



***Evaluation of Just Transition in the  
renewable energy sector in Brazil***

**EVALUATION REPORT**

**Centro Brasil no Clima**

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## DISCLAIMER

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The ECD activity was a learning-oriented activity which aimed to 1) enhance the capacity of CIF Observers to assess, analyze, and evaluate climate interventions on the ground; and 2) generate demand-driven evidence and knowledge on priority topics. This activity was a partnership between the CIF, Global Evaluation Initiative (GEI), and the Center for Learning on Evaluation and Results for Lusophone Africa and Brazil (CLEAR LAB). To support this learning process, 5 call for proposals submitted by Observers were competitively selected to apply learning from evaluation capacity building training, to undertake their own rapid evaluative study. For each study, a dedicated mentoring team from a regional CLEAR center was assigned to each study to provide support from study design to implementation.

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## Acronyms

ABEEólica	Brazilian Wind Energy Association
ABSOLAR	Brazilian Photovoltaic Solar Energy Association
ANEEL	Brazilian Electricity Regulatory Agency
BNDES	National Bank for Economic and Social Development
BNE	Bank of Northeast
CBC	Brazil Climate Center
CIF	Climate Investment Funds
CLEAR	Center for Learning on Evaluation and Results for Lusophone
CNPE	National Energy Policy Council
CONAQ	National Coordination of the Articulation of Black Rural Quilombola Communities
COPPE/UFRJ	Institute for Graduate Studies and Research in Engineering at the Federal University of Rio de Janeiro
EOI	Expressions of Interest
EPE	Energy Research Company
ESG	Environmental, Social and Governance
FGV	Getulio Vargas Foundation
FONTE	National on Energy Transition Forum
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IADB	Interamerican Development Bank
IDP	Industry Decarbonization Program
ILO	International Labor Organization
INESC	Institute of Socioeconomic Studies
JET	Just Energy Transition
JTI	Just Transition Initiative
LAC	Latin America and Caribbean
MDBs	Multilateral Development Banks
MMA	Ministry of the Environment and Climate Change
MME	Ministry of Mines and Energy
MMGD	Micro and Mini Distributed Generation
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
PATEN	Energy Transition Acceleration Program
PDE	Tem-Year Energy Plan
PLANTE	National Energy Transition Plan
PNE	National Energy Plan
PNTE	National Energy Transition Policy
PPE	Energy Planning Program
REN	Renewable Energy
SIN	National Interconnected System
ToC	Theory of Change
UFC	Federal University of Ceará
UFRB	Universidade Federal do Recôncavo da Bahia

## Executive Summary

The energy transition, understood as the gradual replacement of fossil fuels by renewable sources, is seen as a fundamental action for the decarbonization of the global economy and the achievement of the Paris Agreement targets. In this regard, Brazil holds a privileged position, not only because it has historically had an energy matrix with a high share of renewables (especially hydroelectricity and biomass), but also due to its significant potential for the expansion of wind and solar energy, sources that have presented strong growth in the country in recent years.

However, as the transition progresses, questions also arise about undesirable impacts, which in most cases fall on developing (or less developed) countries and/or disadvantaged groups within society. Alongside these concerns, the concept of a just energy transition is gaining ground, aiming to incorporate the socio-economic dimension into decision-making, in order to ensure a fairer distribution of the benefits and costs of the transition and to prevent negative impacts on affected groups.

In many regions and countries, this process is mainly related to the loss of jobs due to the closure of fossil fuel-related activities. But in different contexts, such as Brazil, issues also arise related to the impacts caused by wind and solar energy projects, which may affect nearby populations, traditional communities, ecosystems, as well as specific social groups such as women and the elderly.

Within this context, an evaluative study was carried out with the aim of improving the understanding of the impacts of the expansion of wind and solar energy in Brazil based on the principles of a just transition, identifying relevant aspects so that recommendations can be formulated to ensure a just energy transition in the implementation of interventions (policies, programs, and projects) in this sector.

As a starting point for this analysis, a Theory of Change – ToC (a tool widely used in the design of interventions) was developed that could serve as a model for stakeholders in the sector. This ToC includes two main types of activities, one related to stakeholder engagement, and the other to impact assessment, which, if properly implemented by policy makers, project developers (e.g. development banks) and entrepreneurs, would

result in greater stakeholder participation and trust, consideration of impacts in decision-making, and ultimately, would lead to a just energy transition.

The methodologies used in this evaluation included data collection through literature review, document analysis, stakeholder mapping, and conducting interviews. This collection aimed to answer three evaluation questions that were formulated, as recommended by the methodology:

- Q1: What are the key principles that must be considered to ensure a just energy transition in the renewable energy expansion in Brazil?
- Q2: What renewable energy transition is planned, what are the identified problems, and what needs to change to ensure it is just and fair?
- Q3: How can these principles be incorporated into an ideal framework for a Just Energy Transition within the renewable energy expansion in Brazil?

Ten interviews were conducted with representatives from government, the private sector, academia, civil society, traditional communities, and the financial sector. The analysis of the interviews allowed for the identification of themes and subthemes (e.g., rural, Indigenous and quilombola communities; employment income generation; eradication of poverty and energy vulnerability) that were addressed in the responses, associating them with the evaluation questions. The data analysis also included triangulation between the results obtained from the different data collection methods, aiming to find convergences, divergences, and complementarities.

Regarding question Q1, the analysis indicated the presence of the principles of recognition, participation, distribution, and restoration as fundamental to guiding a just energy transition. These principles, already well-established in international literature, were reaffirmed by national perceptions, pointing to concrete paths for their strengthening. The importance of **recognizing** structural and historical inequalities was identified, especially those experienced by traditional communities and vulnerable populations. In the field of **participation**, the urgency of expanding mechanisms for active listening and qualified engagement from the early stages of planning was

highlighted, with initiatives such as the National on Energy Transition Forum (FONTE)<sup>1</sup> being mentioned as promising institutional advances. Concerning the **distributive** dimension, the findings reinforced the need for a better distribution of the burdens and benefits, as well as ensuring that the transition fosters regional and national development. Finally, regarding the **restorative** principle, the articulation between policies for productive inclusion, technical education, and the strengthening of local economies was advocated as a means to transform the energy model into a vector for social justice and regional development.

With respect to planning, the problems, and the necessary changes (Q2), the results of the analysis were organized into three sub-items: i) injustices to be addressed; ii) affected groups; and iii) groups with decision-making power. The elements analyzed in these sub-items contribute to a detailed structuring of the Theory of Change, identifying impacts and affected groups that should receive greater attention in impact assessments, as well as improvements that must be made in stakeholder engagement and in public participation in decision-making.

The findings reveal a set of structural challenges and indicate the urgency of reviewing current models for the formulation and implementation of energy policy. The interviews suggest that the existence of legal consultation mechanisms, such as those provided for in the International Labor Organization (ILO) Convention 169<sup>2</sup>, has not guaranteed, in practice, qualified and respectful listening processes that are attuned to the ways of life of traditional populations. Intangible impacts on territories, cultural ties, and community well-being, associated with unbalanced land contracts and speculative pressures, demonstrate how projects can exacerbate pre-existing vulnerabilities. The intersectionality of these effects (with distinct implications for vulnerable groups) reinforces the need for approaches that acknowledge the structural inequalities that

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<sup>1</sup> The National Forum on Energy Transition (Fonte) is a consultative and permanent body, established under the National Energy Transition Policy (PNTE) to promote broad and democratic debate on the energy transition in Brazil. It brings together representatives from the government, civil society, and the productive sector to discuss and propose solutions to the challenges of transforming the Brazilian energy matrix.

<sup>2</sup> Available at:

[https://normlex.ilo.org/dyn/nrmlx\\_en/f?p=NORMLEXPUB:55:0::NO::P55\\_TYPE,P55\\_LANG,P55\\_DOCUMENT,P55\\_NODE:REV,en,C169,/Document](https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:55:0::NO::P55_TYPE,P55_LANG,P55_DOCUMENT,P55_NODE:REV,en,C169,/Document)

permeate rural areas and urban peripheries. On the other hand, decision-making power remains concentrated within state institutions, regulatory agencies, and financial actors, while civil society remains largely invisible in these arrangements. This asymmetry between those who decide and those who are impacted accentuates the disconnect between policies and social realities. Although recent initiatives such as FONTE point to attempts to broaden participatory governance, their performance is still incipient.

The analysis results related to Q3, on how to incorporate the identified principles into a framework for a just transition in the sector, were organized into “necessary corrective actions” and “existing policies.” Overall, the results show that the ongoing process requires a series of corrections, which include, for example, recognizing past mistakes and adopting more inclusive practices to align with the principles of a just transition. On the other hand, it was also noted that there are already ongoing efforts in this regard, as well as existing policies to address challenges (e.g., energy poverty) and to promote dialogue and participation, but these still need improvement and consolidation to effectively incorporate the principles of a just transition into decision-making.

In summary, the results of this evaluative study corroborated the importance of impact assessments and stakeholder participation as essential practices to ensure a just energy transition, but also provided additional elements that allow for a more detailed understanding of these actions. Furthermore, the results contributed to emphasizing the notion that the principles of a just transition should be present not only at the level of individual projects, but also in strategic decision-making, at the level of policies and programs. This is noteworthy, given that in Brazil, much the discussions on JET have been focused on energy projects’ direct impacts, differently from other countries, where the subject is many times linked to job losses, which indeed implicates more "planning". In this sense, defining a vision for a just transition for the sector is fundamental, one that will both recognize pre-existing challenges and indicate the paths to be taken. Therefore, the results contribute to the formulation of recommendations that can be used in the design and implementation of interventions in the renewable energy sector.

This study was based on the Brazilian context, which has particular characteristics in terms of both its energy sector and its social and environmental dimensions.

Nevertheless, the findings are expected to contribute to progress toward a just energy transition in other countries and regions that share one or more similar features. Moreover, the study is believed to help fill existing gaps in the field of just energy transition, which in many cases remains focused on specific aspects (such as job losses), by bringing to light other relevant issues.

## 1 Introduction

Brazil is a distinctive case in the global energy landscape due to its high share of renewables in both total energy supply and electricity generation. In 2023, renewables made up 49.1% of the country's total energy supply and 89.2% of its electricity mix (Energy Research Company, 2024). Historically dominated by hydropower, Brazil's energy mix has diversified significantly since the 2001 drought exposed the risks of hydro-dependence, prompting the adoption of policies to promote renewable energy development (Lazaro and Soares, 2024). These efforts have driven a notable increase in solar and wind power, which in March 2025 represented 22.2% and 13.4% of installed electricity capacity, respectively, considering both centralized and decentralized systems (Brazilian Solar Association, 2025).

The expansion of large-scale renewable energy infrastructure in the country has not necessarily translated into benefits for local communities. In fact, the rapid development of wind farms and solar parks has often exacerbated existing socio-economic inequalities. Many of these projects have been developed on land that is traditionally used for agriculture or inhabited by Indigenous and rural communities (Klingler et al. 2024). The construction of these facilities has led to the displacement of local populations, loss of agricultural land, and other socio-economic disruptions, thereby deepening the region's energy poverty rather than alleviating it (da Silva and Galvão, 2022; Klingler et al., 2024).

These dynamics reveal a critical paradox: while renewable energy is central to climate action, its deployment can reproduce or even intensify historical injustices if not carefully governed. It is in this context that the notion of a 'just energy transition' gains relevance. Echoing the 'leave no one behind' principle, it aims to transition to a low-carbon economy in a fair and inclusive way for everyone impacted (UNFCCC 2023). In Brazil, this involves addressing longstanding patterns of exclusion by promoting inclusive decision-making, protecting land rights, and fostering locally beneficial energy solutions.

A just energy transition is more than a technical or economic shift toward low-carbon energy system. It is also a normative and political process that addresses past and

present injustices and inequalities, aiming to avoid deepening and, preferably, reducing them.

Drawing from the literature on environmental and energy justice, three interrelated dimensions of justice are central to this concept: **distributive justice**, which concerns how the benefits and burdens of the energy transition are shared across different social groups and geographies; **procedural justice**, which refers to the fairness and inclusiveness of decision-making processes and the recognition of diverse forms of knowledge and agency; and **recognition justice**, which entails acknowledging and addressing the historical marginalisation of certain communities, especially those disproportionately affected by extractive and energy infrastructure projects (Heffron & McCauley, 2017; Jenkins et al., 2016).

In this context, this report aims to develop recommendations for a just transition in the renewable energy sector. These recommendations are intended to support the design and implementation of renewable energy interventions (policies, incentives, programs, and projects) in Brazil and potentially in other countries. By promoting a more holistic, equitable, and socially responsible approach, this effort seeks to support the sustainable and inclusive development of the renewable energy sector in Brazil.

This report is a result of a project implemented by *Centro Brasil no Clima* (Brazil Climate Centre – CBC) with support from the Climate Investment Funds (CIF) and technical support from the Center for Learning on Evaluation and Results for Lusophone Africa and Brazil (FGV CLEAR). The project, called ‘Evaluation of Just Transition in the renewable energy sector in Brazil’, aimed to deepen the understanding of the impacts of renewable energy (solar and wind power) expansion in Brazil, with a strong focus on just transition principles, through a sector-wide approach, analyzing the renewable energy landscape in Brazil to identify key aspects and elaborate recommendations for guiding the planning of renewable energy projects.

This report is structured as follows. Section **1 – Introduction** contextualizes the background of the study by exploring the context of the impacts of large-infrastructure renewable energy (solar and wind power) expansion in Brazil through the lens of energy transition. Section **2 – Theory of Change (ToC)** presents the conceptual foundation that

guided the evaluation process. The ToC was elaborated as an initial step of this study to establish the groundwork for understanding how just energy transitions can be structured within the expansion of renewable energy in Brazil. Section **3 – Methodology** describes the evaluation approach and details the data collection methods, which include literature review and document analysis, stakeholder mapping, and interviews. Section **4 – Results** compiles the main findings from each of these methods, while section **5 – Discussion of findings** analyzes the results in light of key principles for a just energy transition, current planning challenges in the renewable energy sector, and potential pathways for integrating justice principles into future frameworks. Finally, section **6 – Conclusion and recommendations** summarizes the insights and offers actionable recommendations.

## 2 Theory of change (ToC)

This section introduces the Theory of Change (ToC) that was used as a foundational element for the study. The ToC is a useful tool for evaluating interventions, and can be understood as an ongoing process of reflection to explore change and how it happens – in a particular context, sector, and/or group of people. It is usually represented in a schematic diagram or a table with interconnected elements organized into categories:

- inputs - resources used by the intervention to make the activities viable;
- activities - actions that must be carried out to transform inputs into outputs;
- outputs - immediate and tangible results of activities;
- outcomes - represent the benefits of the intervention, resulting from the set of outputs delivered. In general, outcomes are related to changes in behavior, knowledge, and skills;
- impacts - need to respond to the problem the intervention was fundamentally designed to address.

The ToC presented is a basic version elaborated at the beginning of the study, intended to establish the groundwork for understanding how just energy transitions can be structured within the expansion of renewable energy in Brazil. It was expected that the execution of the project would uncover more complex relationships and dynamics that

should be incorporated into recommendations to guide the planning of renewable energy projects, programs or policies, in alignment with just transition principles.

The Theory of Just Energy Transitions used in this project goes as:

*If funding, skilled workforce, institutional support, stakeholder engagement, and impact assessments of the energy transition contribute to the mobilization of stakeholders – particularly those affected by the transition – and the production and disclosure of Just Energy Transition (JET) analyses, this should ideally raise social awareness and generate analytical insights, ultimately contributing to a just transition.*

The elaboration of the ToC also included the identification of ‘risks and assumptions’, which are indicated throughout the text below by their corresponding numbers in parentheses, as each causal link containing a risk or assumption is presented. The table of risks and assumptions is presented at the end of this section.

