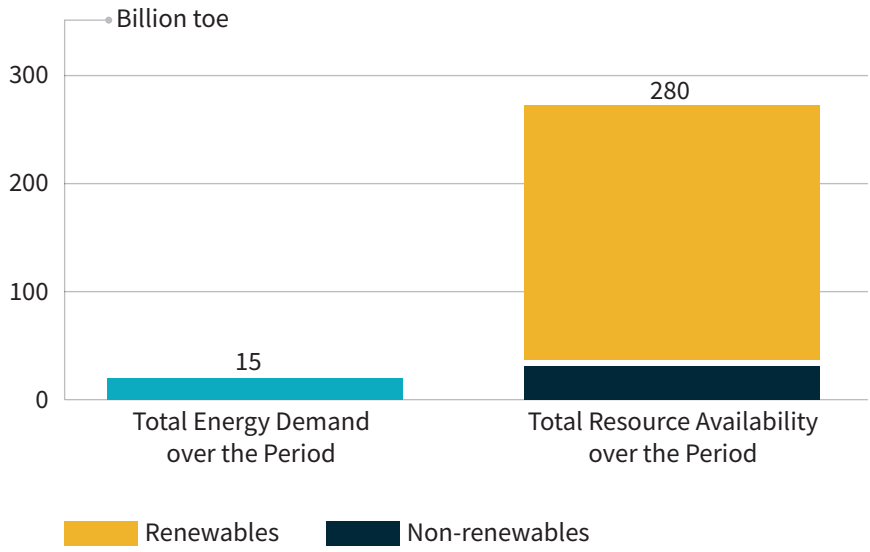
Chart 1 – Economic Projection for 2050



Source: PNE 2050.

Despite this challenge, **Brazil has ample energy resources**. The PNE 2050 estimates that Brazil's total potential energy availability up to 2050 is more than 18 times the country's projected energy demand, with 92% of this potential coming from renewable sources (see Chart 2).

Chart 2 – Energy Projection for 2050



Source: PNE 2050.

Therefore, in this scenario of **energy abundance**, the primary difficulty lies not in resource availability but in selecting the most environmentally sustainable energy alternatives while ensuring energy affordability for the entire population. This decision process underpins Brazil's fundamental energy transition challenge: **balancing fossil fuels and renewables**.

Unless an unforeseen technological breakthrough occurs, **the energy transition will not happen suddenly** but gradually over the coming decades. **Demand must shift in sync with supply** to avoid excessive price pressures. Consequently, fossil fuels and renewables will continue to coexist for a long time, with fossil fuels being gradually phased out while renewables scale up. Depending on the chosen transition strategy, the coexistence of these energy sources may be seen either as **a competition or as a complementary process**—an especially relevant consideration for Brazil.

The exploitation of national oil and natural gas reserves presents, on one hand, an opportunity for supplying liquid and gaseous fuels at more competitive costs (energy security) and generating increasing revenues to invest in social programs and finance a just and inclusive energy transition (energy equity).

On the other hand, it results in higher national emissions (environmental sustainability), which contribute to rising global temperatures and make it harder for Brazil to meet its Paris Agreement commitments. Additionally, continued reliance on fossil fuels complicates the integration of renewables into the energy matrix and reduces Brazil's competitiveness in exporting green goods.

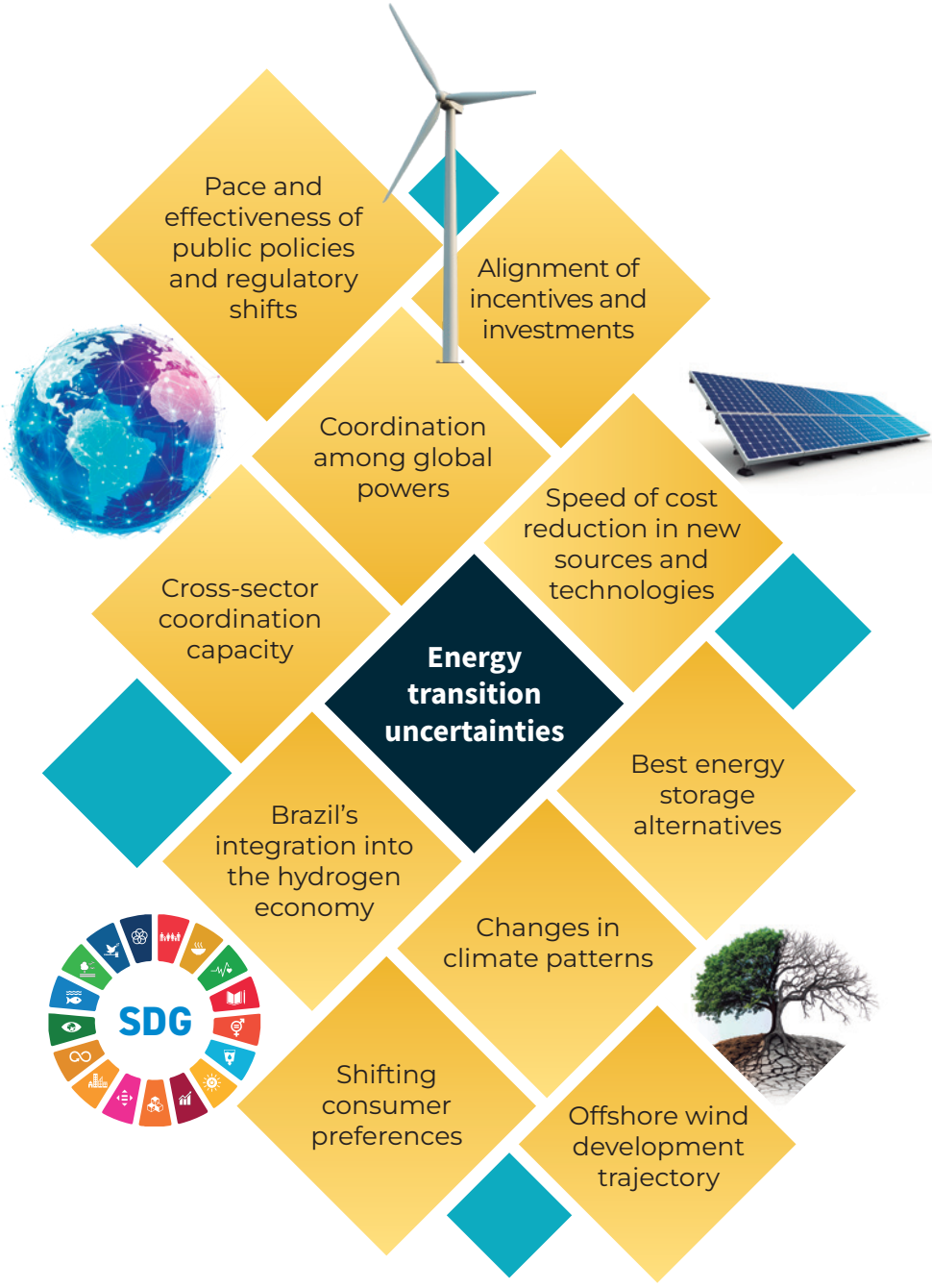
Achieving a **balance among these three objectives** requires well-developed public policies, regulation, and financial incentives to create a favorable investment environment for both domestic and international capital.

Defining this path involves building a consensus on complex, interdisciplinary issues that are marked by essential **uncertainties**.

Uncertainties and the Current State of Brazil's Energy Transition

The energy transition is subject to numerous uncertainties that impact its success, ranging from the extent of climate change effects to the effectiveness of technological innovations, state capacity, and the socio-economic implications of potential shifts in global geopolitics (see Figure 3).

Figure 3 – Uncertainties of the Energy Transition

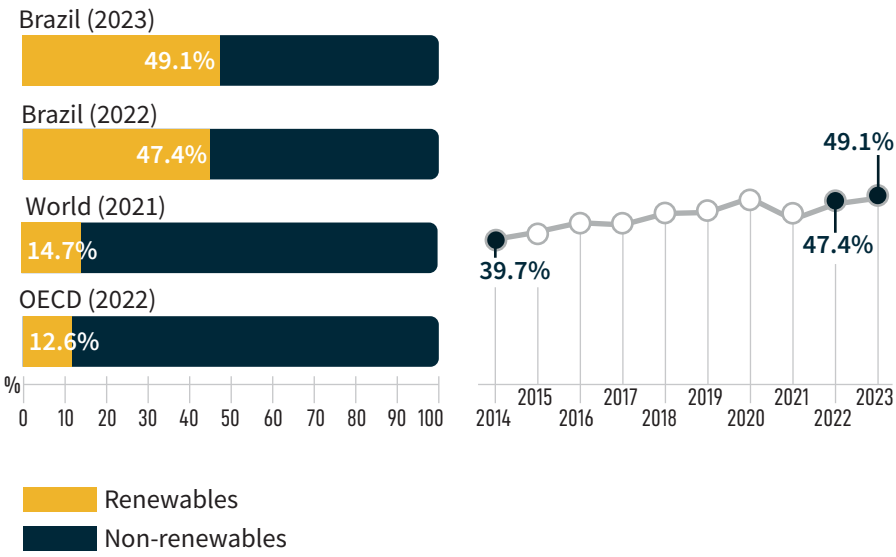


Source: Created by the authors.