### *Inputs*

The three resources used in the ToC to make the activities viable were: funding from implementing parties (governments, NGOs, private investment), assuming that it is promptly available (1); institutional support, which can be guides, infrastructure, networking, political capital, and endorsement letters from governments and implementing parties; and human resources, which are based on a skilled and multidisciplinary workforce in the field of JET, considering that there are professionals specialized in the field of JET available for hiring (2).

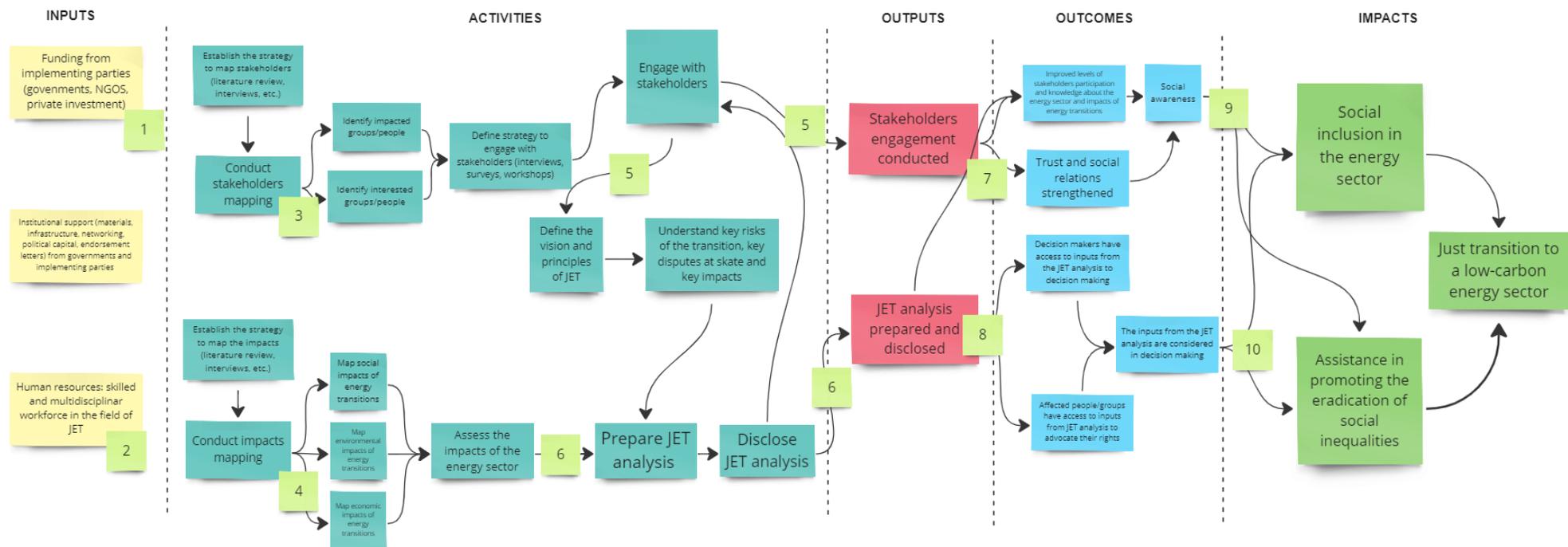


Figure 1 – Theory of Change for a Just Energy Transition

## Activities

The project activities are divided into two main axes: stakeholder engagement; and assessment of the impacts of JET.

- *Stakeholder engagement*

To accomplish this activity, first, it is necessary to establish the strategy to map stakeholders through literature review, interviews, etc. This action will lead to conducting stakeholder mapping, ensuring that it is complete and includes the perspectives of all stakeholders impacted by an intervention (3), which consists of identifying impacted and interested groups. With this established, it will be necessary to define a strategy to engage with stakeholders through interviews, surveys, and/or workshops, to make it possible to execute this action of engagement. In that sense, they will contribute to defining the vision and principles of just energy transition (5), and it will be possible to understand key risks of the transition, key disputes at stake, and key impacts, which are topics connected to the preparation and disclosure of JET analysis.

- *Assessment of the impacts of the intervention*

To start mapping the impacts of the intervention, it is important that the activities begin by establishing the analysis strategy, which might be conducted through literature reviews, stakeholder interviews, surveys, etc. Assuming that the impact mapping step is accurate and complete, this activity should reflect the impacts on the energy sector and energy transitions (4) and lead to three impact categories: social impacts; environmental impacts; and economic impacts.

Considering that the impact assessment carried out leads to a relevant analysis of the intervention (6), the next steps of the program are the preparation of the JET analysis, incorporating the contributions of the stakeholder engagement activities, and the disclosure of the results.

## Outputs

The JET ToC leads to two main outputs: stakeholder engagement concluded; and the JET analysis prepared and disclosed. Regarding the first, this ToC recognizes the

engagement of stakeholders with the intervention as an important output to lead to a Just Energy Transition. Depending on the selected strategy, stakeholders can benefit from the intervention in different ways, such as literacy on the topic (and how they impact or are impacted by this transition) or engagement with other stakeholders (eg., policy makers, entrepreneurs).

Regarding the second output, the ToC considers that the assessment of the impacts of the intervention results in the actions of preparing and disclosing the JET analysis. This activity considers that the assessments carried out lead to a relevant analysis of the JET (6), which causes the output “JET analysis finally prepared and disclosed”.

### *Outcomes*

A well-conducted stakeholder engagement, along with the disclosure of the JET analysis, should result in improved levels of stakeholder participation and knowledge about the energy sector and the impacts of the energy transition. Furthermore, considering the different stakeholder engagement activities, such as consultation and validation stages in workshops, another result is the strengthening of social relations and building of trust among stakeholders that adequate measures will be implemented (7). Thus, the main long-term outcome is social awareness. In addition to the JET analysis disclosure results, it's important to consider that the output might lead to relevant inputs for decision-makers, if the JET analysis is considered in decision-making, and for affected groups to advocate for their rights (8).

### *Impacts*

The long-term outcomes, such as social awareness and JET inputs for decision-makers and affected groups, should provide structural changes in the energy sector. In this sense, considering that social awareness may lead to more demands from society and policymakers (9) and that stakeholders engaged in energy transition strategies take into consideration the inputs provided by JET analyses (10), these actions should generate positive impacts, such as social inclusion in the energy sector and assistance in promoting the eradication of social inequalities. These impacts are expected to provide

the necessary long-term structural changes for a just transition to a low-carbon energy sector.

**Table 1 – Risks and assumptions of the ToC**

	<b>Risks</b>	<b>Assumptions</b>
<b>1</b>	Funding from the implementing parties is not promptly available.	Funding from the implementing parties is promptly available.
<b>2</b>	There are no skilled and multidisciplinary professionals specialized in the field of JET (modelling and planning) available for hiring.	There are skilled and multidisciplinary professionals specialized in the field of JET available for hiring.
<b>3</b>	Incomplete stakeholder mapping might lead to a biased understanding of the intervention and the JET.	Stakeholder mapping is complete and includes the perspectives of all stakeholders impacted by the intervention.
<b>4</b>	Incomplete impacts mapping might lead to an inaccurate assessment of the impacts of the intervention and the energy transition.	Impacts mapping is complete and reflects the impacts of the intervention and the energy transition.
<b>5</b>	Lack of engagement with stakeholders.	Stakeholders participate in the defined stakeholder engagement strategy and contribute to the definition of the vision and principles of JET.
<b>6</b>	Assessment of the impacts of the intervention might not lead to relevant analysis.	Assessments carried out lead to relevant analysis of the intervention.
<b>7</b>	The stakeholder engagement activities do not generate trust and strengthen social relations.	The different activities of stakeholder engagement, such as workshops, contribute to strengthening social relations and building trust among stakeholders that adequate measures will be implemented.

8	JET analysis might not lead to relevant inputs and/or JET analysis is not well disclosed to decision makers and affected people/groups.	JET analysis leads to relevant inputs and is well disclosed to decision makers and affected people/groups.
9	Social awareness does not lead to pressure from society regarding social inclusion and eradication of social inequalities, and/or society demands are not taken into consideration.	Social awareness leads to more demands from society and generates positive impacts.
10	Decision makers and stakeholders engaged in energy transition strategies do not consider the inputs.	Decision makers and stakeholders engaged in energy transition strategies take into consideration the inputs.

### 3 Methodology

The methodological approach used in this study included the elaboration of a list of evaluation questions to guide the research. These evaluation questions are organized in an Evaluation Matrix (**Table 2**), which also includes the data collection methods used to address each of them. The findings derived from each of these methods are presented in detail in the subsequent Results section, which is structured according to the four methodological components: **Literature Review, Document Analysis, Stakeholder Mapping, and Interviews.**

It is important to acknowledge some limitations of both the data collection and analysis methods adopted in this evaluation. Regarding data collection, although efforts were made to incorporate diverse perspectives, some relevant viewpoints remain underrepresented. For instance, the perspective of quilombola communities was brought by a nationally recognized leader who emphasized a specific territorial context. His contribution, while significant, does not necessarily reflect the full range of quilombola interests and perceptions. Similarly, the study did not directly capture the voices of indigenous communities, and the perspectives of women were not sufficiently included. These gaps should be addressed in future research through expanded and more targeted

outreach. In terms of data analysis, a portion of the findings is based on qualitative interpretation. To mitigate potential bias, a triangulation strategy was employed to examine convergences, divergences, and complementarities across the different methods. Nonetheless, the evaluation team recognizes that literature on triangulation in this field sometimes appears under alternative terms, which may have led to overlooking important theoretical contributions. Moreover, the national policy on energy transition is itself an ongoing innovation, and as the project progressed, so did public discourse and institutional framing of what constitutes a ‘just’ energy transition, posing an additional challenge for interpretation and alignment.

Following the results, the **Discussion** section provides a comprehensive analysis of the results through a triangulation approach, examining the convergences, divergences, and complementarities among the insights generated by the different methods, aiming to answer the evaluation questions proposed.

**Table 2 – Evaluation Matrix**

Evaluation question	Literature Review	Stakeholder mapping	Document Analysis	Interviews
Q1: What are the key principles that must be considered to ensure a just energy transition in the renewable energy expansion in Brazil?	X	X		X
Q2: What renewable energy (REN) transition is planned, what are the problems identified, and what needs to change to ensure it is just and fair?	X		X	X
Q3: How can these principles be incorporated into an ideal framework for a Just Energy Transition within the REN expansion in Brazil?  (Q3a): Considering the principles for a just energy transition, do ‘social inclusion’ and ‘assistance in promoting the eradication of social inequalities’ synthesize the desired impact for the framework? Is there any other relevant impact?  (Q3b): Aligned with the principles, are there any other desired outcome for the framework design for ‘just energy transition’ in the renewable energy sector in Brazil?		X		X

(Q3c): Beyond stakeholders mobilization and a prior JET analysis, does a just energy transition framework design include any other relevant output?

(Q3d): In terms of relevance, are the outcomes and the activities aligned with the current issues regarding renewable energy expansion in Brazil?

### 3.1 Data collection methods

To address the evaluation questions, this study combines qualitative data from literature, documents, and stakeholder interviews with a structured stakeholder mapping. This way, the methods employed aimed to capture diverse perspectives, from academic literature to lived experiences of stakeholders. This strategy was designed to ensure a comprehensive understanding of both the conceptual foundations and practical challenges of implementing a just energy transition in Brazil.

#### 3.1.1 Literature review

The literature review in this study aimed to address three evaluation questions, as per **Table 2**, which are related to the principles necessary to ensure a just energy transition (Q1) and to the problems already identified in the energy transition in the way it is currently planned and implemented (Q2).

Three academic platforms – Scopus, Dimensions, and Google Scholar – were used for this literature review, focusing on relevant sources such as journal articles, book chapters, theses, dissertations, and monographs. The search strategy incorporated key terms, including “just transition”, “energy”, “Brazil”, and “energy transition”. In the case of Google Scholar, these terms were also searched in Portuguese to capture a broader range of relevant studies. Given that the expansion of solar and wind power in Brazil is relatively recent, along with the recognition of its associated impacts, no initial time restrictions were applied to the search. This approach aimed to ensure a comprehensive understanding of both the foundational principles necessary for a just energy transition and the challenges already identified in the Brazilian context.

### 3.1.2 Document analysis

The document review was used to address the second evaluation question, in particular the aspect of the energy transition planning, although other aspects could be identified, such as the integration of just transition principles into this planning. With that end, four main official documents were used:

- The new National Determined Contribution<sup>3</sup> that Brazil presented during COP29 in Baku;
- The National Energy Plan 2050 (PNE 2050)<sup>4</sup>;
- The Decennial Energy Plan 2034 (PDE 2034)<sup>5</sup>; and
- The National Policy on Energy Transition and associated instruments<sup>6</sup>, as well as information from government websites on this matter.

In addition to these government documents, publications from civil society organizations were analyzed, aiming to identify different perspectives on renewable energy planning and considerations for a just transition. The main documents included in this analysis were: i) "Future of Energy: Climate Observatory's Vision for a Just Transition in Brazil"<sup>7</sup> of the Climate Observatory; and ii) "Socioenvironmental Safeguards for Renewable Energy"<sup>8</sup> produced by several civil society organizations organized under the Northeast Power initiative.

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<sup>3</sup> Federative Republic of Brazil. 2024. "National Determination to Contribute and Transform: Brazil's Nationally Determined Contribution under the Paris Agreement." Brasília: Ministry of Foreign Affairs. [https://unfccc.int/sites/default/files/2024-11/Brazil\\_Second%20Nationally%20Determined%20Contribution%20%28NDC%29\\_November2024.pdf](https://unfccc.int/sites/default/files/2024-11/Brazil_Second%20Nationally%20Determined%20Contribution%20%28NDC%29_November2024.pdf).

<sup>4</sup> Available at: <https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/Plano-Nacional-de-Energia-2050>

<sup>5</sup> Available at: <https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/plano-decenal-de-expansao-de-energia-2034>

<sup>6</sup> Available at: <https://www.gov.br/mme/pt-br/assuntos/secretarias/sntep/dte/cgate/pnte>

<sup>7</sup> Climate Observatory. 2024. "Future of Energy: Climate Observatory's Vision for a Just Transition in Brazil – Executive Summary." Brasília: Climate Observatory. Available at: [https://www.oc.eco.br/wp-content/uploads/2024/11/OC\\_Futuro-da-Energia\\_SUMARIO-EXECUTIVO\\_EN\\_v6-1.pdf](https://www.oc.eco.br/wp-content/uploads/2024/11/OC_Futuro-da-Energia_SUMARIO-EXECUTIVO_EN_v6-1.pdf)

<sup>8</sup> Northeast Power Initiative. 2024. "Socio-environmental Safeguards for Renewable Energy." Recife: Northeast Power. Available at: [https://nordestepotencia.org.br/wp-content/uploads/2024/03/Safeguards-RE\\_ENG-web.pdf](https://nordestepotencia.org.br/wp-content/uploads/2024/03/Safeguards-RE_ENG-web.pdf)

Finally, with the objective of understanding how the subject is present in the practices of Multilateral Development Banks (MDBs), there was a search for initiatives or frameworks from organizations within this group, and one document from the Inter-American Development Bank (IDB) was analyzed more in depth, the policy brief “Advancing a Just Transition in Latin America and the Caribbean”<sup>9</sup>.

### 3.1.3 Stakeholder mapping

The stakeholder mapping aimed to address the evaluation question about the principles for a just transition (Q1), as well as the groups of questions related to how those principles can be incorporated into an ideal framework for a just energy transition in Brazil (Q3)<sup>10</sup>. The stakeholder mapping presented in this section informed the selection of organizational representatives for the interviews, as detailed in Section **3.1.4 Interviews**.

Nearly 50 stakeholders from different sectors were mapped, and a stakeholder assessment tool was prepared with the following information:

- Stakeholder (organization)
- Category – Public sector; Private sector; Civil society; Academia; Traditional, Indigenous and *Quilombola* Communities<sup>11</sup>; International cooperation; Financial sector
- Reason – explanation of the reasons to include this stakeholder
- Website

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<sup>9</sup> Inter-American Development Bank (IDB). 2023. “Advancing a Just Transition in Latin America and the Caribbean.” Washington, DC: Inter-American Development Bank. Available at: <http://dx.doi.org/10.18235/0005216>

<sup>10</sup> Although the primary focus is on Brazil, we understand that this framework may be applicable to other countries facing similar challenges related to energy expansion. As will be discussed throughout the document, recognizing the specificities of each region is essential to ensure that the outcomes of the transition are genuinely just.

<sup>11</sup> Quilombola communities are Afro-Brazilian social groups with recognized Black ancestry, whose identities are shaped by historical resistance to slavery and oppression. These communities have their own historical trajectories and specific territorial relations, and their territories are essential for the reproduction of their social, cultural, and economic ways of life. Recognized by Brazil’s 1988 Constitution as traditional peoples, quilombola communities hold collective territorial rights under Brazilian law (Centre of Excellence against Hunger and Poverty, 2021).

- Level of Influence (low, medium, high) – describes how this stakeholder can influence decision making in this sector
- Level of Interest (low, medium, high) – describes the level of interest of this stakeholder in this sector

Table 3 presents an example of the stakeholder assessment tool, and the complete tool is attached in **Appendix I**.

**Table 3 – Example of stakeholder assessment tool'**

Stakeholder	Category	Reason	Level of Influence (low, medium, high)	Level of Interest (low, medium, high)
<b>Ministry of Mines and Energy</b>	Public Sector	Ministry responsible for policy making in the energy sector in Brazil	High	High
<b>National Coordination of the Articulation of Black Rural Quilombola Communities (CONAQ)</b>	Traditional, Indigenous and Quilombola Communities	National representative organization for <i>quilombola</i> communities. The institution's goal is to advocate for rights at national and international levels and to inform national public policies for these communities.	Low	Medium
<b>Northeast Power</b>	Civil Society	Network of civil society organizations to promote public debate on post-pandemic economic recovery in the Northeast based on green, fair, and inclusive principles. Energy is one of their core activities.	Medium	High
<b>National Bank for Economic and Social Development (BNDES)</b>	Financial sector	It is the national development bank, responsible for many infrastructure projects, including the energy sector	High	Medium
<b>Brazilian Wind Energy Association (ABEEólica)</b>	Private Sector	Association unites and represents the wind energy industry in the country, including companies from the entire production chain.	Medium	High
<b>Energy Planning Program (PPE/COPPE/UFRJ)</b>	Academia	Sector of the Federal University of Rio de Janeiro responsible for many analyzes on the energy sector in Brazil	High	High

### 3.1.4 Interviews

The interviews were conducted to address all three evaluation questions (and sub-questions). Based on the stakeholder mapping, a list of 10 stakeholders was selected according to the following criteria:

- **Representation from each key group:** Public sector; Private sector; Civil society; Traditional, Indigenous and *Quilombola* communities; Financial sector;
- **Influence and Interest:** stakeholders with higher levels of influence and interest.

The selected stakeholders are listed in Table 4, which also provides details on their participation in the evaluation. One stakeholder – from the public sector – was identified as having high levels of influence and interest. Following this, stakeholders categorized with medium to high levels of influence and interest were included, comprising one representative from civil society, two from the private sector, and one from the financial sector. Lastly, to ensure representation of traditional communities, a stakeholder from Traditional, Indigenous, and *Quilombola* communities was included, as no organization within this category was classified as having a high level of influence.

presents the selected stakeholder matrix structured by level of influence and by level of interest.

It is important to highlight that some stakeholders were selected not solely based on the highest levels of influence or interest but due to their significant relevance to the study. These include the Ministry of the Environment and Climate Change (MMA), the Wind Energy Observatory (Federal University of Ceará), and the Universidade Federal do Recôncavo da Bahia<sup>12</sup>.

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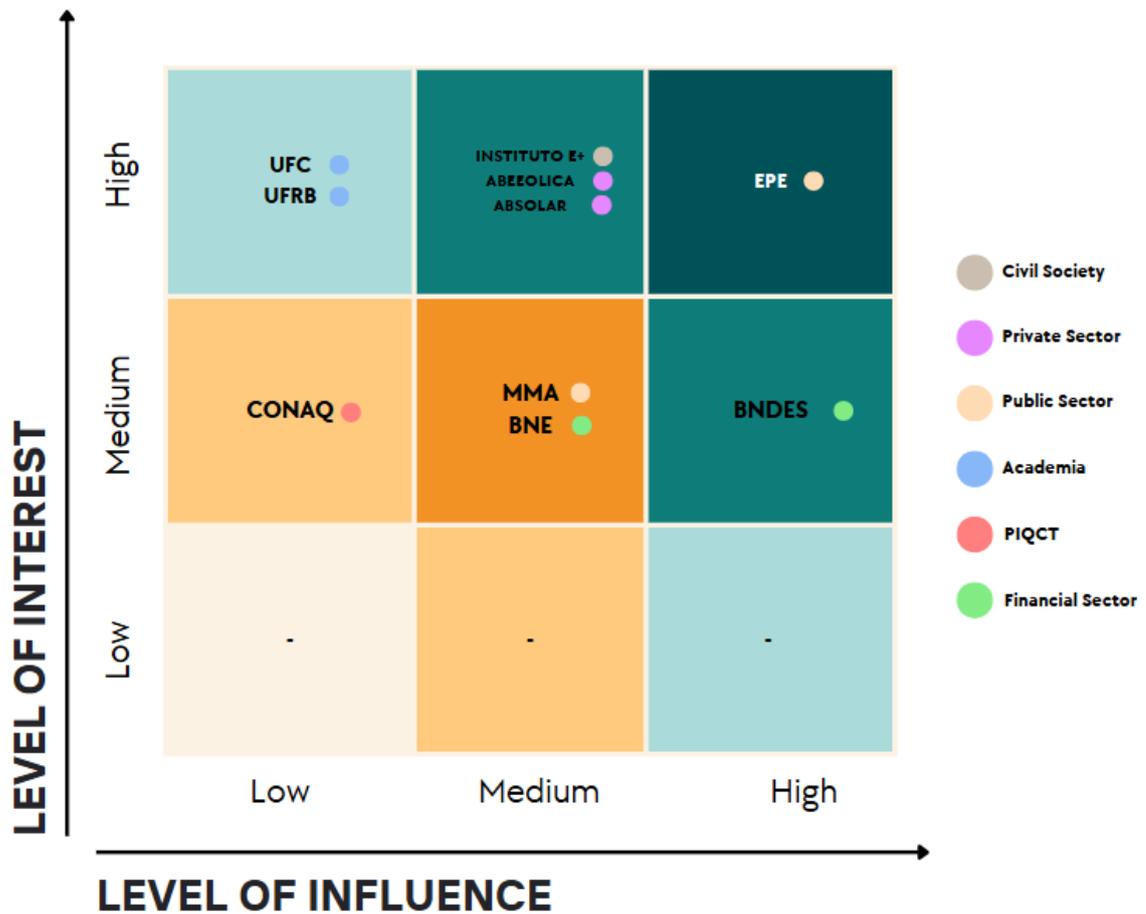
<sup>12</sup> The name was not translated to English because the university keeps the Portuguese form in their English version webpage.

**Table 4 – Stakeholder selection**

Stakeholder	Category	Participation in the evaluation	Level of Influence	Level of Interest
<b>Energy Research Office (EPE)</b>	Public Sector	EPE supports the Ministry of Mines and Energy with studies and research on the energy sector planning. The EPE’s participation contributes to understanding the planning of renewable energies and how socio-environmental impacts and just transition principles are being considered.	High	High
<b>Ministry of the Environment and Climate Change (MMA)</b>	Public Sector	MMA is currently coordinating the update of the Climate Plan, which will bring sectoral measures for climate change mitigation and adaptation. The Plan has a transversal axis focused on Just Transition. The participation of MMA in the study contributes to understanding how just transition aspects are being considered in public sector planning.	Medium	Medium
<b>Universidade Federal do Recôncavo da Bahia (UFRB)</b>	Academia	UFRB is located in the state of Bahia, where many of solar and wind power plants are being installed. The state also faces challenges disputes for land and water resources. The Professor from UFRB is involved with the subject of just energy transition, including the impacts on workers.	Low	High
<b>Wind Energy Observatory (Federal University of Ceará - UFC)</b>	Academia	The Observatory has a focus on the socio-environmental impacts of wind energy projects. The Federal University of Ceará – UFC’s participation in the study contributes to understanding the impacts, groups affected, and what the measures are to reduce those impacts and achieve a just energy transition.	Low	High
<b>E+ Institute</b>	Civil Society	E+ is a think tank focused on the subject of energy transition, and it promotes dialogues among stakeholders from different sectors on this. The studies produced by the institute have a significant influence in this sector, and understanding their view on the topic of just transition contributes to this study.	Medium	High

<b>Brazilian Wind Energy Association (ABEEólica)</b>	Private Sector	The association represents wind energy companies in Brazil. Its participation provides insights into the private sector's perspective on the expansion of this energy source, the existing impacts and challenges, measures to mitigate them, and how socio-environmental aspects are considered by companies.	Medium	High
<b>Brazilian Photovoltaic Solar Energy Association (ABSOLAR)</b>	Private Sector	This association represents photovoltaic solar energy companies in Brazil. Its participation contributes to understanding the private sector's perspective on the expansion of this energy source, the impacts and challenges faced, measures to mitigate them, and how socio-environmental aspects are integrated into corporate practices.	Medium	High
<b>National Bank for Economic and Social Development (BNDES)</b>	Financial sector	As a national development bank, the BNDES supports various sectors, including energy. Its participation provides insights into the financial sector's perspective on renewable energy expansion, the measures adopted to address impacts, and how (if) just transition principles are incorporated.	high	medium
<b>Bank of Northeast (BNE)</b>	Financial sector	BNE is a regional development bank with focus in the Northeast region, covering areas that concentrate the potential for wind and solar power in Brazil. The participation in the study contributes to understanding the perspective of the financial sector on the expansion of these sources and how (if) socio-environmental aspects are being considered.	Medium	Medium
<b>National Coordination of the Articulation of Black Rural Quilombola Communities (CONAQ)</b>	Traditional, Indigenous and Quilombola Communities	CONAQ is an organization representing <i>quilombola</i> communities in Brazil, a group significantly impacted by energy projects. Its participation helps to better understand the impacts perceived by these communities, what should be improved in projects, and their vision on the necessary principles to ensure a just transition.	Low	Medium

Source: Prepared by the authors



**Figure 2 – Stakeholder Matrix per level of influence and relevance**

\* PIQCT stands for Indigenous People, Quilombolas and Tradicional Communities

The interviews were semi-structured, involving a prepared list of key questions elaborated towards answering the evaluation questions. Some questions had an exploratory nature, closely tied to the evaluation questions, aiming to identify emergent themes and facilitating a more inductive approach. Other questions were directly related to the theoretical framework based on the three main justice principles found in the literature: recognition, procedural and distributive justice. The questions varied slightly from interview to interview, depending on the interviewee's experience and knowledge of the topics explored. The order of the questions also varied according to the natural flow of the conversation. The set of questions prepared for the interviews are presented in Appendix II.

## 3.2 Data Analysis

The data analysis in this study draws on three complementary sources: literature review, document analysis, and interviews, as presented in section **3.1 Data collection methods**. Each of these sources contributed to answering the evaluation questions, and their findings were later integrated through a triangulation approach to enhance the robustness and credibility of the results.

### Interviews

The analysis of the interviews was following the Thematic Analysis method, as proposed by Braun and Clarke (2022). According to them, thematic analysis is a method for identifying, analyzing, and reporting patterns (themes) within data. It organizes and describes the data set in detail, often interpreting various aspects of the research topic. According to what is proposed by Braun and Clarke (2022), the thematic analysis was conducted in six phases:

1. **Familiarization with the Data:** All interviews and documents were collected and analyzed in Portuguese. The interviews were auto-transcribed using Team's transcription tool and reviewed after the interviews;
2. **Generating Initial Codes:** This phase entailed coding interesting features of the data in a systematic manner across the entire data set. In NVivo, the initial codes were elaborated to answer the evaluation questions. Other codes emerged from the data during the analysis;
3. **Searching for Themes:** During this phase, the codes were collated into potential themes, gathering all data relevant to each potential theme. Using NVivo's capabilities, the codes were reviewed and grouped into broader themes that reflected significant patterns in the data;
4. **Reviewing Themes:** This phase involved checking if the themes work in relation to the coded extracts and the entire data set;
5. **Defining and Naming Themes:** At this stage, themes were refined to define the specifics of each theme and the overall story the analysis tells. The

translation into English was conducted during this phase to integrate them into the final report;

6. **Producing the Report:** This final phase involved the final analysis and writing.

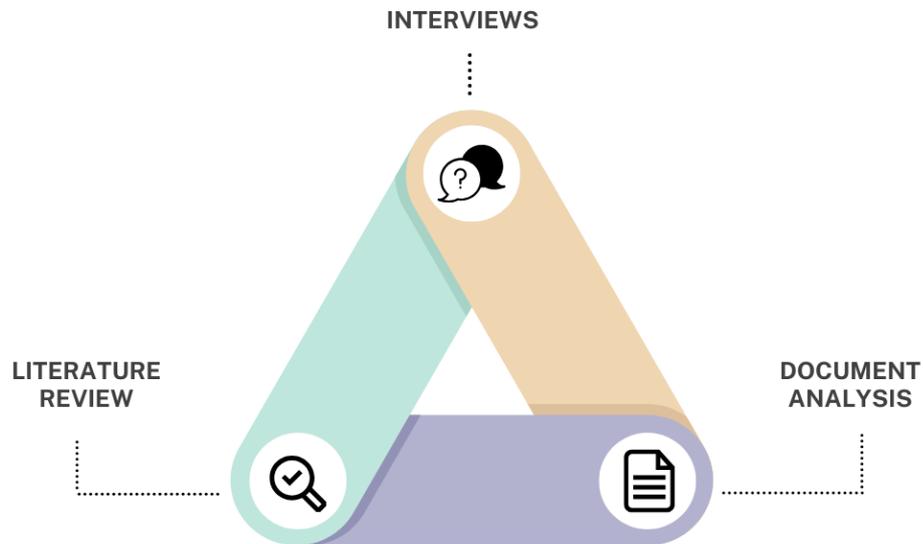
Thematic Analysis is a widely used method for identifying, analyzing, and reporting patterns (themes) within qualitative data. It provides a flexible yet systematic approach to interpreting various aspects of the research topic. In this study, both deductive and inductive coding strategies were used: some themes were defined in advance based on the three evaluation questions, while others emerged organically from the data during the coding process.

### **Literature Review and Document Analysis**

For the literature review and document analysis, no predefined analytical method was strictly applied. Instead, both sources were examined through a qualitative, interpretative lens aimed at extracting relevant insights aligned with the evaluation questions. The review focused on identifying core concepts, principles, challenges, and proposed measures related to the just energy transition in Brazil. Documents, including policy reports, institutional frameworks, and civil society publications, were analyzed to trace how justice-related considerations have been integrated into the planning and implementation of renewable energy initiatives. This interpretative approach allowed for a contextualized understanding of each source, emphasizing content relevance, consistency with the literature, and complementarities or gaps with stakeholder perspectives.