Brazil is a country with abundant natural resources and a relatively stable environment, making it a strong candidate to lead in providing clean energy and decarbonization solutions to other nations. However, achieving this leadership role requires **proactive government action** to transform its comparative advantages into competitive advantages.

Over the past decades, various initiatives promoting renewable energy sources have positioned Brazil as a global leader in clean energy. According to data from the National Energy Balance (BEN), **the share of renewables in Brazil's energy matrix significantly surpasses the global average**. In 2023, 49.1% of Brazil's internal energy supply came from renewables, compared to a global average of 14.7% in 2021 and just 12.6% in 2022 among OECD countries (see Chart 3).

Chart 3 – Domestic Energy Supply in 2023

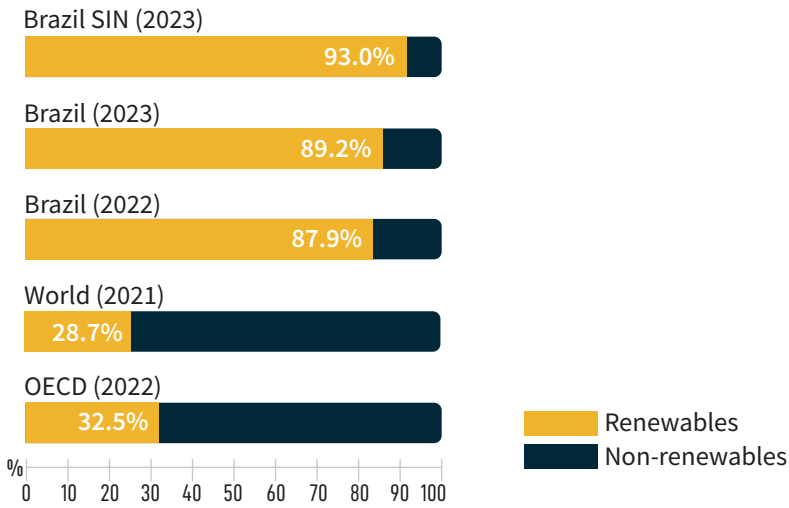


RENEWABLES▸ 49.1%

16.9%	12.1%	2.6%	8.6%	7.2%	1.7%
Sugarcane biomass	Hydropower	Wind	Firewood and charcoal	Black liquor and other renewables	Solar

NON-RENEWABLES▸ 50.9%

35.1%	9.6%	4.4%	1.2%	0.6%
Oil and derivatives	Natural gas	Coal	Uranium	Other non-renewables

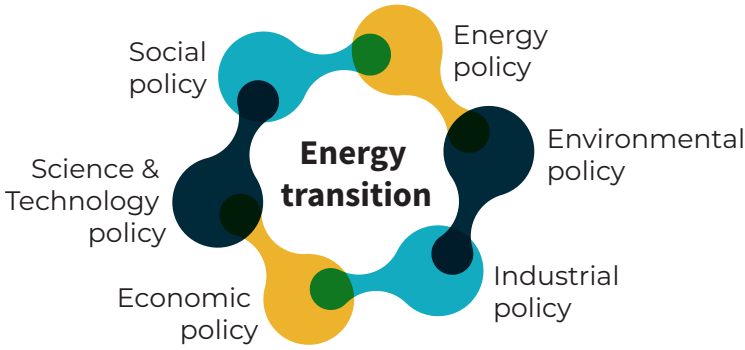


In conclusion, the energy transition in Brazil presents a unique opportunity to lead globally in sustainability. However, it requires a careful balance between security, sustainability, and equity, as well as the effective management of the uncertainties inherent to the process.

GOVERNANCE AND MANAGEMENT STRUCTURES OF THE FEDERAL GOVERNMENT FOR ENERGY TRANSITION

Due to its long-term and cross-sectoral nature, the energy transition requires a strong political strategy that fosters interministerial coordination and engagement with other branches of government. It also demands clear governance structures to ensure effective implementation, social acceptance, and cooperation with subnational entities. The energy transition involves harmonizing policies across at least six major sectors (see Figure 4).

Figure 4 – Energy Transition and Related Policies



Source: Created by the authors.

Given this cross-sectoral scope, energy transition policies are addressed by multiple ministries, either within existing structures or through newly established bodies, with key roles played by: • The Office of the Chief of Staff of the Presidency of Brazil (CC/PR), • The Ministry of Mines and Energy (MME), • The Ministry of the Environment and Climate Change (MMA), • The Ministry of Finance (MF), • The Ministry of Development, Industry, Trade, and Services (MDIC), • The Ministry of Science, Technology, and Innovation (MCTI).

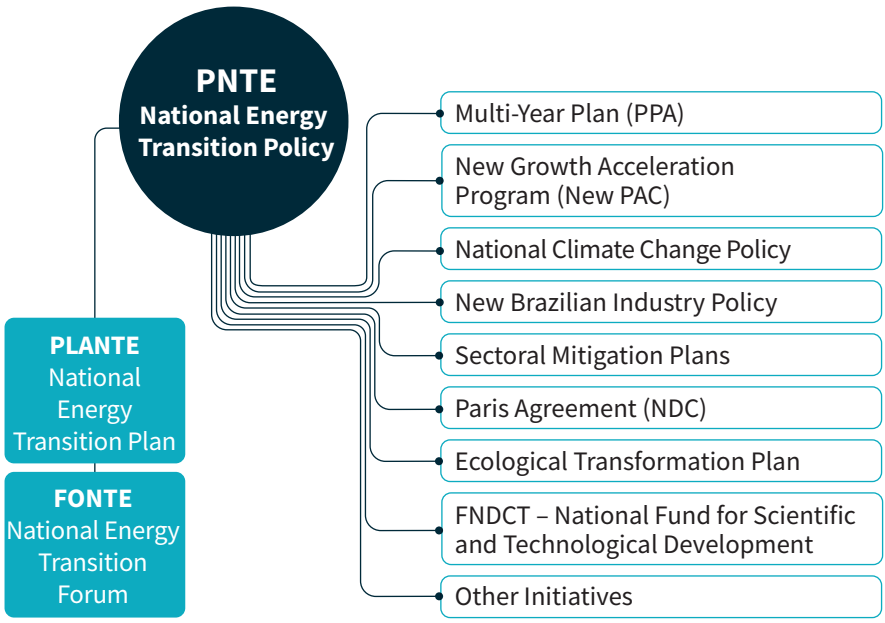
Institutionalization and Governance

Climate governance is led by entities such as the Interministerial Committee on Climate Change (CIM), the National Energy Policy Council (CNPE), and the Council for Sustainable Economic and Social Development (CDESS).

The recent establishment of the **National Energy Transition Policy (PNTE)** by the CNPE marks a significant milestone, setting guidelines and objectives to transform the national energy matrix into a low-carbon structure.

The PNTE aims to integrate government policies and actions at the federal level while engaging with subnational entities and fostering dialogue with civil society and the productive sector. As instruments for implementing the policy, it establishes the **National Energy Transition Plan (PLANTE) and the National Energy Transition Forum (FONTE)** (see Figure 5).

Figure 5 – PNTE, PLANTE, and FONTE



Source: SNTEP/MME.

PLANTE will be a **long-term action plan** aligned with energy transition scenarios, economic and social development requirements, and Brazil's net-zero greenhouse gas (GHG) emissions targets. Meanwhile, FONTE will serve as a **permanent consultative instrument** to encourage, expand, and democratize discussions on energy transition between the Federal Government, civil society, the productive sector, and subnational entities.