### **Data Triangulation**

After the individual analyses, a data triangulation process (represented in **Figure 3**) was carried out to synthesize findings from the three sources. Triangulation served to identify convergences, divergences, and complementarities between interview data, literature, and documents. This comparative analysis enabled a more comprehensive and nuanced understanding of the dynamics surrounding just energy transition in Brazil, and it provided a stronger foundation for the conclusions and recommendations presented in this report. The triangulated findings are discussed in detail in the Discussion section.



**Figure 3 – Data Triangulation**

## 4 Results

### 4.1 Literature review

The literature review in this study addressed two evaluation questions, as per the table above, which are related to the principles necessary to ensure a just energy transition (Q1), and to the problems already identified in the energy transition in the way it is currently planned and implemented (Q2). Section *Erro! Fonte de referência não encontrada. Erro! Fonte de referência não encontrada.* introduces the main principles and frameworks found in the literature on just energy transitions. While section **4.1.2 Just Energy Transition in Brazil: Challenges and Opportunities** introduces the results for the literature review on just energy transition in Brazil, according to the methodology presented in section **3.1.1 Literature review.**

#### *4.1.1 Understanding Just Energy Transitions: Principles and Frameworks*

The concept of a "just transition" originated within the United States labor movements of the 1970s, focusing on safeguarding workers and communities from job losses caused by new environmental regulations (Wang and Lo 2021). Over time, it

became a recognized strategy towards promoting the creation of new green jobs as a vital component of transitioning to renewable energy systems (McCauley and Heffron 2018; Wang and Lo 2021). The concept of a “just transition” gained international prominence with its inclusion in the Paris Agreement in 2015, which underscored the need to address the social dimensions of climate action (United Nations 2015). Despite gaining this global recognition, “just transition” as a concept is still under construction. In fact, Wang and Lo (2021) point out that the concept of a just transition has become so ambiguous and varied in meaning that debates around it have become difficult. The lack of a definition impedes the development of a common understanding among stakeholders, which is crucial for establishing governance mechanisms that support just transitions.

Yet, “just transitions” are gaining momentum and are at the forefront of academic and policy discussions, including the energy sector. The idea of a “just energy transition” thus addresses the socio-economic dimensions of the energy transition, sparking debates around critical questions such as who benefits, who bears the costs, how and why the transition occurs, and which communities are most affected (Wang and Lo 2021). This concept has emerged as a new research agenda within the social sciences, seeking to apply principles of justice to energy policy, energy production and consumption systems, and the political economy of energy and climate change (Jenkins et al. 2016). Building on the historical context of the just transition movement, scholars have sought to connect it with related justice concepts, including “climate justice”, “energy justice” and “environmental justice” (Wang and Lo 2021). In short, climate justice focuses on distributing the impacts of climate change fairly from a human rights viewpoint, energy justice applies human rights throughout the energy lifecycle, and environmental justice ensures equal treatment and involvement of all citizens in environmental policy-making and enforcement (Heffron and McCauley 2018).

The concept of ‘energy justice’ has been discussed by several scholars, mainly in the last decade (Heffron 2023). This concept integrates human rights across the entire energy lifecycle, from extraction to production, operation, consumption, and waste management, including decommissioning (Heffron 2023; McCauley and Heffron 2018). According to this perspective, energy justice aims to ensure that every stage of energy

development adheres to the principles of fairness and equity, considering both the environmental and social impacts of energy systems. Sovacool and Dworkin (2015) expand this definition by emphasizing that an energy-just world should equitably distribute the benefits and burdens of energy production and consumption, ensuring fairness in decision-making processes. They argue that energy justice is not only about the substantive outcomes, such as access to energy, but also about inclusive decision-making procedures, where communities, especially those in less developed regions, are meaningfully informed and involved. This concept also involves addressing human rights abuses and ensuring that energy projects do not infringe on civil liberties, while providing access to remedies for impacted communities (Sovacool and Dworkin 2015).

Various approaches to energy justice frameworks are found in the literature, with most of them built around three core principles: distributive justice, procedural justice, and recognition justice (Wang and Lo 2021). Distributive justice is understood in terms of the distribution of goods and bads (also seen as resources and harms); procedural justice is defined in terms of the way decisions are made, who is involved and who has influence; and recognition justice, by its turn, is understood as who is given respect and who is not valued (Williams and Doyon 2019). These justice principles are widely applied not only in energy justice frameworks but also in environmental justice, climate justice, and just transition frameworks (Williams and Doyon 2019).

Over time, scholars like Heffron (2023) have argued for an expanded framework to include restorative and cosmopolitan justice, recognising the need to address the global and intergenerational dimensions of energy justice. Restorative justice first emerged in the literature of energy justice around 2017, drawing from its origins in criminal justice, where it was used to address violations of interpersonal relationships by focusing on the needs of victims and communities harmed (Hazrati and Heffron 2021). Therefore, restorative justice is applied after harm has already occurred, emphasizing the obligation to repair the damage already caused, whether these impacts were intentional or unintended (Hazrati and Heffron 2021). Cosmopolitan justice, on the other hand, began to gain attention in energy justice discussions around 2015 (Heffron 2023). It extends the scope of justice beyond national borders, emphasizing the global implications of energy

decisions. Cosmopolitan justice underscores the interconnectedness of energy policies and their effects on a global scale, particularly in light of international commitments such as the Paris Agreement (Sovacool et al. 2016; Heffron 2023).

Scholars see these principles as deeply interconnected and mutually reinforcing each other (Wang and Lo 2021; Heffron 2023; Hazrati and Heffron 2021). For example, recognition justice is a fundamental prerequisite for distributive justice, as fair distribution of benefits and harms requires identifying who is affected (Wang and Lo 2021). Procedural justice, by its turn, is closely linked with recognition justice, as ensuring inclusive participation in decision-making processes requires the recognition of diverse voices and perspectives (Wang and Lo 2021). Similarly, restorative justice cannot be fully realised without addressing the distributive injustices that often underpin energy-related harms (Heffron 2023). In practice, these principles can be applied to evaluate and guide energy projects and policies, ensuring that they contribute to a just and equitable energy transition. For instance, in assessing a new renewable energy project, one might consider how the benefits and costs are distributed among different communities (distributive justice), whether all affected groups were included in the decision-making process (procedural justice), and how the project addresses the rights and needs of local communities (recognition justice). Additionally, one might evaluate the project's compliance with international climate commitments (cosmopolitan justice) and its plans for mitigating and rectifying any potential harm (restorative justice).

Another energy justice framework found in the literature is the one proposed by Sovacool and Dworkin (2015). The authors evaluated how energy justice can serve as a conceptual, analytical and decision-making tool. They argue that as a conceptual tool, it can serve to integrate better distributive and procedural justice issues. For them, the concept of energy justice is significant not so much for its definition, but for its functions. In this "functional" sense, energy justice can be understood by observing its impact on actual decisions, rather than by examining various predefined definitions of the term. As an analytical tool that applies energy justice to energy problems, Sovacool and Dworkin (2015) connect energy policy and technology with philosophical concepts, injustices, applications and solutions. They categorise it into eight topics: (1) energy efficiency, (2)

energy externalities, (3) human rights and social conflict, (4) energy and due process, (5) energy poverty, (7) energy subsidies, (8) energy resources and climate change. This analytical tool intends to help researchers to understand the relationship between values and energy systems.

Complementary, the energy justice decision-making tool, proposed by the same authors, considers eight principles: (1) availability, (2) affordability, (3) due process, (4) good governance, (5) sustainability, (6) intergenerational equity, (7) intragenerational equity, and (8) responsibility. The decision-making tool aims to support energy planners and consumers to make more informed decisions, as these decisions have significant impacts on energy systems, costs, and the environment. The decision-making tool proposed by Sovacool and Dworking (2015) is shown in **Erro! Fonte de referência não encontrada.4**.

Principle	Explanation
Availability	People deserve sufficient energy resources of high quality
Affordability	All people, including the poor, should pay no more than 10 percent of their income for energy services
Due process	Countries should respect due process and human rights in their production and use of energy
Good governance	All people should have access to high quality information about energy and the environment and fair, transparent, and accountable forms of energy decision-making
Sustainability	Energy resources should not be depleted too quickly
Intragenerational equity	All people have a right to fairly access energy services
Intergenerational equity	Future generations have a right to enjoy a good life undisturbed by the damage our energy systems inflict on the world today
Responsibility	All nations have a responsibility to protect the natural environment and minimize energy-related environmental threats

**Figure 4 – Decision-making tool propose by Sovacool and Dworking (2015)**

Source: Sovacool and Dworking (2015)

The literature on just energy transitions highlights the complexity of ensuring that energy transitions are equitable, inclusive, and socially just. While the concept of a just transition has evolved from its labor movement roots to encompass broader dimensions of climate, environmental, and energy justice, scholars continue to debate its definitions and applications. As the literature suggests, energy transitions, to encompass justice, must go beyond technological shifts to address deeper structural inequalities, ensuring that historically marginalized communities are not left behind. These challenges are particularly pronounced in countries of the Global South, where energy transitions intersect with long-standing social and economic disparities. The next section delves into the specific context of Brazil, examining how just energy transition principles and frameworks are being (or failing to be) applied in practice.

#### *4.1.2 Just Energy Transition in Brazil: Challenges and Opportunities*

The expansion of large energy infrastructure projects in Brazil, such as hydroelectric power plants, has historically generated significant socio-environmental conflicts. More recently, similar negative impacts have begun to emerge in large solar and wind energy developments, particularly concentrated in the Northeast region. An analysis of international academic publications using keywords such as "energy justice" and "just energy transition" in the Brazilian context reveals that the literature has increasingly highlighted this issue, with numerous studies exploring specific aspects of energy justice.

For instance, García et al. (2024) underscore the spatial injustices caused by the Jirau and Santo Antônio hydroelectric plants, where communities living near these facilities suffer from unreliable or inaccessible energy services despite their proximity to major energy infrastructure. Similarly, Mayer et al. (2022) highlight procedural injustices in hydroelectric projects, particularly within the Madeira River Hydroelectric Complex. According to the authors, despite formal participatory processes, local communities experienced "pretend participation", where their voices had little real influence on project outcomes. Such practices erode trust and exacerbate perceptions of exclusion and marginalization.

In the case of the Belo Monte dam, Castro-Diaz et al (2024) applied the principles of distributive, procedural, recognition, restorative, and capabilities energy justice, adopting a multidimensional and multitemporal perspective to assess the impacts experienced by inhabitants of a community located downstream from the dam. The authors identified multiple forms of energy injustice that varied across the project's phases: during the construction phase, violations of recognition and procedural justice were most prominent, particularly due to the exclusion of local communities from decision-making processes and the lack of cultural sensitivity; during the operational phase, injustices related to capabilities and restoration became more apparent, as the affected community faced long-term disruptions to their livelihoods and daily functioning, without adequate compensation or support to restore their pre-existing quality of life.

In the context of wind energy development, Frate et al. (2019) analyse procedural and distributive justice concerns surrounding a wind farm built in Galinhos, a fishing and tourist community in Rio Grande do Norte. Their study reveals that local residents

experienced unequal access to the economic benefits of the project, with most jobs being short-term, externalised, and insufficient to generate long-term improvements in livelihoods. Furthermore, many community members felt excluded from the decision-making processes, reporting a lack of transparency and limited access to information about the project's impacts.

These perceptions were reinforced by the presence of outside actors representing the community in public hearings and by the limited responsiveness of institutions, which together contributed to widespread distrust. The authors also highlight that structural conditions (such as dysfunctional bureaucracies, insecure land tenure, and socio-economic inequalities) amplify the likelihood of conflict and resistance, especially in areas where wind resources are valuable but communities are politically and economically marginalised. The case illustrates how failures in procedural and distributive justice can shape public opposition and influence the legitimacy of renewable energy projects in the Global South

Exploring the literature further, two theses (Belzunces 2021; Schneider 2018), two dissertations (Matheus 2022a; Salmi and Coelho 2023), one monograph (Ribeiro 2017), and four book chapters (Lenoir-Improta and Di Masso, 2021; Chedid et al., 2022; Ciotta, Peyerl and Zacharias, 2023; Santos et al., 2023) that address concepts of just transition in the context of the energy transition in Brazil were found, as well as seven scientific articles (Braga and Alencar 2021; De Paula 2023; Poque González et al. 2023; Kumar et al. 2019a; Lazaro et al. 2022; Ribeiro 2017; Maria Marinho Sales and Gustavo de Lima Sales 2022).

The analysis of the literature related to Brazil identified that the just energy transition has been more discussed at the national level, and the negative impacts related to the expansion of renewable energies on society have been addressed in greater complexity, rather than the positive impacts associated with just energy transitions. It was found that the main groups affected by the negative impacts are workers (Braga and Alencar 2021; De Paula 2023; Ribeiro 2017; Santos et al. 2023; Schneider 2018), traditional and/or isolated communities (Poque González et al. 2023; Kumar et al. 2019a; Matheus 2022a; Santos et al. 2023), low-income families (Kumar et al. 2019b; Matheus 2022b), and local communities (Braga and Alencar 2021; De Paula 2023). Table 5 summarizes some of the

main points identified in the literature regarding the discussion on just energy transitions in Brazil.

Although most of the analyzed literature discusses the expansion of renewable sources, including wind, solar, hydroelectric, and bioenergy, only a small portion explicitly frames these discussions using the language of a just energy transition. Nonetheless, many of these works engage with core themes of energy justice, including equity, participation, and socio-environmental impacts. This suggests that, even if not always labelled as such, conversations around fairness, inclusion, and the social consequences of energy transitions are gaining traction in Brazil. The emerging consensus points to the need for more equitable planning processes and stronger protections for affected communities.

Nevertheless, the findings from the literature illustrate that large-scale renewable energy projects often replicate long-standing patterns of socio-environmental injustice, prioritizing national energy goals over local needs and deepening existing inequalities. For a just energy transition to be realized, it is essential to move beyond a narrow focus on energy expansion and actively integrate justice considerations into planning and implementation. As the country continues to develop its renewable energy infrastructure, the challenge lies in ensuring that this growth is not only environmentally sustainable but also socially inclusive, addressing historical injustices rather than reinforcing them.

**Table 5 – Literature on Just Energy Transition in Brazil**

Reference	Type	Overview
BELZUNCES (2021)	Thesis (PhD)	<p><b>Limites e possibilidades da atuação dos sindicatos de trabalhadores da mineração na questão ambiental no Brasil e no Peru</b></p> <p>The author aims to understand how the environmental theme is treated by mining workers' unions in Brazil and Peru. The author points out that the concept of a just transition presupposes that the necessary changes are implemented to improve the environment, workers, and affected communities, highlighting that there is no rigid concept or predetermined rules about the functioning of the just transition process. The author indicates that, from the workers' perspective, a just transition should involve</p>

		job guarantees through relocation to other activities without a reduction in pay and worsening working conditions.
BRAGA; ALENCAR (2021)	Article	<p><b>Acordo Verde para Amazônia Brasileira</b></p> <p>The authors discuss the proposition of elaborating a green deal for the Brazilian Amazon, highlighting the importance of promoting research to achieve a 100% clean and renewable energy-dependent transition. The authors suggest that the mentioned deal needs to address social justice and guarantee safe, accessible, and adequate housing for all, aiming to reduce irregular housing that contributes to deforestation and pollution of rivers, streams, and their sources, as well as providing support for unemployed people.</p>
CASTRO-DIAZ ET AL. (2024)	Article	<p><b>Multidimensional and Multitemporal Energy Injustices: Exploring the Downstream Impacts of the Belo Monte Hydropower Dam in the Amazon.</b></p> <p>In the case of the Belo Monte dam, the authors applied the principles of distributive, procedural, recognition, restorative, and capabilities energy justice, adopting a multidimensional and multitemporal perspective to assess the impacts experienced by inhabitants of a community located downstream from the dam. The authors identified multiple forms of energy injustice, varying across the project's phases: issues of recognition and procedural justice were more evident during construction, while injustices related to capabilities and restoration prevailed during the operational phase.</p>
CHEDID et al. (2022)	Book chapter	<p><b>Social Licensing to Operate and Social Justice in Energy Transition: The Case of Brazil</b></p> <p>The authors do not directly mention the energy transition and just transition but include a vision of social justice regarding the Brazilian oil and gas industry, seeking to discuss how the Brazilian government can combine the need to protect communities and the environment while developing the energy industry during the energy transition. The authors discuss a "social license to operate," understood as a tool through which energy sector companies can engage with communities to listen to them.</p>
CIOTTA; PEYERL; ZACHARIAS (2023)	Book chapter	<p><b>Effect of the COVID-19 Pandemic on the Brazilian Energy Sector.</b></p> <p>The authors seek to understand the effects of Covid-19 on the Brazilian energy sector from an energy justice and climate resilience perspective. The lens employed by the article allowed them to present the effects of the pandemic from unexplored perspectives, presenting the reductions in emissions from the</p>

		energy sector as a possible process of impoverishment rather than a positive environmental effect.
DE PAULA (2023)	Article	<p><b>Fim do mês, fim do mundo: mesmo combate: Justiça ambiental/climática e transição justa no caso da Mina Guaíba.</b></p> <p>The author points out aspects considered fundamental for the transition to be considered just, such as guaranteeing decent working conditions, including in the renewable energy job market. The author refers to the need to create economic alternatives for the development of public policies for the population dependent on fossil fuel-related activities, including training for reintegration into the job market.</p>
FRATE ET AL. (2019)	Article	<p><b>Procedural and Distributive Justice Inform Subjectivity Regarding Wind Power: A Case from Rio Grande Do Norte, Brazil</b></p> <p>In the context of wind farms, the authors assess procedural and distributive justice aspects related to the development of a wind farm in a fishing and tourist community in Galinhos, Rio Grande do Norte. The study reveals that the local population experienced an unequal distribution of benefits and limited inclusion in decision-making processes, highlighting the need for more transparent and equitable governance. The article notes that factors such as dysfunctional bureaucracies, land tenure insecurity, and extreme socioeconomic inequality can create new types of conflicts and resistance in Global South communities, particularly in areas with potentially lucrative wind resources.</p>
GARCÍA ET AL. (2024)	Article	<p><b>Spatial Injustice to Energy Access in the Shadow of Hydropower in Brazil</b></p> <p>The authors underscore the spatial injustices caused by the Jirau and Santo Antônio hydroelectric plants, where communities living near these facilities suffer from unreliable or inaccessible energy services despite their proximity to major energy infrastructure.</p>
GONZÁLEZ et al. (2023)	Article	<p><b>Socio-Ecological Controversies from Chilean and Brazilian Sustainable Energy Transitions.</b></p> <p>The authors evaluate the lack of justice in energy projects in Chile and Brazil where socio-ecological conflicts exist, seeking to understand where injustices lie, who is ignored, and whether a fair process is underway. From the perspective of a just transition, the authors assess the use of renewable energies and the energy transition in these countries and identify that energy injustices occur in large hydroelectric projects, wind farms, and biomass production, ignoring the cultural and natural heritage of indigenous and local inhabitants and the ecosystem services they</p>

		<p>exploit, leading to population displacement, loss of knowledge, practices and traditional culture, human rights violations, land dispossession, increased violence, and impacts on the population's health.</p>
<p>KUMAR et al. (2019)</p>	<p>Article</p>	<p><b>Solar energy for all? Understanding the successes and shortfalls through a critical comparative assessment of Bangladesh, Brazil, India, Mozambique, Sri Lanka and South Africa</b></p> <p>The authors compare research on small-scale solar energy - residential systems, solar heating systems, and solar microgrids - conducted in Bangladesh, Brazil, India, Mozambique, Sri Lanka, and South Africa, aiming to understand how, when, and for whom access to solar energy occurs. The authors found that the high costs of energy produced by the national grid and the fact that, in Brazil, the National Interconnected System does not equitably serve all regions of the country are impediments for low-income families and communities in remote areas to obtain access to the service.</p>
<p>LAZARO; SOARES (2024)</p>	<p>Article</p>	<p><b>The energy quadrilemma challenges - Insights from the decentralized energy transition in Brazil.</b></p> <p>The authors introduce a context dimension to the Energy Trilemma Index, which includes social, environmental, and governance factors, allowing for a more comprehensive analysis of the challenges of the energy transition in the country. Among the challenges found are access to electricity in rural and remote areas, issues related to the quality and reliability of electricity services, and the affordability of electricity tariffs, especially for low-income families. The authors state that the energy transition process in Brazil must incorporate justice, equity, and sustainability as fundamental elements.</p>
<p>LENOIR- IMPROTA; DI MASSO (2021)</p>	<p>Book chapter</p>	<p><b>People-Place Bonds, Rhetorical Meaning-Making and “Doing Acceptance” to a Renewable Energy Infrastructure: Postcolonial Insights from the Global South</b></p> <p>The authors explore the cultural and political dimensions of the process of accepting renewable energies at the local and macro levels. The authors present the impacts of renewable energies from a more critical perspective and indicate that peripheral countries tend to import transition solutions and discourses. The article analyzes the role of people-place ties in the articulation and legitimization of the implementation of the first wind farm in southern Brazil and discusses the discursive construction of the meanings of the wind farm and the residents' relationships with the territory.</p>

<p>MATHEUS (2022)</p>	<p>Thesis (Master)</p>	<p><b>SISTEMAS ENERGÉTICOS RESIDENCIAIS: avaliação do cenário atual brasileiro e alternativas para autogeração sustentável</b></p> <p>The author discusses residential energy systems, aiming to evaluate the potential of sustainable self-generation of energy in Brazilian homes as an alternative to reducing the consumption of energy from the national grid. The author indicates that a just energy transition to solar and biogas self-generation systems is necessary to include and democratize access to energy and cooking fuels that do not emit toxic gases to humanity, with the social impact of increasing energy supply security by reducing dependence on the transmission grid.</p>
<p>MAYER ET AL. (2022)</p>	<p>Article</p>	<p><b>Pretend Participation: Procedural Injustices in the Madeira Hydroelectric Complex</b></p> <p>The authors highlight procedural injustices in hydroelectric projects, particularly within the Madeira River Hydroelectric Complex. According to the authors, despite formal participatory processes, local communities experienced "pretend participation", where their voices had little real influence on project outcomes. Such practices erode trust and exacerbate perceptions of exclusion and marginalisation.</p>
<p>RIBEIRO (2017)</p>	<p>Article</p>	<p><b>Justiça espacial e justiça socioambiental: uma primeira aproximação</b></p> <p>The author discusses how spatial justice and socio-environmental justice can contribute to the interpretation of urban phenomena and their inequalities. The author argues that it is necessary to promote a transition that does not harm workers and allows their functional adaptation and requalification.</p>
<p>RIBEIRO (2022)</p>	<p>Thesis (Graduation)</p>	<p><b>Análise da Transição Energética no Brasil: Aportes a partir do direito Francês.</b></p> <p>The author seeks to analyze the stage of development of the Brazilian energy transition and compare it to the international context, specifically to the energy transition that occurred in France. The author indicates that there are still regions in Brazil with low development and that this should be taken into account in energy transition planning, applying the principle of equality.</p>

## 4.2 Document analysis

The document analysis was conducted to address Evaluation Question 2, aiming to understand the nature of the energy transition currently underway in Brazil and how energy planning is being structured and implemented, considering both official

government documents and the perspective from civil society. In addition, it included an analysis of initiatives from MDBs related to just transition to understand how this subject is being considered in their operations.

#### *4.2.1 Policy framework for the energy transition*

The energy transition in Brazil has been consolidating as one of the main axes for reducing greenhouse gas (GHG) emissions and advancing towards a low-carbon economy, being recognized in strategic documents such as the Nationally Determined Contribution (NDC), the National Energy Plan (PNE), the Ten-Year Energy Plan (PDE), the National Energy Transition Policy (PNTE), the National Energy Transition Plan (PLANTE), the National Energy Transition Forum (FONTE), and the Energy Transition Acceleration Program (PATEN). These documents converge on the necessity of expanding the renewable energy matrix, with an emphasis on solar and wind sources, aligning the sector's growth with the guidelines of the Paris Agreement.

Brazil's NDC reaffirms the country's commitment to decarbonizing the economy, emphasizing the need for public policies to expand renewable energy. The document highlights that currently 89.2% of the national electricity matrix is composed of renewable sources, reflecting the growing participation of solar and wind energy. However, the intermittency of these sources requires investments in transmission and energy storage infrastructure, as well as incentives for research and innovation.

The PNTE, established by Resolution n. 5 of the National Energy Policy Council (CNPE), is one of the cornerstones of this planning, setting comprehensive guidelines to ensure a just transition, including climate change mitigation and adaptation, energy security assurance, universal access to energy, and economic competitiveness. Additionally, reducing regional inequalities and promoting initiatives aligned with sustainable growth are fundamental pillars.

To ensure the effectiveness of this policy, two main instruments have been established: the National Energy Transition Plan and the National Energy Transition Forum. PLANTE, structured as the operational mechanism of the PNTE, consolidates and proposes actions aligned with long-term goals with the aim of integrating public policies and efforts from the productive sector, ensuring coherence and effectiveness in strategy

execution, whereas FONTE complements the plan by fostering dialogue between the government, the productive sector, and civil society.

The institutional framework established by the PNTE reflects a commitment to creating sustainable infrastructures and solutions, recognizing Brazil's strategic role in the global energy transition. By coordinating efforts from various stakeholders and promoting an integrated approach, the PNTE seeks to establish the country as an example of inclusive and efficient governance in addressing climate and energy challenges.

The PATEN also plays a crucial role by offering financial incentives and support mechanisms for replacing polluting energy sources with clean alternatives. The program aims to foster the financing of sustainable development projects, particularly those focused on infrastructure, research, and technological innovation, promoting the generation and efficient use of low-carbon energy in alignment with national commitments to reduce greenhouse gas emissions.

#### *4.2.2 Scenarios of Wind and Solar Power Expansion in Brazil*

Given the accelerated growth of renewable sources in Brazil – particularly solar and wind – it is essential to understand the projected pathways for their expansion, as outlined in key national energy planning instruments. This subsection presents future scenarios for these energy sources, emphasizing the technological, regulatory, and structural opportunities and challenges associated with their development.

According to the National Energy Plan (PNE), the scenario for wind and solar energy in Brazil has shown robust growth, primarily as allies in the energy transition towards a low-carbon economy with a smaller environmental footprint. The document compiles studies and guidelines aimed at outlining strategies for the future of Brazil's energy sector.

Brazil's wind potential, highlighted in the Brazilian Wind Potential Atlas, developed in 2001, reveals a promising scenario for expanding this renewable energy source. The initial study indicated an installable capacity of 143 GW nationwide. Since then, with the development of more detailed and state-focused studies, Brazil continues to present enormous wind potential, particularly in the Northeast region, where winds are more intense and consistent.

The Energy Research Company (EPE) conducted a study indicating a high wind power generation potential in the country. Although onshore wind potential is more advantageous and accessible, offshore wind also emerges as a relevant future possibility, particularly due to its capacity to generate large volumes of wind energy. However, Brazil still needs to overcome several obstacles, such as reducing implementation costs (CAPEX) and improving regulations for offshore wind farm installations.

Regarding solar energy, the PNE indicates a significant increase in installed capacity, driven by factors such as decreasing prices in recent years, technological robustness with projects operating for over 30 years, vast existing technical potential, and the absence of GHG emissions during plant operation. Brazil, with its privileged location and high solar radiation levels, has vast potential for expanding photovoltaic solar energy, making it one of the most competitive renewable sources in the market. The installed capacity of solar energy in the country has shown remarkable growth in recent years, and the prospects for 2050 are promising, with a significant role in Brazil's energy matrix.

Studies indicate that Brazil has a technical potential for installing 307 GWp of photovoltaic solar energy, considering only areas with an average solar radiation greater than 6 kWh/m<sup>2</sup>/day and already anthropized. Based on this, it is estimated that by 2050, centralized photovoltaic solar capacity could reach between 27 and 90 GW, representing 5% to 16% of the total installed capacity of the Brazilian electricity system, and between 8 to 26 GWh of average energy generated, depending on the scenarios analysed. In more optimistic cases, such as the limit for wind energy expansion, centralized photovoltaic solar capacity could exceed 100 GW, reaching up to 30% participation in the country's electricity matrix.

The constant and rapid evolution of photovoltaic solar technology, although posing a long-term planning challenge for the industry, plays a crucial role in this expansion, with emphasis on the continuous reduction of costs, improvement of tracking systems, and innovation in photovoltaic modules. These advances result in greater efficiency and reduced land demand for plant installations, allowing for the maximization of available space use. It is estimated that photovoltaic technology could continue to reduce its costs, becoming more competitive compared to other energy sources, such as

hydroelectric and biomass. This scenario could be even more favorable with the advancement of integrating photovoltaics into building materials, such as tiles and glass, promoting distributed generation and increasing energy efficiency.

The Ten-Year Energy Expansion Plan (PDE) 2034, another energy planning instrument, also projects a significant increase in Brazil's installed renewable energy capacity. According to its data, wind energy generation is expected to rise from 114.1 TWh in 2024 to 180.3 TWh in 2034, representing 17.2% of the country's total electricity generation. Centralized solar energy will follow this trend, growing from 26.1 TWh in 2024 to 60.5 TWh in 2034, increasing its share to 5.8% of the national electricity matrix. Distributed solar generation, driven by the advancement of micro and mini distributed generation (MMGD), will grow from 40.9 TWh to 76.5 TWh in the same period.

The diversification of the energy matrix, as outlined in PDE 2034, highlights that solar and wind sources will be essential in compensating for the reduced share of hydroelectric power in electricity supply, consolidating the presence of renewable energies, which are expected to account for 85% of total installed capacity. This accelerated growth will require investments in energy transmission infrastructure to ensure the integration of new capacities into the National Interconnected System (SIN), as well as the adoption of energy storage technologies to mitigate the intermittency of renewable sources.

Projections for 2050 indicate that centralized solar energy could reach up to 100 GW of installed capacity, while wind energy, including offshore projects, could reach 194 GW. However, some barriers must be surpassed to achieve this expansion. The evolution of the wind sector in Brazil will depend on a series of technological innovations. Increasing tower heights and the growth of wind turbine blades are among the key changes that promise to enhance wind generation efficiency, reduce costs, and expand installed capacity. The use of new materials, such as carbon and hybrid fibers, can make turbine construction lighter and more efficient. Offshore segment innovations are also notable, with larger and more powerful wind turbines being developed, such as those with rotors up to 150 meters in diameter and nominal power exceeding 6 MW.

Regarding the operation and maintenance of wind farms, an alternative based on remote support using digital technology is proposed, allowing diagnostics from data

collected, stored, and processed through this technology. Digitalization would contribute to the control and performance of wind farms, opening doors to new opportunities such as Virtual Power Plants.