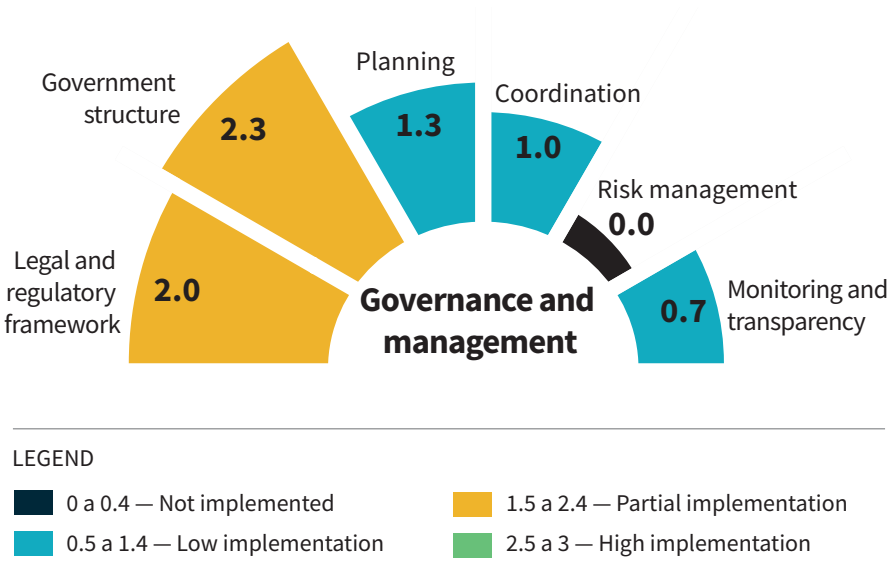
One of PLANTE's key objectives is to systematize and consolidate the Federal Government's programs for promoting energy transition, identifying additional efforts needed as well as estimated costs and benefits. It also aims to support the alignment of the PNTE with the implementation tools of other public policies and to monitor the necessary measures to achieve the goals and objectives of the Climate Plan related to the energy sector.

Thus, PLANTE will be developed as an action plan within the energy policy framework, coordinated with other government initiatives such as the New Growth Acceleration Program (PAC), the National Policy on Climate Change (PNMC), the Climate Plan, the New Industry Brazil (NIB), and the Ecological Transformation Plan.

The assessment of governance and management structures was conducted based on the analysis of six related components: legal and regulatory framework, governmental structure, planning, coordination, risk management, and monitoring and transparency.

Each component's score represents the average of the scores of its respective items. The consolidated results are shown in Figure 6 below.

Figure 6 – Assessment of Governance and Management Structures



Source: Created by the authors.

Based on the assessment conducted by the TCU, it is possible to conclude that **governance and management structures within the Federal Government are insufficient for implementing Brazil's energy transition.**

Although responsibilities for formulating and implementing energy transition actions have been defined, the regulatory framework, governmental structure, and leadership and management responsibilities still require improvements and effective implementation.

Regarding planning, the **absence of a long-term plan for energy transition and sectoral mitigation plans for climate change in the energy sector** has significantly impacted the assessment of both the long-term strategy and its alignment with Brazil's Nationally Determined Contribution (NDC).

Concerning the strategy to be adopted by the country, it was observed that there is still a lack of clarity and transparency, which may distort the design of the PNTE itself as well as the development of PLANTE. Essentially, energy transition is linked to replacing fossil fuel consumption with low-carbon technological solutions. However, in the PNTE, in key national strategic plans, in statements by Federal Government officials, and in Ministry of Mines and Energy (MME) presentations on PLANTE, **ambiguities persist regarding the national strategy for phasing out fossil fuels.**

Furthermore, the **absence of a formalized risk-mapping process** for the energy transition represents a significant gap.

The TCU report indicates that, while the establishment of the PNTE is a substantial step forward, the **effectiveness of governance and management in Brazil's energy transition still requires significant improvements. Implementing a clear and coordinated strategy, supported by long-term plans and effective coordination mechanisms, is crucial to ensuring a successful energy transition aligned with Brazil's international climate commitments.**

In addition to the governance and management structure analyses highlighted above, the audit identified the following key findings:

1. Absence of sectoral energy plans with GHG mitigation targets;
2. Inconsistencies in the financing strategy for Brazil's energy transition;
3. Insufficient institutionalization and implementation of actions aimed at energy justice;
4. Government initiatives inconsistent with the goal of a just energy transition.

Finding 1: Absence of Sectoral Energy Plans with GHG Mitigation Targets

One of the key findings of the TCU is the absence of sectoral energy plans with greenhouse gas (GHG) mitigation targets. Although the National Policy on Climate Change (PNMC), established in 2009, stipulates that the Executive Branch should define sectoral mitigation plans to support the transition to a low-carbon economy, these plans have not yet been developed.

Energy transition is a fundamental part of shifting the economy toward lower GHG emissions, aligning with global warming limitations and carbon neutrality goals. Furthermore, it entails a profound transformation of infrastructure and energy use across various sectors and activities.

Through CIM Resolution 3/2023, the Committee set forth the guidelines and foundations for structuring the Climate Plan. It determined that sectoral mitigation targets must be established to ensure Brazil's achievement of its Nationally Determined Contribution (NDC) global target for 2030 and its indicative target for 2035 (Article 2, III). However, more than thirteen years after the PNMC was instituted, the sectoral climate mitigation plans required by Law 12,187/2009 have yet to be formulated.

The absence of energy sector plans with sectoral GHG mitigation targets—essential for meeting Brazil's NDC global target—represents a discontinuity in the PNMC's planning instruments. This gap could lead to misalignment between the long-term strategy for Brazil's energy transition and the Climate Plan, as well as risks of non-compliance with the country's climate commitments, including those under the Paris Agreement.

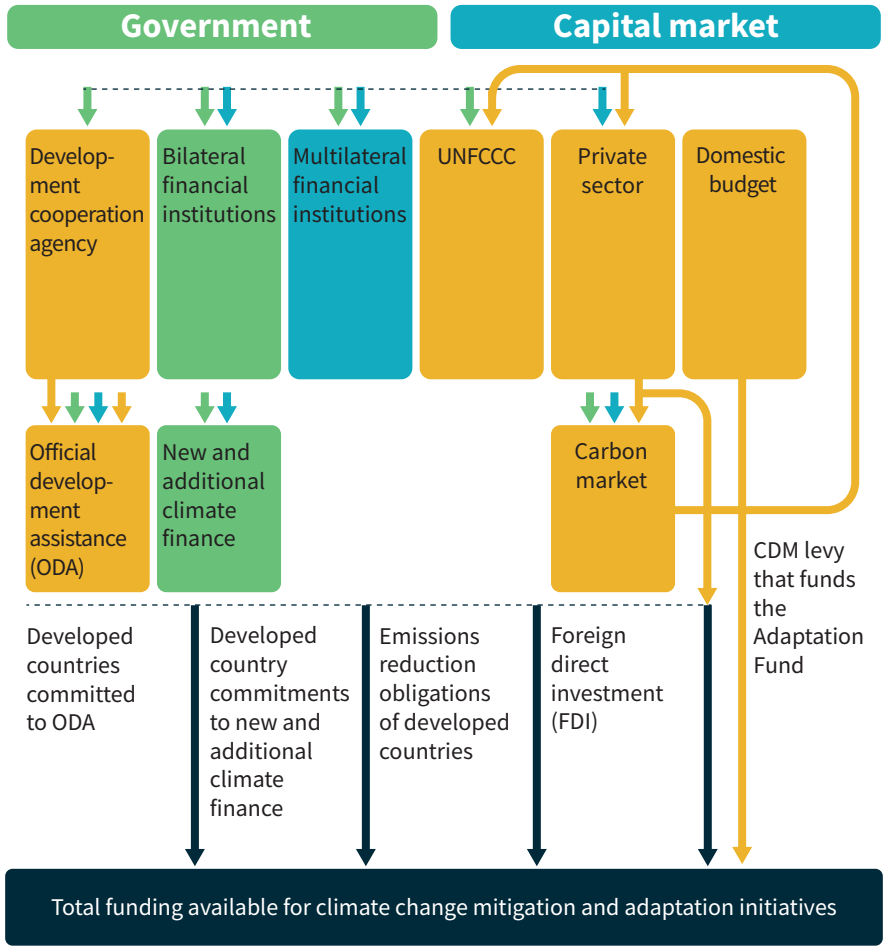
The lack of these sectoral plans may also hinder the development of a clear and coordinated strategy for energy transition, which is crucial for achieving carbon neutrality by 2050.

BRAZILIAN ENERGY TRANSITION FINANCING SYSTEM

Climate finance refers to **capital flows** that directly or indirectly contribute to greenhouse gas (GHG) mitigation or support climate change adaptation. It consists of a framework of funds and mechanisms established internationally to facilitate the climate transition and counter its effects. Climate finance resources may originate at local, national, or transnational levels and come from public, private, or alternative sources.