Understanding the scale and trajectory of renewable energy expansion is crucial to assessing how just transition principles can be embedded into Brazil's energy planning. The trends and projections presented here serve as a foundation for evaluating whether current pathways are aligned with equitable development goals, and for identifying the conditions necessary to ensure that future growth in the sector delivers social, economic, and environmental benefits to all.

#### *4.2.3 Just transition considerations in the energy planning*

A just energy transition in Brazil faces a series of socioeconomic and environmental challenges, as detailed in various strategic documents. These challenges encompass environmental impacts, territorial conflicts, social justice issues, and technological obstacles, requiring an integrated and participatory approach to ensure an equitable and sustainable transition.

From the perspective of the Climate Observatory in the document "Future of Energy: Climate Observatory's Vision for a Just Transition in Brazil", the incorporation of renewable sources into the energy matrix must consider the occasional harmful effects of these projects to envision a sustainable future. Among the main environmental challenges, deforestation caused by the installation of wind and solar farms stands out, especially in the Caatinga biome, where more than 4,000 hectares were deforested in 2022. The occupation of hilltops, ecologically sensitive areas, compromises habitats of various species, altering the natural composition of these ecosystems.

Another significant impact is related to human health. The constant noise of wind turbine blades has caused disturbances such as insomnia, stress, migraines, and even neurological problems in neighboring communities. Additionally, territorial conflicts resulting from the expansion of wind farms directly affect traditional communities, which face difficulties due to land enclosures and restricted access to essential resources such as water sources and agricultural roads. Real estate speculation and land grabbing further exacerbate the situation.

For solar power plants, the environmental impact can also be significant. The need for vast flat areas leads to the suppression of native vegetation and compromises local biodiversity. The improper disposal of solar panels at the end of their life cycle, which could reach 550,000 tons by 2050, represents a major environmental challenge, demanding recycling policies and reverse logistics. Socially, the installation of large solar farms in contested lands can exacerbate land conflicts, harming traditional communities and their livelihoods.

The document “Socioenvironmental Safeguards for Renewable Energy” produced by civil society organizations, states that although renewable energy is often promoted as “clean,” its unregulated implementation has caused significant socio-environmental impacts, particularly in regions such as the Brazilian Northeast, and that the shift to a low-carbon energy matrix cannot come at the expense of vulnerable populations, biodiversity, or the territorial sovereignty of traditional communities.

The socio-environmental safeguards proposed in the document address the need for more responsible energy planning, which considers socioeconomic and ecological variables when selecting sites for new projects. The suggested guidelines include regulating land-use agreements, improving environmental licensing, and requiring social and economic compensations from energy companies. The implementation of safeguards also seeks to prevent land conflicts, ensure the regularization of traditional territories before the installation of projects, and promote decentralized energy generation models that enable local communities to directly benefit from energy production.

According to the document, the governance of a just energy transition should incorporate social inclusion mechanisms, such as the National Energy Transition Forum (FONTE) and the National Energy Transition Plan (PLANTE), previously detailed. Thus, a just energy transition should be understood as a process that goes beyond decarbonization, incorporating a keen focus on social and territorial inequalities, promoting economic opportunities, and ensuring that no group is left behind in building a more sustainable and equitable energy future.

The PDE underscores the importance of an energy transition that considers distributive, procedural, and recognition justice. Distributive justice seeks to ensure that the economic benefits of the transition are equitably distributed, generating jobs and reducing inequality in energy access. Especially when considering that automation and the replacement of traditional jobs with new positions in the renewable sector could lead to labor precarity, requiring professional retraining policies. Procedural justice, which emphasizes the need for social participation in energy decisions, is hindered by a lack of transparency in public policy formulation and the exclusion of vulnerable groups, presenting obstacles to a truly inclusive transition.

Furthermore, in terms of recognition justice, historically marginalized groups, such as Indigenous and *Quilombola* communities, often face territorial expropriation and environmental degradation. Women and racialized populations are also more vulnerable to the impacts of the transition, whether due to difficulty in accessing electricity or low representation in the energy sector. The adoption of affirmative policies, such as training programs and incentives for female participation in the sector, is essential to mitigate these inequalities.

The safeguards document presents specific challenges for a just energy transition, focusing on the need for territorial regulation and mitigating socioenvironmental impacts. The expansion of renewable energies has led to land disputes and forced displacements, particularly in traditional and Indigenous communities. The absence of prior and informed consultation violates rights guaranteed by international conventions, increasing social conflicts.

In this analysis, it is observed that inequality in access to the benefits of the energy transition is also a significant issue. Many wind and solar power plants are installed in underprivileged regions without ensuring direct improvements for local communities, such as rural electrification and economic development. The document highlights the importance of policies that guarantee a more equitable distribution of the benefits of the transition.

Other challenges addressed in the document include environmental degradation caused by the installation of energy projects, the lack of transparency in the granting of

permits, and the absence of regulations for land use contracts. Many communities sign disadvantageous agreements with energy sector companies, receiving minimal compensation while losing access to their traditional territories.

The policy brief “Advancing a Just Transition in Latin America and the Caribbean” from IDB identifies challenges related to the context in the Latin America and Caribbean (LAC) region that may generate social impacts linked to the transition, such as income and gender inequalities, high levels of informal employment (particularly in rural areas) and tax structures that are primarily consumption-based. Some potential impacts were identified that are more directly related to the expansion of renewable energy sources, such as:

- despite the potential for job creation, most of these jobs are expected to be in male-dominated sectors, offering fewer benefits to women;
- there may be an increase in transportation costs due to changes in energy sources, which could mainly affect low-income groups.

In the first case, this form of job creation could deepen gender inequalities, while in the second, there is a potential impact on the livelihoods of poorer populations, who already allocate a significant portion of their income to transportation expenses.

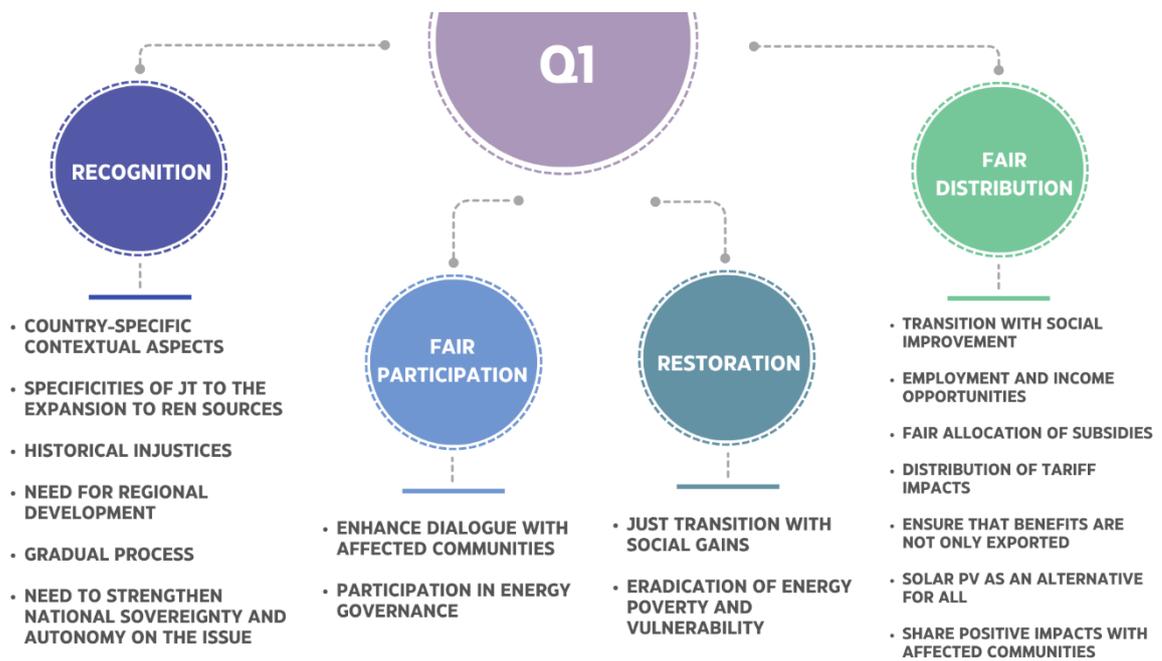
The policy brief mentions that MDBs have established five principles for a just transition, one of which is directly related to the Theory of Change presented, which highlights the need for a stakeholder engagement: “encourage transparent and inclusive planning, implementation and monitoring processes that involve all relevant stakeholders and affected groups, and that further inclusion and gender equality.”

Finally, the document presents a set of actions that governments in the region can adopt to promote a just transition. However, it does not mention practices that are required or recommended in projects supported by the bank for this purpose.

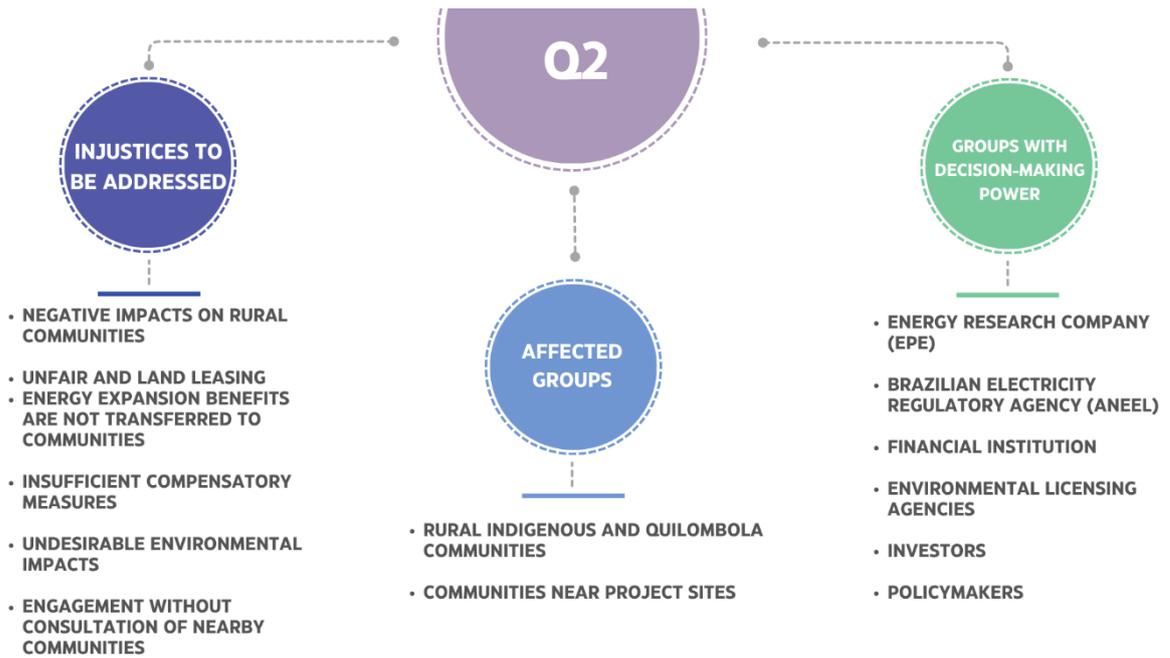
### **4.3 Interviews**

The analysis of the interviews resulted in the identification of a set of core themes and subthemes that reflect the perceptions, experiences, and recommendations of the participants regarding each evaluation question. These themes were developed through

a systematic process of thematic analysis, combining both deductive and inductive approaches. Deductive codes were initially structured to respond to the guiding evaluation questions, while additional codes and interpretive categories emerged organically from the data. The themes were subsequently refined and organized to highlight key patterns and tensions within the material. **Figure 5, Figure 6 and Figure 7** illustrate the thematic classification taken from interviewees' perceptions for questions Q1, Q2 and Q3, respectively.



**Figure 5 – Thematic classification of interviewees' perceptions for Q1**



**Figure 6 – Thematic classification of interviewees' perceptions for Q2**



**Figure 7 – Thematic classification of interviewees' perceptions for Q3**

With respect to the principles of a just energy transition (Q1), grounded on the literature review and using an inductive approach, these were divided into four dimensions: (1) Principle of Recognition; (2) Principle of Fair Participation; (3) Principle of Fair Distribution; and (4) Principle of Restoration.

Regarding the principle of recognition, several points were raised to be acknowledged in the interviews regarding the planning of just energy transitions in Brazil, in particular:

- the distinctive features of the energy transition in the country;
- the specificities of analyzing a just transition through the lens of renewable energy expansion;
- the historically unaddressed injustices;
- the need for regional development across different parts of the country;
- the necessity of gradual and holistic planning of transitions;
- the development of a national and autonomous perspective on the subject; and the inclusion of future generations' perspectives in the discussion.

The principle of fair participation emerges as central to securing legitimacy and equity in governance processes. This includes the enhancement of dialogue with affected communities and the promotion of inclusive participation in energy governance. Ensuring fair participation is essential to bridge the gap between institutional decision-making and the lived realities of communities directly impacted by renewable energy projects.

Regarding the principle of fair distribution, the need to link energy transition with social improvement was emphasized, creating employment and income opportunities, and ensuring a fair allocation of subsidies and tariff impacts. The principle also stresses that benefits should not be limited to external stakeholders; rather, they must be shared with local communities, including through decentralized solutions such as solar PV systems.

Furthermore, the principle of restoration highlights the necessity of tackling past and ongoing injustices, aiming for a just transition with tangible social gains, and the eradication of energy poverty and vulnerability. These dimensions underscore the

importance of not only preventing harm but actively redressing historical inequities within the energy system.

To ensure that the planned transition is truly just (Q2), it is necessary to identify the injustices that must be addressed and the groups that are affected in this process. The injustices identified include:

- negative impacts on rural communities,
- unfair land leasing arrangements,
- and the lack of equitable transfer of benefits from energy expansion.

There are also concerns regarding:

- insufficient compensatory measures;
- undesirable environmental impacts;
- and the absence of prior consultation with local communities.

These challenges require structural changes in the way projects are designed, implemented, and monitored.

With regard to the affected populations, the transition must take into account the specific vulnerabilities of rural, indigenous and *quilombola* communities, as well as populations living near project sites. These groups have historically borne a disproportionate burden from energy projects and must therefore be at the center of the vision of a just transition.

Crucially, the role of Groups with Decision-Making Power – such as the Energy Research Company (EPE), the Brazilian Electricity Regulatory Agency (ANEEL), financial institutions, environmental licensing agencies, investors, and policymakers – must be reconsidered. Their actions and frameworks shape the direction of energy policy, and their engagement with principles of justice is imperative for systemic transformation.

The incorporation of these principles into an ideal Just Energy Transition (Q3) model requires the adoption of necessary corrective measures, ranging from the

implementation of International Labor Organization (ILO) Convention 169<sup>13</sup>, the expansion of dialogue with stakeholders, the prioritization of the use of unproductive land, to the development of social licensing mechanisms. They also include the promotion of training and labor inclusion, the energy literacy of communities and the fair distribution of royalties.

Other proposed strategies involve the adoption of a tariff justice policy, benchmarking of best practices, and the encouragement of ESG-aligned investment. Furthermore, the incorporation of community technical knowledge in impact studies, land regularization, industrialization policy, and fiscal reform are seen as fundamental steps for structuring a model that aligns energy transition with social justice.

In sum, these four principles explored in Q1 and their associated dimensions provide means to guide policy and practice in the context of Brazil's renewable energy expansion. They not only highlight the systemic changes needed across regulatory, financial, and participatory structures, but also reaffirm the central role of historically marginalized communities in shaping a transition that is truly equitable and sustainable.

## **5 Discussion of findings**

This section presents an in-depth discussion of the key themes that emerged from the interviews, which will be examined in light of the literature review and the documentary analysis of existing energy planning instruments, as well as selected documents explicitly concerned with the just energy transition. The aim is to identify points of convergence and divergence between institutional narratives, academic debates, and the perspectives of impacted groups, thereby contributing to a more comprehensive understanding of the challenges and possibilities associated with planning a just energy transition in the Brazilian context.

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<sup>13</sup> ILO Convention No. 169 is an international treaty that establishes the rights of Indigenous and tribal peoples, including the right to free, prior, and informed consultation whenever legislative or administrative measures may affect them directly. Brazil ratified the convention in 2002, thereby committing to uphold these rights in its policies and projects.

## **5.1 Key principles for a just energy transition in the renewable energy expansion in Brazil**

### *5.1.1 Recognition*

With regard to the distinctive aspects of a just energy transition in Brazil, interviewees pointed to the need to adapt the concept to the Brazilian context, under the premise that a just energy transition must consider Brazil's social, territorial, and economic particularities, including regional and social inequalities. It was indicated that, beyond addressing distributive aspects of the transition, the concept in Brazil must recognize and incorporate social inclusion as a priority for action, with particular attention to vulnerable populations to prevent new processes of exclusion and/or the deepening of existing vulnerabilities during the renewable energy expansion. In this sense, from the perspective of most interviewees, a just energy transition in Brazil must align with the idea of "leaving no one behind," thus requiring the recognition of current injustices and energy vulnerabilities. Supporting this view, a key point raised was the geographical heterogeneity within the country, where vastly different realities coexist in terms of energy needs and exclusion.

A second aspect that stood out in the interviews concerns the specificity of a just energy transition analyzed from the perspective of the national energy portfolio. Due to Brazil's "renewable vocation" – the result of its historically renewable-based energy matrix – the process involves less of a "transition" and more of an expansion or diversification of energy sources. As one interviewee put it, it is rather an "energy transformation". The idea of transformation was defended because the focus of this diversification is not on the risks typically associated with replacing fossil fuel production chains, but rather on creating opportunities, ensuring rights, and promoting social inclusion – especially when supported by inductive mechanisms that enhance its positive impacts and maximize energy's transformative potential for the country.

Among the social injustices to be acknowledged, the realities of Brazil's traditional communities were highlighted, shaped by multiple layers of historical oppression. From the standpoint of a just transition – as also supported by the literature – these communities are particularly affected by greater energy vulnerability and the increased

risk posed by the proximity of large-scale projects to their territories (as will be further discussed in the subsections “affected groups” and “injustices to be addressed”).

One interviewee emphasized the importance of planning gradual processes, avoiding abrupt transitions “from one day to the next”. Specifically in the Brazilian context, it was stressed that this energy diversification must be carefully planned to ensure that intermittent sources can meet the country’s energy security needs.

The recognition of the rights of future generations was also brought up by one of the interviewed public institutions. It was argued that future generations must be guaranteed, at the very least, basic conditions through today’s transition planning, thereby affirming the importance of intergenerational equity in this discussion.

A financial sector representative also pointed to the need to acknowledge that some regions in Brazil still lack sufficient development incentives, and that the exploitation of energy and natural resources in these areas must not result in the ‘leakage’ of wealth to other parts of the country. The central point in this statement – which focused particularly on the Northeast region, already recognized in earlier sections as one of the primary fronts of renewable energy expansion – was that this recognition is key to regional reindustrialization and endogenous development, ensuring that the benefits of energy expansion remain within the region.

Finally, regarding the development of a national and autonomous perspective on the subject, at least two interviewees highlighted the need to acknowledge differentiated responsibilities within what was referred to as the “international division of carbon” – to ensure that differences and power asymmetries between the Global North and Global South are taken into account. This point was grounded in the argument that Brazil must formulate its own definition of a just energy transition, rather than adopting concepts crafted in the Global North that may not reflect the country’s specific needs and urgencies. It was argued that Brazil holds strategic advantages – such as access to renewable sources, a consolidated electricity sector, a functional financial system, and a strong university network – that distinguish it within the Global South and enable it to lead an alternative model of transition. Among the autonomous visions mentioned, one

interviewee proposed the notion of a “just transition to a green economy,” integrating themes such as green industrialization, social justice, and geopolitical rebalancing.

### *5.1.2 Fair participation*

Among the principles highlighted in the literature, aspects related to procedural justice or fair participation were certainly the least mentioned by the interviewees. This is partly due to the fact that national energy planning in Brazil remains predominantly centralized. In one of the interviews, the idea of participation was explored from the perspective of decentralization, where fair participation was expressed through the defense of a people-led energy transition, with emphasis on decentralized initiatives for the adoption of renewable technologies, such as solar photovoltaic systems.

From the energy planner's perspective, however, it was emphasized that communities must be properly informed about policies, processes, and projects that affect them, with guarantees of transparency and accountability. These elements are presented as central to ensuring that the transition is, in fact, inclusive and socially grounded.

Still, although the interviews identified the consequences of insufficient consultation and social engagement during the planning stages of the energy transition – and pointed to the need for policies that respond to this gap – they did not, in general, explicitly reference the procedural principle of energy justice. The absence of this framing suggests that, while the effects of limited participation are recognized in practice, the normative dimension of fair and inclusive decision-making has yet to be fully incorporated into how stakeholders conceptualize a just transition. This gap reinforces the relevance of promoting broader awareness and integration of procedural justice as a foundational element in energy governance frameworks.

### *5.1.3 Fair distribution*

In line with the principle of recognizing national autonomy and leadership in the just transition agenda, one element raised in relation to distributive aspects was the need to ensure that the benefits of the energy transition are not purely exported to other countries. Discussions with different stakeholders highlighted concerns that the economic gains of

the energy transition in Brazil are largely being externalized, while the negative impacts remain concentrated in the territories hosting the projects.

In the case of green hydrogen, for instance, it was pointed out that the gains tend to be accounted for abroad, while local populations affected by the projects do not even receive basic benefits, such as discounts on electricity bills, financial compensation, training opportunities, or stable employment. What has been observed are isolated and insufficient benefits, disconnected from the actual needs of the impacted communities, which are left to deal with permanent effects.

In the case of solar energy, it was emphasized that the manufacturing of solar panels does not generate jobs in Brazil, as the equipment is largely imported from China. Moreover, this process has a negative impact on the national economy, due to a significant trade imbalance: the country exports raw silicon at low prices and imports high-value-added solar panels. This dynamic undermines industrial development and weakens the cost-benefit balance of renewable projects, as the country internalizes the negative impacts without internalizing the productive and technological gains.

This distributive dimension, rooted in macroeconomic imbalances and global asymmetries of power, already highlights the need to contextualize and territorialize the understanding of energy transitions for them to be truly just. The Brazilian experience reveals how national productive structures and external dependencies shape the ability to retain benefits and avoid the externalization of harms. Such challenges are often underexplored in the international literature, which tends to prioritize normative or technical approaches to just transitions, without fully accounting for the structural constraints faced by countries in the Global South.

One interviewee also noted that the way the solar energy supply chain was introduced in Brazil led to a weakening of the wind energy chain, which had been developed over the years through domestic production of components like wind blades. This disruption has direct implications for job creation, public revenue, and local economic activity. Without incentives for national technological development and the industrialization of renewable energy supply chains, investments end up benefiting

mostly foreign suppliers, which limits the redistributive potential of the transition and undermines balanced regional development goals.

Still on the topic of solar energy, and in the context of an increasingly decentralized energy sector, one point raised both in literature and in the interviews was the need to ensure that distributed photovoltaic generation becomes an opportunity for all, not only for the wealthiest segments of the population. This issue becomes even more relevant in light of the fact that while certain social groups have privileged access to solar energy, the infrastructure that enables this access is financed by society as a whole. According to the accounts, this asymmetry is clearly visible: individuals with higher income, education, and access to public policies and financing mechanisms are those who most benefit from distributed solar generation. Meanwhile, residents of *favelas* and low-income areas, who face greater economic hardship, rarely have access to this technology. As a result, the most vulnerable end up subsidizing, through the centralized public system, the energy benefits of a more privileged group, without receiving equivalent returns in terms of energy justice. This dynamic creates a distributive tension, as the expansion of distributed solar energy, in the way it has been occurring, reproduces pre-existing socio-economic inequalities, concentrating the benefits of the transition within specific segments of the population.

Regarding the distribution of incentives, one interviewee pointed to the need to rethink the subsidy model currently adopted in Brazil. According to a study cited from INESC (2024), for every BRL 1 of incentive granted to renewable sources, BRL 4.50 are allocated to fossil sources. This imbalance shows that the current subsidy structure still favors unsustainable energy sources, contradicting the official narrative of prioritizing the energy transition. Although there has been a slight improvement in recent years – the ratio was previously BRL 5.20 or BRL 5.60 for every BRL 1 in renewables – the disproportion remains significant.

This discussion reinforces a central concern highlighted in the literature: that while justice must guide the design and implementation of energy transitions, it cannot become an obstacle to their advancement. Ensuring that transitions actually take place – and do so in line with climate goals such as those established in Brazil's Nationally Determined

Contribution (NDC) – is fundamental. A just transition, therefore, must ensure the pace and scale required to decarbonize the energy system, while simultaneously addressing structural inequalities to guarantee fairness and inclusion. Despite Brazil being globally recognized for its highly renewable energy matrix – often cited as a model of low-carbon electricity generation – maintaining this level of renewability is crucial. Without deliberate action and a vocal call for “transition”, there is a risk of a backward transition, in which the country regresses in climate ambition.

#### *5.1.4 Restoration*

The eradication of energy poverty and vulnerability was identified as an essential element of a just energy transition from the perspective of the restorative principle. Interviewees highlighted that historically oppressed communities, such as traditional Brazilian communities, continue to be disproportionately affected by situations of exclusion and energy insecurity. In addition to the injustices inherited from the past, an “irony” of the Brazilian energy system was mentioned: while traditional communities have their ways of life affected by the expansion of renewable energies, once these projects are established, they still often lack secure and quality access to energy.

The restorative principle was presented through the idea that the energy transition must generate social benefits through inclusive policies targeting historically marginalized and vulnerable groups in the country. In this context, women, Indigenous communities, Quilombola communities, and people with special needs were mentioned. Additionally, the need for restoration was also raised from the perspective of infrastructure – in places historically neglected in terms of access to roads, sanitation, and other essential services.

## **5.2REN planning, problems and necessary changes to ensure a just and fair energy transition**

### *5.2.1 Injustices to be addressed*

One of the main points of conflict raised (both in the interviews and literature review) is the absence of free, prior, and informed consultation with the affected communities. Although Convention 169 of the ILO guarantees this right, in practice, projects are often implemented without genuine dialogue with local residents. Decisions are taken unilaterally and hastily, abruptly disrupting the daily lives of communities and disregarding their ways of life and their connection with territory. In the traditional communities' perspective, consultants hired to carry out impact studies spend only a few days in the area, preventing any deep understanding of the reality and needs of the affected population. This reveals a pattern of exclusion, where those who suffer the most from the effects of the energy transition are also those who benefit the least from it.

This approach, carried out without consultation, not only violates fundamental rights but also contributes to a series of negative impacts on rural communities. The installation of energy infrastructure directly affects the landscape, peace, and well-being of residents. Constant noise from turbines, intermittent shadows cast by wind blades, and the use of pesticides in solar parks compromise both the physical and mental health of the population. These intangible impacts cannot be remedied with simple measures, such as minor construction projects or material improvements, as they involve the loss of emotional ties with the territory, cultural identity, and traditional ways of life. One of the interviewees reported that some recent initiatives have sought to reverse this logic. In 2023, the General Secretariat of the Presidency of the Republic formed a dialogue group with the aim of seeking solutions to the conflicts between the parties involved, listening to demands and complaints.

Another critical aspect concerns unfair land leasing. Many farmers are pressured into signing long-term, unequal contracts that restrict the use of their property for decades – sometimes even when the projects are never fully implemented. In cases of early rescission, the contracts impose extremely high penalties, often in euros, making it almost impossible to challenge them. This amounts to a veiled form of expropriation, in

which the farmer loses control over their land and remains bound to an agreement that offers no proportional benefits.

The situation is worsened by undesirable environmental impacts. Communities, often historical guardians of local biodiversity, are witnessing the destruction of sensitive areas of their territories. As mentioned in the interviews, native vegetation is often suppressed, centuries-old trees are cut down with official authorization, and the soil is contaminated by pesticides used to control vegetation under the solar panels. Meanwhile, traditional practices such as subsistence hunting are criminalized, showing a double standard of treatment and profound environmental inequality.

In light of these impacts, the compensatory measures proposed by the companies have proven to be clearly insufficient. Generally limited to the implementation phase of the projects, these actions are restricted to symbolic interventions, such as small courses to capacitate people for green jobs (such as PV installation) or superficial renovations in community spaces. Often presented as examples of social responsibility, these initiatives fail to address the depth of the losses suffered by the communities. These are not favors, but obligations that should reflect the true social and environmental costs of these projects.

In addition to all these factors, the arrival of energy projects also imposes increasing pressure on land ownership. The sudden rise in land value generates conflicts, facilitates speculation and benefits those who have access to privileged information — businessmen, politicians or large landowners. Small-scale producers, on the other hand, are often forced to sell their land at low prices, or to give up their traditional activities due to the loss of productive areas used, for example, for raising goats, sheep or beekeeping, which are the main sources of income in many communities. Without a fair and proportional compensation plan, these populations become even more economically vulnerable.

These reflections point to the need to reassess how energy projects are planned and implemented in Brazil, ensuring that participation, transparency, and socio-environmental safeguards are not treated as secondary concerns. More than mitigating localized harm, a just and sustainable transition requires transforming the decision-

making model by placing socio-environmental justice at its center. In this context, the expansion pathway projected in national energy planning – marked by the rapid growth of wind and solar capacity – reinforces the importance of integrating these concerns into long-term strategies, so that the pursuit of scale does not overshadow the commitment to fairness. In this sense, the National Energy Transition Plan (PLANTE) and the National Energy Transition Forum (FONTE) may offer strategic opportunities to embed equity, participation, and territorial inclusion into Brazil’s energy transition, helping to anticipate and mitigate the social and environmental impacts associated with this expansion.

### *5.2.2 Counterpoints*

Nevertheless, interviewees raised some counterpoints. For instance, some argue that the negative impacts caused by wind and solar projects should not necessarily be seen as a social injustice. This is because any human activity will generate negative externalities, and it is the role of developers to minimize them, including through voluntary initiatives (beyond legal requirements). However, there are cases where such impacts cannot be anticipated, as these are new technologies, making it a learning process. It is also inappropriate to generalize a few cases of irregularities committed by some developers to the entire sector, as this does not imply that these sources are harmful to the population.

Moreover, considering that society needs energy, some argue that wind and solar sources present lower impacts when compared to hydropower or thermal power plants. The latter, in addition to greenhouse gas emissions, also generate air pollutants and consume water (there are now solar power plants that do not require water for cleaning).

Interviewees also highlighted the positive impacts caused by these sources. The expansion of wind energy has the benefit of driving growth in the Northeast and South regions, which previously had few economic opportunities, leading to improvements in development indicators and GDP. In this sense, in some of the interviewee’s opinion, this expansion already constitutes a just transition. Along with the growth in opportunities, these sources have significant potential for job creation (three times greater than fossil fuels) and income generation. Additionally, workers in solar projects acquire knowledge

that can open other opportunities, including the possibility of becoming entrepreneurs in this sector. Although this job growth occurs mainly during the construction phase, followed by a decline, this process already generates dynamism in the regional economy.

This position stands in contrast to the findings of the literature review, which has predominantly focused on the negative impacts associated with the expansion of renewable energy in Brazil. The juxtaposition of these perspectives highlights a divergence between how academic analyses and other actors (such as private agents and energy planners) frame the distributive dimensions of the energy transition.