Governments play a crucial role in granting and directing climate finance through national budgets, taxes, fees, and subsidies. Additionally, multilateral international organizations provide funding for mitigation and adaptation projects in developing countries. The private sector—including development banks and credit institutions—also finances investments in clean technologies and emission reduction projects. Funds are channeled through cooperation agencies, bilateral and multilateral financial institutions, the private sector, and carbon markets before reaching their final destination (see Figure 7).

Figure 7 – Climate Finance Flow



Source: **Climate Finance**: reality and challenges (Getúlio Vargas Foundation).

Overcoming obstacles such as **resource scarcity, access barriers, lack of transparency, political opposition, and difficulties in mobilizing private capital** is essential for the efficiency of climate finance and the achievement of mitigation and adaptation goals. It is necessary to leverage the **complementarity** of different financing sources and seek global solutions alongside local efforts to foster a fair and inclusive market, particularly benefiting vulnerable regions while generating positive global impacts.

Key Players in Brazil's Energy Transition Financing

To address the investment needs of Brazil's energy transition, audit examinations identified a dense and interconnected "ecosystem" through which financial resources flow to support the country's energy transition and decarbonization efforts. This ecosystem comprises policies, programs, funds, budgetary actions, public institutions, and various financial instruments aimed at investing in, financing, or promoting the energy transition.

Based on their implementation status, two groups of policies, programs, funds, institutions, and financial instruments were identified. These do not only make direct investments in energy transition projects but also create conditions to attract additional investors.

The first group consists of a solid investment, financing, and incentive system aligned with international best practices. Key highlights include:

a. **Novo PAC** (Growth Acceleration Program): This initiative features an energy transition and security component that integrates investments in power generation and transmission projects, low-carbon fuels, energy efficiency, mining, and universal energy access.

b. **BNDES** (Brazilian Development Bank): Recognized internationally as a leading financer of sustainable infrastructure projects, BNDES is the primary institution structuring infrastructure financing in Brazil. It plays a central role in the country's energy transition financing strategy.

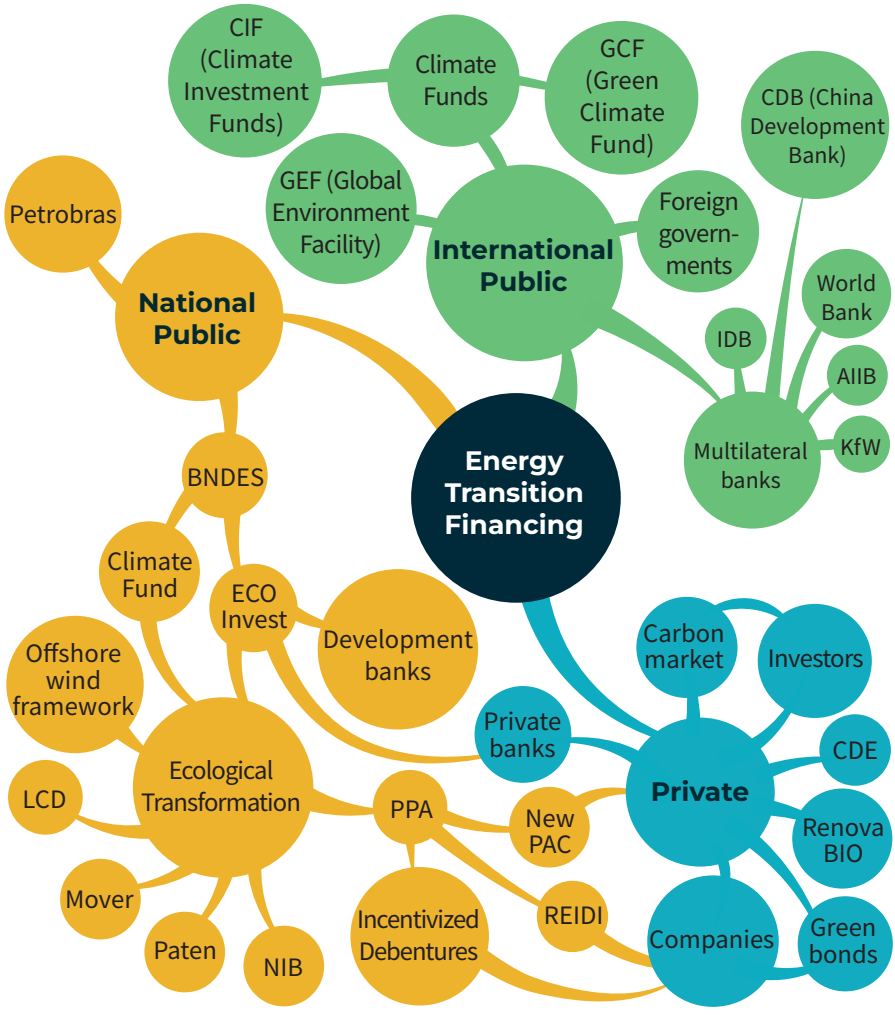
c. **Fundo Clima** (Climate Fund): With a recent federal contribution of up to BRL 10 billion, this has become one of the largest national funds for climate change mitigation and adaptation worldwide.

d. **Incentivized Debentures:** These debt issuance instruments are increasingly accepted in the market, with accumulated issuances surpassing BNDES disbursements in infrastructure—especially in renewable energy projects, transmission lines, and, more recently, bioenergy and mining.

e. Incentive Mechanisms under the **2024–2027 PPA:** These include tax subsidies under the Special Regime for Infrastructure Development Incentives (Reidi), credit subsidies for BNDES, and substantial financial subsidies allocated to fostering sustainable improvements in the automotive industry, supporting the power sector, and promoting reindustrialization.

These financial instruments have been operating successfully for years, spanning multiple political cycles, and have consistently delivered results in line with global market trends. While there is room for improvement, they are at an **advanced stage of implementation** (see Figure 8).

Figure 8 – Investment, Financing, and Incentive System for the Energy Transition



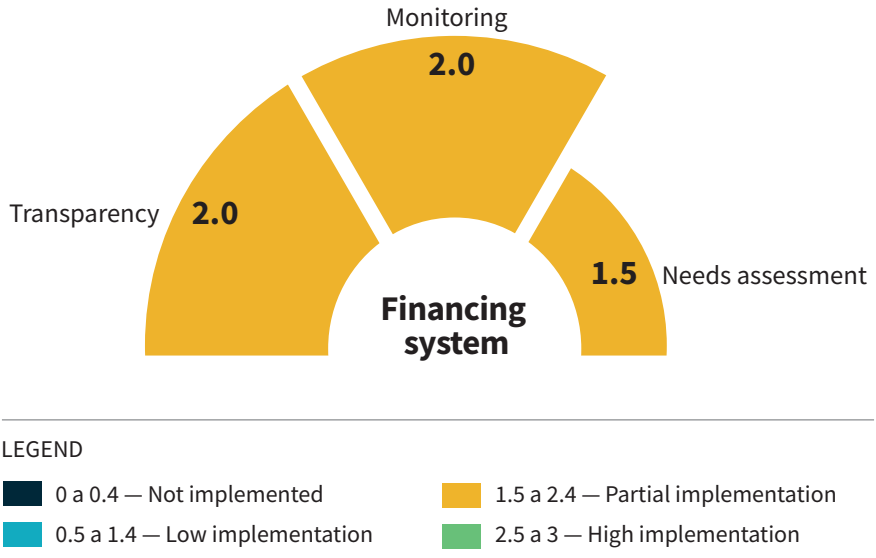
Source: Created by the authors.

The second group consists of policies, programs, and financial instruments that remain at an **early stage of implementation**, including: the **Ecological Transformation Plan**, the **NIB** (New Industrial Policy), the **Mover Program**, the **Eco Invest Brazil Program**, the **Energy Transition Acceleration Plan** (Paten), the **Special Incentive Regime for Low-Carbon Hydrogen Production** (Rehidro), the **Offshore Wind Regulatory Framework**, and the **Brazilian Greenhouse Gas Emission Trading System** (SBCE).

These initiatives have not progressed beyond the public agenda formation stage, as they are still under discussion in Congress or lack the necessary regulatory framework. Additionally, they do not yet have sufficient institutionalization—such as clear guidelines, defined objectives, targets, or approved budgets. They propose the introduction of new financial instruments into the national financing system, including sustainability taxonomies for projects and activities, a carbon pricing system, selective taxes, long-term foreign exchange protection instruments, and credit cost reduction mechanisms.

These instruments are essential to lowering perceived investment risks for private investors, whether through a favorable regulatory environment or by establishing protection mechanisms against losses and guarantees. However, the necessary regulatory framework remains underdeveloped and requires further refinement by the relevant authorities (see Figure 9).

Figure 9 – Assessment of the Financing System



Source: Created by the authors.

While Brazil currently ranks **6th globally in energy transition investments**, primarily due to investments in renewable energy and transmission lines, certain strategic sectors—such as nuclear energy, energy storage, carbon capture, utilization, and storage (CCUS), hydrogen, and electrification—still receive **insufficient investment**. The low investment levels in these sectors result from a combination of their early-stage technological development and the lack of a regulatory framework.

Based on the information presented in the previous sections, the audit report concludes that the existing or planned financing system by the Federal Government is only **partially aligned with the investment needs of Brazil's energy transition**.

Assessment of Governance Structures for Energy Financing

The TCU's assessment concluded that public governance over energy financing presents some **institutional capacity deficits**. Knowledge of investment needs and funding sources, as well as monitoring and transparency regarding investments and expenditures in energy transition, largely inherit elements of the previous paradigm, which was limited in sectoral scope. A new approach is needed to provide a consolidated and centralized view of the financial flow of Brazil's energy transition.

The Federal Government points to the **Climate Plan** as the path to achieving the necessary institutional capacity for managing the energy transition. The Climate Plan will guide Brazil's climate policy until 2035, consolidating sectoral mitigation plans. For the energy and mining, industry, and transportation sectors, PLANTE will serve as the instrument that will outline, among other things, **activity costs**, **financing alternatives**, and **monitoring and transparency strategies**.

Until PLANTE is operational, there is no fully implemented energy financing system in place that allows the government to manage the activity according to best-known practices, in an optimal and satisfactory regime with minimal vulnerability to political cycles.

Resources for Investment, Financing, and Support of Brazil's Energy Transition

It was found that the financial flow and financing instruments currently indicated by the Federal Government for funding the energy transition investment needs are sufficient to continue Brazil's historical pace of investments in mature low-carbon energy technologies (hydropower, wind, solar, traditional biofuels, natural gas, and electric mobility). However, the same cannot be said for more ambitious objectives, such as reindustrializing the country on a green basis.

Since no official Federal Government survey was found regarding Brazil's energy transition investment needs, specialized literature on the subject was consulted. The World Economic Forum presents a more conservative estimate, pointing to an investment requirement of **R$ 600 billion by 2030**, which can be considered a minimum threshold for Brazil's possible investments in its energy transition and economic decarbonization. At the opposite extreme, the Boston Consulting Group (BCG) estimates **R$ 8 trillion in investments** under a broader perspective of full national reindustrialization by **2050**, thus representing an upper limit for Brazil's energy transition investment horizon (see Table 1).

Table 1 – Comparison of Estimates Between WEF and BCG

Institution	Investment Needs Estimate	Time Horizon	Annual Average
World Economic Forum	R$ 600 billion	2030	R$ 85 billion
Boston Consulting Group	R$ 8 trillion	2050	R$ 308 billion

Source: Created by the authors.

Ongoing initiatives to meet Brazil's energy transition investment needs:

1. **Energy Transition and Security Axis of the Novo PAC:**

   - **Description:** The program signals investments in power generation and transmission, low-carbon fuels, energy efficiency, mining, and universal energy access.

   - **Value:** R$ 228.9 billion.

2. **BNDES Financing Capacity:**

   - **Description:** BNDES finances energy transition projects based on its recent disbursement history.

   - **Annual Average Value (2019-2023):** R$ 18 billion.

3. **Banco do Nordeste (BNB):**

   - **Description:** BNB invests in infrastructure with a focus on renewable energy in the Northeast region.

   - **2023 Investment:** R$ 11 billion (70%-80% for energy).

   - **2024 Budget:** R$ 8.1 billion for renewable energy.

4. **Climate Fund:**

   - **Description:** The National Policy on Climate Change (PNMC) finances projects that reduce GHG emissions and support climate adaptation.

   - **2024 Value:** Up to R$ 10 billion.

5. **Incentivized Debentures:**

   - **Description:** Long-term financing mechanisms for priority infrastructure projects with tax benefits.

   - **Average Annual Issuance in the Last 4 Years:** R$ 41 billion.

6. **PPA 2024-2027 Subsidies:**

   - **Description:** Subsidies for energy transition programs, including tax, credit, and financial incentives.

   - **Value:** R$ 127 billion.

7. **Other subsidies: RenovaBio and the Energy Development Account (CDE)**

   - **Description:** These include subsidies such as the decarbonization credits under RenovaBio and funds allocated through the Energy Development Account (CDE) to support incentivized energy sources, such as wind, solar, small hydropower plants, and biomass.

   - **2023 Value:** R$ 4.5 billion for biofuels and R$ 18 billion for renewable energy sources.

Considering these initiatives, the available resources for investment, financing, and support of Brazil's energy transition align with the lower-end investment estimate for 2030 (R$ 600 billion). However, they remain far from the multi-trillion estimates for 2050.

This gap persists even when considering the initiatives currently being implemented by the Federal Government (see Table 2).

Table 2 – Breakdown of Financing and Support for Brazil's Energy Transition

	Sources (R$ billion)		
Status / Goal / Instrument	**Public National**	**Private**	**Total**
FUNDING	**27**	**40**	**67**
ECO Invest Brasil	27		27
LCD		40	40
SUPPORT	**1.137,6**	**287**	**1.424,6**
NIB	300		300
Paten	800		800
Mover	19,3		19,3
Rehidro	18,3		18,3
Offshore Wind Framework		287	287
TOTAL	**1.164,6**	**327**	**1.491,6**

Source: Created by the authors.

Programs such as the Ecological Transformation Plan, NIB, Mover, Eco Invest Brasil Program, LCD, Paten, Rehidro, and the Offshore Wind Framework remain in an early stage of implementation. These programs introduce new financial instruments to the national financing system, such as sustainable project taxonomy, carbon pricing systems, selective taxes, long-term foreign exchange protection instruments, and credit cost reduction mechanisms, in line with global trends.

International public concessional financing has historically had low relevance in Brazil's energy transition due to the stringent requirements imposed by international funds and multilateral organizations for project approval and resource disbursement. Thus, it is considered a low-implementation alternative.

Conversely, private financing is significant for energy transition investments in Brazil. However, private sources highly depend on sectoral regulatory frameworks and the Federal Government's financial incentives to mitigate investment risks. Consequently, private sector participation in energy transition investments is expected to increase only as regulations are consolidated, particularly in areas such as low-emission hydrogen, carbon capture, offshore wind, and a national carbon pricing system.

A key alternative to bridge this gap is the effective implementation of a regulated emissions market in Brazil. Law No. 15,042/2024 established the Brazilian Greenhouse Gas Emissions System (SBCE). The law's regulations will define emission caps for facilities emitting over 25,000 tons of CO2 per year.

A study conducted by WayCarbon, in partnership with ICC Brasil, estimates that Brazil's revenue potential from carbon credits by 2030 has increased from US$ 100 billion to US$ 120 billion, considering an optimistic scenario of US$ 100 per ton of CO_2. This would translate into at least R$ 600 billion in incentives for climate change mitigation and energy transition.

Brazil's comparative advantages will only become competitive if the country overcomes fiscal and regulatory challenges that limit public and private investments. Amid limited domestic financial resources and fierce competition from multi-billion-dollar incentive programs like the U.S. Inflation Reduction Act (IRA) and the European Green Deal, **additional efforts will be required to finance the energy transition**. Beyond changes to the energy mix, there is an ongoing technological race that could redefine the development trajectory of early adopters.

In a scenario of limited fiscal space, difficulty in attracting larger flows of public concessional international capital, and the creation of costly incentives to attract private capital, certain aspects of Brazil's energy strategy stand out as inconsistent with the objectives of the national energy transition, constituting Finding 2 of the report.

Finding 2: Inconsistencies in Brazil's Energy Transition Financing Strategy

Among the structural barriers to investments in sustainable energy and technologies that reduce their financial feasibility is public support for fossil energy sources. The gradual elimination of fossil fuels is a challenge for all countries worldwide. However, the phase-out of oil takes on critical contours for Brazil, as the country has significant potential for both fossil and renewable energy production.

In recent years, Brazil has demonstrated what environmentalists consider an **ambiguous** commitment to the climate targets established in the Paris Agreement. While acknowledging the urgency of reducing GHG emissions and developing ambitious plans for energy transition and economic decarbonization, the reality reveals a continued preference for fossil fuels.

It is recognized that the energy transition must be a gradual process to avoid adverse economic impacts on the population. Additionally, the future will not be entirely free of oil and natural gas, not only due to their necessity in hard-to-abate sectors but also for petrochemical applications.

Audit examinations concluded that Brazil's strategy of continuing oil and gas exploration does not conflict with its NDC and aligns with the trends agreed upon at COP. However, **it remains unclear how this strategy aligns with the declared goal of reindustrializing the country on a green basis.**

The TCU audit identified the following inconsistencies in Brazil's energy transition financing strategy that support this perception:

1. Underutilization of Oil Revenue for Energy Transition Financing

Given a scenario of fiscal constraints and increasing public debt, national petroleum revenue does not constitute a significant source of financing for the energy transition. Aside from the R&D clause, the Climate Fund is the only instrument receiving oil revenue as a percentage of special participation fees.

From 2011 to 2023, the Climate Fund received R$ 1.83 billion, according to the Department of Fund and External Resources Management of the Ministry of the Environment. In the same period, total government revenues from oil exploration reached R$ 756 billion, with R$ 433 billion from special participation fees. Thus, only 0.42% of these fees, or 0.24% of total government royalties, were allocated to the Climate Fund.

2. Imbalance in Public Investments Between Fossil and Renewable Energy

The updated budget for June 2024 indicates that projects under the Energy Transition and Security axis of the Novo PAC amount to R$ 596.3 billion, aiming to make Brazil's energy matrix more efficient and sustainable. However, of this total, around **62% (R$ 367.4 billion) is allocated to fossil fuel** production, while only 38% (R$ 228.9 billion) is directed toward renewable or low-carbon energy (including natural gas). In other words, **for every R$ 1.00 invested in renewable energy, R$ 1.60 is invested in fossil fuels**.

3. Distortions in Brazil's Energy Subsidy Structure

Although Brazil's energy matrix is rich and diverse, it presents distortions in its subsidy structure, disproportionately favoring fossil energy sources over renewables.

According to an analysis by the Institute for Socioeconomic Studies (Inesc), Brazil's national energy subsidy structure in 2023 revealed two contradictions—one related to the distribution of subsidies between fossil and renewable sources and another concerning the allocation between production and consumption:

- **For every R$ 1.00 in incentives for renewable energy sources, approximately R$ 4.00 is subsidized for fossil fuels.**
- **For every R$ 1.00 in subsidies for renewable energy consumption, R$ 18.95 subsidized fossil fuel consumption.**

4. Absence of a Carbon Pricing System

To definitively close the cost gap between sustainable projects and their fossil competitors, it is necessary to establish mechanisms to penalize high-GHG-emission assets and provide operational incentives for reducing carbon intensity in operations. Additionally, strategies are needed to gradually phase out fossil fuels by ending public support for this type of energy.

In Brazil, there are two fronts for carbon pricing: one for the creation of a **selective tax** as part of tax reform and another for the establishment of the SBCE, promoted by Complementary Law No. 214/2025 and Law No. 15,042/2024, respectively. Both still require subsequent regulatory definitions.

The new Brazilian carbon market could generate significant financial resources through the trade of certificates, quotas, and carbon credits, with Brazil having the potential to supply credits to the world, especially through agroforestry activities.

JUST AND INCLUSIVE ENERGY TRANSITION

Sustainable development is based on social, economic, and environmental dimensions, which are intrinsically connected, as there are cause-and-effect relationships between deprivations in any of these spheres. From this perspective, analyzing the energy situation of the population is fundamental to explaining exclusion processes and defining applicable policies for a given socioeconomic system, since the progress of a society is related to energy access as well as the energy intensity of a country or region. In this sense, **poverty reduction also refers to minimizing limitations on access to energy**.

Along these lines, the concept of **climate justice** is brought into the discussion, indicating an **equitable and inclusive approach to transforming a society's energy system**. A just transition seeks to ensure that the economic and social impacts of shifting to more sustainable energy sources are fairly distributed and that no group in society is left behind. From this perspective, Brazil's oil revenues can play a significant role—from financing or subsidizing renewable energy and developing infrastructure to research and the development of new technologies, as well as supporting affected communities, retraining professionals, and promoting regional development.

In alignment with this approach, the United Nations has established clean and affordable energy as one of the Sustainable Development Goals (SDGs) of its 2030 Agenda, aiming to "ensure access to affordable, reliable, sustainable, and modern energy for all". As it is a multidimensional phenomenon, energy access is also linked to other SDGs, such as poverty eradication, health and well-being, reducing inequalities, sustainable cities and communities, climate action, and life on land, among others.

In the international context of transitioning to a low-carbon economy, there are challenges in aligning interests and coordinating actions among countries. There is no consensus on how to equitably distribute the responsibilities and efforts needed to achieve the goals defined in the Paris Agreement. Within this scenario, a **just energy transition is a multifaceted concept encompassing various dimensions and meanings**, reflecting the complexity of transforming global energy systems in a way that is not only efficient and sustainable but also equitable and inclusive.

From a practical standpoint, a just transition relates to the following elements, among others:

- the **historical responsibility** of emitting countries for the climate emergency and the right of developing nations to also utilize their natural resources for the benefit of their people;

- **reducing the economic and social impacts** of climate mitigation measures on disadvantaged countries and communities (affordable energy);

- **protecting workers and communities dependent on fossil fuel industries** by offering retraining, employment opportunities in new energy sectors, and economic support during the transition.

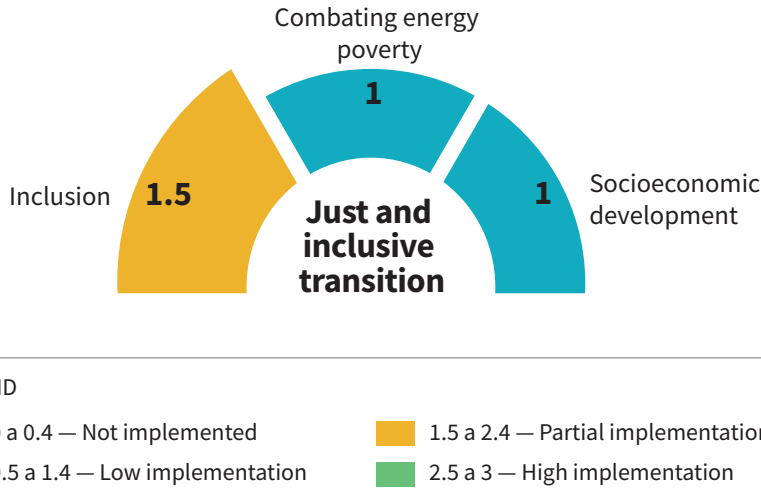
In Brazil's case, the recently published CNPE Resolution No. 5/2024, which established the National Energy Transition Policy (PNTE), the National Plan for a Just Energy Transition (PLANTE), and the National Energy Transition Forum (FONTE), defines three key concepts related to a just and inclusive energy transition in its Article 2, II. In addition to the concept of a just and inclusive energy transition itself, the resolution presents definitions for energy equity and energy poverty. Moreover, at least four of the twelve PNTE guidelines are directly related to a just and inclusive transition.

Assessment of a Just and Inclusive Energy Transition in Brazil

As part of its oversight activities, an evaluation was conducted on the Federal Government's efforts to implement a just and inclusive energy transition. The following analytical components were defined (see Figure 10):

I) inclusion;
II) combatting energy poverty;
III) socioeconomic development.

Figure 10 – Assessment of a just and inclusive energy transition



Source: Created by the authors.

Regarding inclusion, it was concluded that while the Federal Government has made progress in identifying vulnerable populations and expanding their participation in decision-making processes, there is still a long way to go in integrating equitable measures into governmental strategies.

Concerning combatting energy poverty, little progress has been made in ensuring access to clean energy for vulnerable communities. Additionally, although tariff mechanisms exist to keep energy prices affordable, they are deemed insufficient to alleviate the burden of energy costs on the budgets of the most vulnerable households.

As for socioeconomic development, the implementation of strategies for developing fossil-fuel-dependent communities, generating employment and income, and reducing regional inequalities has been minimal.

Thus, the Federal Court of Accounts (TCU) concludes that **the Federal Government's actions aimed at promoting a just and inclusive energy transition in Brazil remain in an early stage of implementation**.

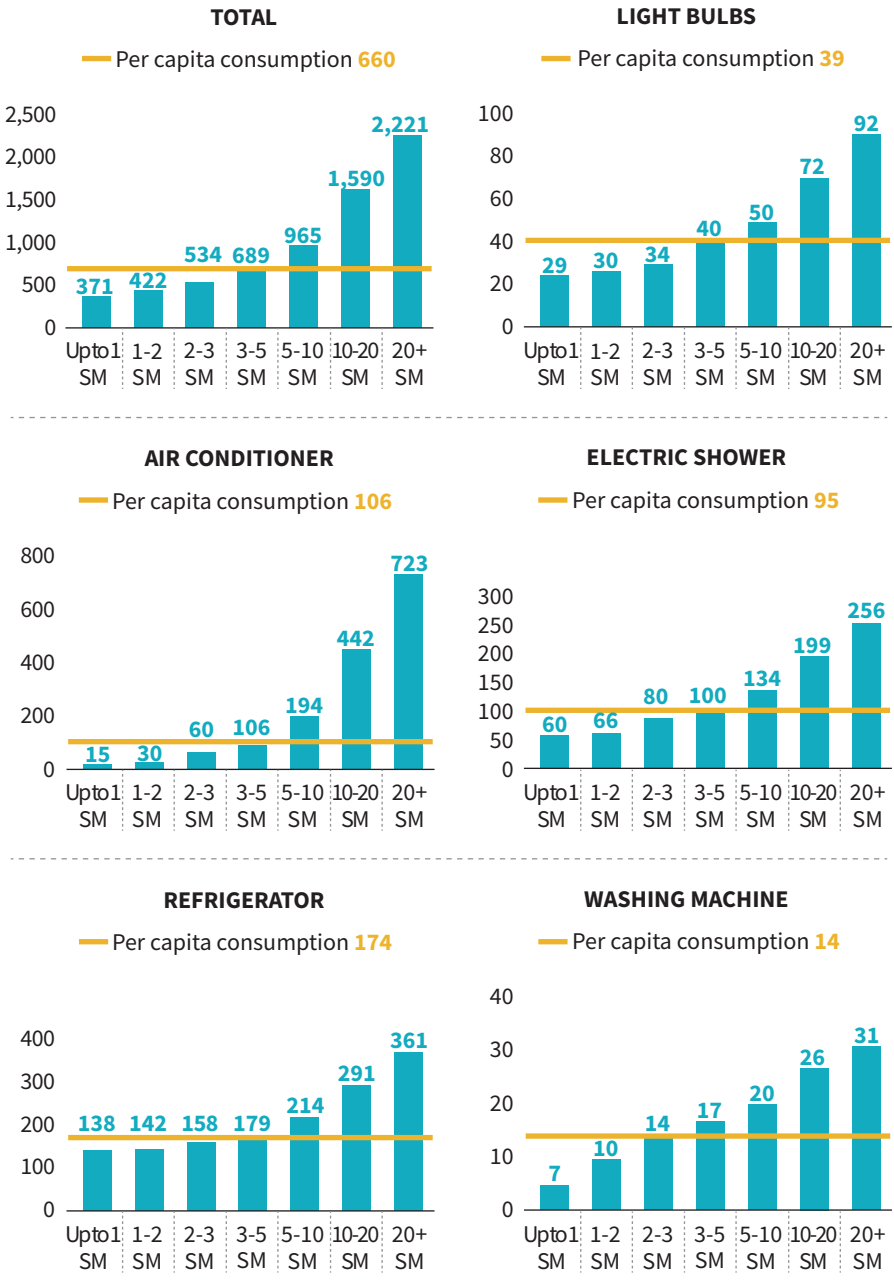
Energy Pricing Accessibility in Brazil

Although Brazil is widely recognized as a country rich in energy resources, enjoying competitive advantages in energy production compared to most nations, this advantage is not fully reflected in energy prices, particularly in electricity tariffs, when measured against the population's purchasing power. According to the Brazilian Association of Large Energy Consumers, a comparative study of electricity prices among 34 OECD countries found that **Brazil had the highest residential electricity tariff**. This means that energy expenses weigh more heavily on Brazilians than on consumers in developed countries like the United States and Spain, as well as in emerging nations such as Chile and Turkey.

Regarding the affordability of energy prices in Brazil, a study by the Institute for Research and Consulting Intelligence revealed that **approximately 46% of the Brazilian population spends half or more of their household income on electricity and gas bills**. According to international standards, energy expenses (electricity and natural gas) should not exceed 10% of household income to ensure families can afford other essential expenses.

Chart 4 below, extracted from a study by the Energy Research Office (EPE), illustrates the inequality in energy consumption between the poorest and wealthiest segments of the population across various household appliances, highlighting disparities in consumption levels between different social classes. The data clearly show how energy costs contribute to differences in well-being among different economic groups.

Chart 4 – Social Inequality in Energy Consumption



Source: EPE (Energy Research Office)

This situation of energy poverty has already been highlighted by the TCU in previous audit work, notably in the Operational Audit on the Electricity Sector Tariff Policy, ruled by Court Decision No. 1,376/2022-Full Court (Case No. 014.282/2021-6, rapporteur: Minister Benjamin Zymler).

Finding 3: Lack of Institutionalization and Implementation of Actions to Promote Energy Justice

During the audit, several public policies aimed at expanding access to clean energy for vulnerable populations were identified, including the Light for All Program, the Social Electricity Tariff (TSEE), the Amazon Energy Program, the Brazilian Gas Subsidy Program, and the Clean Energy Program within the My Home My Life initiative. However, while these initiatives contribute to combating energy poverty, they were found to be **palliative and insufficient to address the issue of equity within the Brazilian energy system.** Although Brazil's progress in expanding access to electricity—particularly through the Luz para Todos Program—is acknowledged, there is a lack of more coordinated and well-equipped efforts to resolve the high cost of energy in the country, especially for vulnerable families.

Some of these initiatives include targets to reduce energy prices for low-income populations; however, such goals are isolated from a broader context that would enable real progress on the issue. As a result, there is a **lack of institutionalization and instrumentation of clear criteria or measurable objectives for a just energy transition.**

Finding 4: Government Initiatives Inconsistent with the Goal of a Just Energy Transition

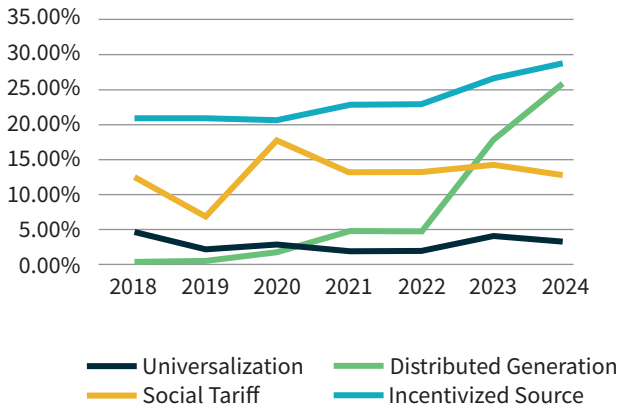
While there are public policies in place to promote access to energy among vulnerable populations, there are also **inconsistent measures that negatively affect electricity rates.** This situation, combined with the already mentioned lack of institutionalization and instrumentation of energy justice measures, further burdens household income with energy expenses and deepens the problem of energy poverty in the country.

Among the factors that negatively affect electricity rates, **cross-subsidies stand out. In some cases, they benefit certain sectors of society at the expense of the majority of consumers.** In addition, these incentives pose a risk to the financial sustainability of the electricity market in Brazil—a phenomenon referred to by sector specialists as the "death spiral."

The CDE (Energy Development Account) is a budget line created by Law No. 10,438/2002 to fund energy development. In addition to incentives for the Net Metering System (SCEE), this fund consolidates charges to ensure universal access to electricity, the social tariff, support for electricity consumption among low-income populations, irrigation, increased competitiveness of renewable sources and mineral coal, and fossil fuel consumption costs.

Although some CDE components are aimed at combating energy poverty (universal access and the social tariff), components that hinder energy justice—such as distributed generation and incentivized sources—are increasingly significant in terms of their share within the CDE. Chart 5 below shows the percentage change of these components in the total CDE amount from 2018 to 2024.

Chart 5 – Percentage Change of CDE Components From 2018 to 2024



Source: Created by the authors based on data from Aneel.

This data reveals a clear **contradiction with the objective of energy justice.** While components aimed at greater equity in energy access have shown little progress over the period, socially regressive components have increased significantly.

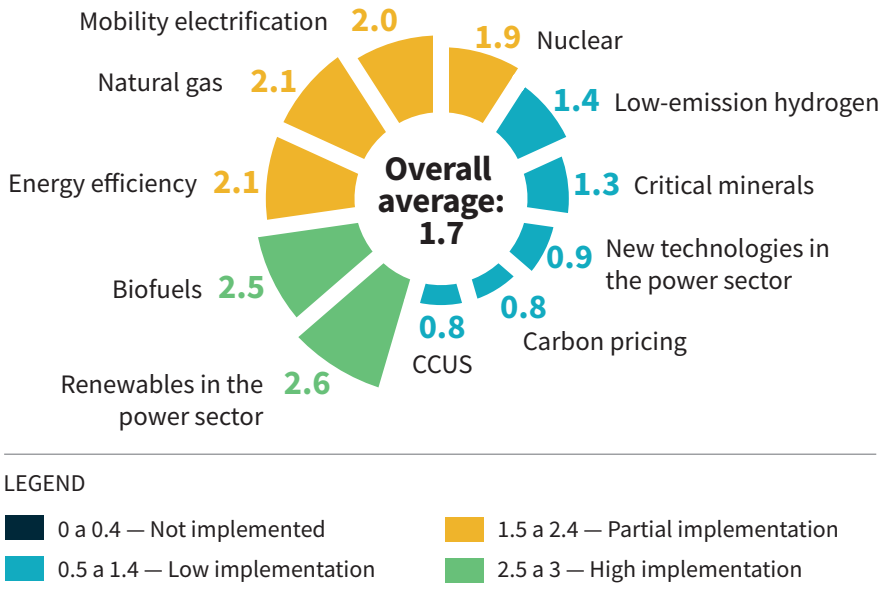
Finally, ongoing bills and provisional measures were also identified that extend, increase, or create subsidies detrimental to energy justice, which may further perpetuate this unfair model.

MATURITY OF FEDERAL ACTIONS ON KEY TOPICS OF THE ENERGY TRANSITION

In the current context of climate change and the urgent need to transition to more sustainable energy sources, the State's role in promoting and implementing effective energy policies is increasingly important.

To assess Brazil's progress and challenges in this energy transition scenario, the TCU carried out a comprehensive evaluation of the current status of various federal policies and actions. The analysis covered eleven topics considered crucial for the energy transition, aiming to assess their level of implementation and identify areas requiring urgent attention (see Figure 11).

Figure 11 – Evaluation of the Implementation of Federal Government Policies on Energy Transition



Source: Created by the authors.

Three policy clusters were identified, based on their level of maturity:

1. **High level of implementation:** public policies responsible for incorporating renewable energy sources into the national energy mix—solar, wind, biomass thermal energy—and traditional biofuels (first-generation ethanol and ester-based biodiesel).

2. **Policies in place but still lacking structural consolidation:** energy efficiency policies that aim to promote greater integration of natural gas and nuclear energy into Brazil's energy matrix, as well as policies supporting electric mobility development.

3. **Low level of implementation:** policies for the introduction of low-emission hydrogen, adoption of new technologies in the electricity sector, advanced fuels (second-generation ethanol, renewable diesel, biogas and biomethane, sustainable fuels for aviation and maritime transport, and synthetic fuels), carbon capture, utilization and storage (CCUS), development of critical minerals for the energy transition, and the creation of a regulated emissions pricing system.

From the results obtained, several general conclusions can be drawn:

a) All evaluated topics have **surpassed the agenda-setting phase**, indicating that key issues in energy transition are being publicly discussed and studied;

b) Civil society **participation** has been a common practice in the policy formulation processes for nearly all of the topics evaluated;

c) Seven of the eleven topics show relatively satisfactory levels of institutionalization (scored between 2 and 3), but relevant topics still lack adequate regulation;

d) **The implementation of clear goals and objectives within public policies is weak in Brazil,** with an overall average score of 1.3. Five of the eleven topics received a score of 1 or 0, and the others also have room for improvement in setting policy goals;

e) Despite **weak implementation regarding the stability of public policies** (average score of **1.2**), six of the eleven topics scored **1 or 0**, most of which relate to emerging areas. Future assessments will be needed to determine the long-term stability of these policies;

f) **There is low implementation of public policy performance evaluations**, with an overall average of **0.5**. All topics assessed showed low or no implementation of performance evaluation practices, indicating a critical failure in monitoring and assessing public policies.

Some specific aspects related to the evaluated topics also deserve mention:

- Except for the topic of critical minerals for the energy transition, the other areas classified as having low implementation relate to technologies still under development or whose regulation is recent in most countries;
- Among newer topics, only low-emission hydrogen has been formally regulated;
- In terms of resilience to political cycles, no consistent patterns were observed. However, well-established policies—such as those on energy efficiency and renewables in the SEB—stood out;

- Delays in developing the legislation, regulations, and other governmental actions necessary for new technologies may significantly hinder the implementation of the energy transition policy;

- The lack of a clear and updated regulatory framework may discourage investment in new technologies;

- The absence of performance evaluations to verify the effectiveness and efficiency of implemented public policies in addressing the energy transition challenge is a critical concern.

Based on this assessment of the maturity of government actions on key topics essential to achieving the energy transition, it is concluded that several specific risks and challenges must be addressed by the Federal Government in implementing the necessary public policies.

This type of evaluation is considered a good practice that the Federal Government could adopt to support the improvement of policies under implementation or development.

CONCLUSION

The main takeaway from this audit is that, despite recent efforts and Brazil's renewed leadership in climate action, the federal government still operates under a fragmented governance model, with disconnected sectoral initiatives.

The publication of CNPE Resolution 5/2024, which established the National Energy Transition Policy, is a step forward; however, there is still no evidence of a coordinated effort to align sectoral decarbonization initiatives with the Climate Plan mandated by Law No. 12,187/2009.

The audit assessed four dimensions: institutionalization and governance, financing, key themes in federal energy transition policies, and a just and inclusive energy transition.

On the governance front, the creation of the National Secretariat for Energy Transition and Planning (SNTEP) and the reactivation of the Interministerial Committee on Climate Change (CIM) are important milestones. However, the absence of sector-specific energy plans with GHG mitigation targets is a critical gap. SNTEP has yet to implement necessary governance and planning instruments such as medium- and long-term plans, performance indicators, and monitoring systems.

In terms of financing, the current system is only partially aligned with the scale of investment required. There is a lack of institutional capacity in public energy financing governance, and Brazil's strategy still lacks a centralized and consolidated approach. While there are advanced financial mechanisms in place—such as the new Growth Acceleration Program (PAC), incentivized debentures, and the Climate Fund—several initiatives under the Green Transformation Plan are still in early stages of implementation.

The audit also identifies inconsistencies in the financing strategy, such as the underutilization of oil revenues and the persistence of high fossil fuel subsidies.

As for a just transition, the concept is still under development in Brazil. Institutionalization and implementation of justice-oriented energy actions remain insufficient. Subsidy policies, such as the Energy Development Account (CDE), result in tariff distortions that disproportionately burden the poorest segments of the population.

When it comes to the main federal actions, the audit identifies three policy categories: those with advanced implementation, such as hydropower and solar energy; those requiring consolidation, such as energy efficiency and the electrification of mobility; and those with low implementation levels, including low-emission hydrogen and carbon capture.

The audit concludes that the federal government faces significant challenges in delivering on these policies and recommends regular evaluations to identify risks and improve current initiatives.

In short, the TCU audit finds that while progress has been made, energy transition governance and management in Brazil still require substantial improvements to ensure effective implementation aligned with international climate commitments.

To address the key findings, the TCU issued Court Decision No. 2,470/2024-Full Court, with the following decisions:

- Instruct the Ministry of Mines and Energy to prepare, within 180 days, an action plan listing the activities and timeline to:
  - conduct a technical study to support the review of the electricity sector subsidy matrix in order to promote energy justice;
  - establish measurable goals and parameters to fulfill Brazil's energy justice ambitions, using quantifiable indicators and targets in coordination with other relevant ministries.

- Recommend that the Ministry of Mines and Energy:

  - in coordination with other relevant ministries, review the financing strategy for Brazil's energy transition, with the aim of addressing the underuse of oil revenues, the imbalance in public investments between fossil and renewable energy, and distortions in the subsidy matrix;

  - conduct a diagnostic study to define Brazil's energy justice objectives, with indicators and targets capable of demonstrating policy progress and ensuring a just and inclusive energy transition, especially for vulnerable populations;

  - carry out periodic evaluations on energy transition-related topics, such as: biofuels; carbon capture, utilization and storage; energy efficiency; electrification of mobility; nuclear energy; natural gas in the energy matrix; low-emission hydrogen; critical minerals; new technologies in the Brazilian Electric System (SEB); carbon pricing; and renewable energy in the SEB. These evaluations should serve to identify risks and challenges that can support improvements to existing initiatives or the creation and regulation of new policies to drive emerging technologies.

- Inform the Interministerial Committee on Climate Change of the need to incorporate sectoral mitigation plans into the National Climate Change Plan (Climate Plan).

The audit's findings are expected to help improve coordination and integration across public policies and institutions involved in Brazil's energy transition at the macro level. Among other societal benefits, this audit aims to support Brazil in balancing the energy "trilemma" (energy security, energy equity, and environmental sustainability), seizing opportunities associated with the energy transition, advancing a socially just transition, and meeting its international climate commitments.

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