### *5.2.3 Affected groups*

The energy transition is widely promoted for its environmental benefits and contributions to sustainable development. However, the expansion of renewable energy projects in Brazil, particularly wind and solar farms, reveals a series of socioeconomic and territorial impacts that disproportionately affect certain groups, referred to as “affected groups.” An analysis of these territories reveals structural processes of inequality, vulnerability, and conflict.

In this context, the interviews conducted indicated that the primary affected groups are those living in areas close to the projects. These are mostly small-scale rural producers, family farmers, and traditional communities who maintain a historical and vital relationship with land use, whether for productive purposes or for the continuation of their cultural practices. The physical proximity of renewable energy projects - which are generally implemented based on technical criteria that disregard social and territorial dynamics - emerges as the main factor determining who will be directly impacted. This deepens existing inequalities and leads to the erosion of ways of life based on a direct relationship with the territory and natural resources.

In this regard, one interviewee highlighted the loss of rights faced by local small producers who sign land lease agreements for the installation of these projects. Due to the asymmetry of information between this group and the developers, many of these individuals do not fully understand the legal, economic, and social consequences of such

decisions. This can result in severe restrictions on their access to and use of their own productive land, compromising their subsistence and perpetuating cycles of exclusion.

Furthermore, the interviews also drew attention to the need to recognize the differentiated impacts on other socially vulnerable groups, such as women, the elderly, and children. Particularly in the context of wind power projects, these groups, who tend to spend more time at home, are especially affected by issues such as the mental stress associated with the operation of the project's infrastructure. This highlights the importance of adopting an intersectional perspective in analyzing the impacts of the energy transition, in order to avoid perpetuating structural inequalities related to gender and social status, which have historically been rendered invisible in development processes.

#### *5.2.4 Groups with decision-making power*

Interviews indicate that the groups currently concentrating decision-making power in the energy sector are part of an institutional arrangement composed of state agencies, regulatory bodies, financial institutions, and environmental authorities. In an articulated manner, these institutions are responsible for the various stages that structure the sector, including planning, implementation, and project monitoring.

The Ministry of Mines and Energy (MME) is identified as the central actor in the planning of the Brazilian energy sector. Among its various responsibilities, the definition of transmission line routes stands out as a strategic step, as it guides the territories in which private developers are expected to operate. Linked to the ministry, the Energy Research Company (EPE) is responsible for preparing technical studies and research, which serve as inputs for the ministry's decisions throughout the different stages of sectoral planning.

The National Electricity Agency (ANEEL) plays a regulatory and supervisory role in the sector, establishing the criteria that must be met for project implementation. Its main instruments include organizing energy auctions, which allow new projects to be contracted, and issuing concessions, which formalize the right to carry them out.

Financial institutions act as structuring agents for the energy sector, establishing criteria that determine the viability of projects. Institutions such as the BNDES, Banco do Nordeste (BNB) and various private banks impose legal, economic and environmental requirements in line with their strategic visions, in order to provide credit lines. One example mentioned is the progressive exclusion of coal energy projects from financing policies, a measure justified by its alignment with sustainability and decarbonization commitments.

In the case of investors, their influence on decision-making processes stems from the central role they play in determining what will, in fact, be financed and executed. Acting according to their interests, these agents conduct technical and economic feasibility analyses of energy projects, which function as an initial filter for deciding whether or not to invest. They then engage with financial institutions in a process of interest alignment that shapes the final configuration of the projects.

Policy makers structure the energy sector by defining the guidelines that orient projects, from the choice of energy sources to contracting models. This group plays a strategic role in setting national priorities, establishing normative frameworks that constrain technical and institutional decisions. Based on these definitions, other actors – such as investors, agencies, and developers – operate within the limits imposed by the established policies.

Finally, environmental agencies participate in the process as the authorities responsible for granting licenses at different levels of government. Licensing is a formal requirement for project implementation, yet it faces criticism regarding the weakness of mechanisms for listening to the communities directly affected. Gaps in both the licensing model and the regulatory process itself reveal shortcomings that compromise the socio-environmental dimension of decision-making.

One of the actions identified that may contribute to a greater distribution of decision-making power is the creation of the National Energy Transition Forum (FONTE), as mentioned in the document analysis. FONTE has among its objectives the democratization of discussions, ensuring social participation and transparency in decisions related to the energy transition. However, the Forum is still recent, and it will

take time to understand its real role in this process of change. It is also noteworthy that, although the need for active listening was a recurring perception in both the literature and the interviews as a necessary condition for a just transition, neither society at large nor democratically elected political actors were commonly identified as groups currently holding decision-making power. This highlights a disconnect between the recognized importance of participation and the actual configuration of institutional power in the energy transition process.

### **5.3 Pathways for the incorporation of principles into an ideal framework for a Just Energy Transition**

#### *5.3.1 Necessary Corrective Measures*

The interviews revealed a broad recognition among various stakeholders that the ongoing energy transition in Brazil requires a series of corrective measures. This need manifests across multiple dimensions, ranging from the acknowledgment of past mistakes to the proposal of more inclusive practices capable of aligning renewable energy investments with the principles of a just transition.

The effort to understand the mistakes made in the expansion of renewable energy sources has already materialized in concrete initiatives. One example cited was a series of meetings coordinated by the Ministry of the Environment and Climate Change (MMA) and the Ministry of Mines and Energy (MME), involving entrepreneurs, environmental agencies, and community representatives. The goal of these meetings was to hear different perspectives and identify recurring communication failures during project implementation. According to interviewees, the outcome of this effort was a report submitted to the Executive Office of the Presidency, signaling an institutional attempt to incorporate lessons learned and adjust practices accordingly. This political shift also laid the groundwork for the creation of the National Energy Transition Forum as a participatory governance mechanism launched in response to persistent criticism that energy planning processes have historically remained disconnected from social demands.

Beyond error analysis, interviewees reiterated the importance of promoting an ongoing benchmarking process, based on both national and international best practices.

The aim is to replace reactive approaches with technically and scientifically grounded models that can guide the development of best practice guidelines and standardized procedures for engagement between companies, communities, and public authorities. This refinement also involves recognizing that merely complying with minimum legal requirements is not enough; advancing toward qualified, responsible engagement from the earliest stages of project development is essential.

This perspective reinforces the importance of conducting structured assessment studies on energy transition processes. The findings discussed throughout this research demonstrate that recognizing country-specific contexts is crucial for understanding the planning challenges of a just energy transition. Far from being transferable in a uniform manner, principles and practices of justice must be adapted to national realities, institutional frameworks, and socio-territorial dynamics. Therefore, evaluative efforts play a key role not only in identifying gaps and risks, but also in informing more context-sensitive, effective, and legitimate transition strategies.

The expansion and improvement of dialogue between stakeholders emerged as one of the most frequently suggested measures. Both private sector and academic representatives emphasized the importance of involving local communities from the beginning of energy projects, including during prospecting and licensing phases. Practices such as hiring local residents, creating accessible grievance channels, and maintaining a physical presence through dedicated social teams were identified as strategies that build trust and reduce the risk of conflict. Beyond formal consultation, active listening and providing feedback to communities were defined as key elements of a “good neighbor” corporate approach, promoting a more socially engaged business culture in the territories where projects are implemented. By active listening, the evaluation team refers to a process that goes beyond hearing community inputs, and instead seeks to genuinely incorporate their core concerns, aspirations, and local premises into project decisions. It entails recognizing communities as knowledge holders and partners, rather than merely stakeholders to be informed.

While the expansion of dialogue and the adoption of corporate best practices are seen as important advances, especially from the private sector's perspective, this

approach alone is insufficient to ensure a truly just transition from the standpoint of affected communities. From the voices of traditional communities, an implicit critique emerges of this logic centered on “good neighborliness.” What is demanded, beyond listening and mediation, is the effective recognition of territorial rights as the foundation for any legitimate negotiation process. In this sense, the strengthening of compensation mechanisms and social protection, such as the enforcement of ILO Convention 169 and the advancement of legal recognition of traditional territories, appears not only as a corrective measure but as a structural condition for these communities to exercise meaningful agency in decisions that affect their lands.

Also emphasized by affected communities, another essential corrective measure concerns the technical training of local populations. A lack of energy literacy and professional skills limits their ability to seize the opportunities that energy investments could bring. Without targeted education and training programs, the financial flows generated by the transition tend to “leak” out of the benefiting regions, reproducing historical patterns of exclusion. Thus, a combination of investment in technical education, the inclusion of marginalized groups, and the strengthening of local value chains is seen as a strategic condition to root the economic benefits of the energy transition within local territories.

This dimension, however, has not been substantially addressed in the literature or in official planning documents, where discussions around capacity building and local economic inclusion remain limited or peripheral. The fact that this issue emerges so clearly from the voices of affected communities underscores the importance of listening to those directly impacted by the energy transition. Their perspectives not only reveal overlooked vulnerabilities but also offer concrete and context-specific solutions that are often absent from institutional agendas.

Beyond the need for isolated compensation initiatives, what is being proposed is a structural change in the logic of planning and financing the energy transition. Institutionally, interviewees highlighted the urgency of incorporating explicit distributive justice criteria in investment allocation, recognizing that the mere expansion of energy infrastructure (especially under a centralized model) does not automatically lead to

equitable outcomes. In this regard, prioritizing underutilized or degraded land for the installation of solar and wind farms was cited as a concrete measure to avoid land conflicts and reduce impacts on productive areas, traditional territories, or sensitive ecosystems. This proposal was linked to broader criticisms of poor land-use planning and the inappropriate occupation of valuable agricultural or socio-environmental areas, underscoring the need for public policies that combine technical criteria with socio-environmental sensitivity.

The urgency of an industrial policy aligned with a just energy transition also gained prominence. Interviewees called for a strategic reorientation of the country's development model, moving away from commodity dependence and toward value-added production within national territory. This would include, for instance, local content requirements for renewable energy equipment, support for reindustrialization based on clean technologies, and the strengthening of Brazil's technological and productive capacities. For some, this shift should be viewed not merely as an economic opportunity but as an intrinsic component of social justice, capable of generating quality employment and integrating diverse regions into the energy transition agenda.

This call for a reindustrialization strategy aligned with the energy transition finds a potential institutional response in the Energy Transition Acceleration Program (PATEN), launched in 2025. While much of the literature and planning documents have focused on technological or environmental aspects, the emphasis placed by interviewees on productive inclusion and territorial integration brings attention to the need for industrial policy to serve broader justice goals. In this sense, PATEN's focus on financing infrastructure, innovation, and clean technologies may represent an important platform for operationalizing these demands – particularly if its mechanisms are designed to prioritize national value chains, local employment, and regional diversification.

Finally, public and development banks were identified as strategic actors in steering investments toward a fairer transition. The suggestion to create incentive mechanisms for companies adopting strong environmental, social, and governance (ESG) practices, such as lower interest rates, extended loan terms, or expedited licensing processes, reflected a growing demand for positive reinforcement of voluntary leadership. Additionally,

interviewees highlighted the need to strengthen socio-environmental criteria in resource allocation processes, thereby expanding the role of these banks in shaping more responsible development patterns.

### 5.3.2 Existing Policies

The interviews revealed that several existing public policies in Brazil serve as relevant starting points for elaborating recommendations for a national just energy transition. These instruments offer institutional foundations that, although still limited in scope, can be enhanced to more robustly incorporate the principles of distributive justice, recognition, and procedural justice. Three subthemes emerged within this category: **energy access, dialogue, and participation.**

Regarding access, participants highlighted the relevance of public policies such as the *Luz para Todos* (Light for All) program, which aimed to universalize electricity access in rural and remote areas, and the *Tarifa Social de Energia Elétrica* (Social Tariff), a subsidy mechanism that reduces electricity bills for low-income households. Although not originally designed based on the conceptual frameworks of a just transition, these initiatives are widely recognized as concrete contributions toward reducing energy access inequalities. *Luz para Todos*, for instance, was described as a “costly policy for the sector”<sup>14</sup> due to its ability to bring electricity to rural and remote regions of the country, despite continuing difficulties in reaching the most isolated communities. The Social Tariff, which targets low-income households, was mentioned as an essential mechanism of economic relief. Both policies align with distributive justice principles.

Beyond access, the theme of dialogue also stood out. For example, participants cited the creation of dialogue tables by the Executive Office of the Presidency, which aims to directly hear from communities impacted by renewable energy projects. According to the interviewees, these spaces have led to concrete responses and corrections in project design, fostering closer connections between developers and local communities. These dialogue mechanisms represent important advances in the direction of procedural

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<sup>14</sup> Original citation in Portuguese: “*políticas caras para o setor*”.

justice, as they seek to make decision-making processes more inclusive and responsive to local realities.

In the same vein, there was a growing appreciation for structured social participation through platforms such as FONTE. This forum was cited as a relevant institutional innovation with the potential to enhance the quality and scope of participatory processes in national energy planning. For interviewees, instruments like this demonstrate an ongoing movement toward improving participation mechanisms, which could be deepened and integrated more systematically into a just transition framework tailored to the Brazilian context.

In this light, the discussion around existing policies points to a scenario in which Brazil's just energy transition does not need to be built from scratch. On the contrary, there is already a set of ongoing experiences and instruments that, while still incipient or insufficient, are advancing toward addressing inequalities and including historically marginalized populations in decision-making processes. Incorporating, strengthening, and articulating these mechanisms within a broader and more integrated approach to energy justice may represent a strategic and feasible step toward building a transition model that is, in fact, just.

These findings from the interviews align closely with elements identified in both the academic literature and the analysis of official and civil society documents. The literature reviewed highlights that, although the concept of a just transition is still taking shape in Brazil, there are already initiatives and instruments with the potential to embody its core principles, particularly in terms of distributive justice and the recognition of vulnerable populations. The *Luz para Todos* program, for example, is frequently cited as one of the country's leading public policies for universalizing energy access, with notable results, albeit challenged by structural limitations in remote regions. Similarly, documents such as the National Energy Plan (PNE 2050) and the National Energy Transition Policy (PNTE) recognize the need to reduce regional inequalities and promote universal access as part of the strategic goals of the energy transition. The Social Tariff is also highlighted in reviewed publications as a relevant tool to ensure the right to energy for low-income populations, helping to mitigate energy exclusion.

Regarding procedural justice, the literature warns of the limitations of participatory processes in Brazilian energy projects, which are often characterized by what Mayer et al. (2022) refer to as “pretend participation”. In this context, mentions of dialogue spaces and the FONTE indicate an emerging institutional response aimed at addressing these gaps and enhancing the quality of public participation. Document analysis reinforces this view by highlighting FONTE as one of the key mechanisms established for cross-sectoral coordination and social inclusion in energy planning, though its effectiveness will depend on concrete implementation and the guarantee of genuine spaces for listening and influence.

Therefore, the triangulation of interviews, literature, and documents shows that, while existing instruments still require consolidation and refinement, they represent promising foundations for building a national framework for a just energy transition: one that unites the recognition of rights, the redistribution of benefits, and the active inclusion of diverse voices in decision-making.

## **6 Conclusion and recommendations**

The starting point for this study was the development of a Theory of Change outlining how a just energy transition process should be, which could be used as a model in the design and implementation of interventions (policies, programs, and projects) in the renewable energy sector. The goal was that this ToC could guide the evaluation study and the development of recommendations.

Based on a literature review and previous analyses, this first version established two main types of activities that should be implemented. The first type was related to stakeholder engagement, which should include actions such as stakeholder mapping, the development of an engagement strategy, and the definition of a just energy transition vision, while the second type concerned impact assessment and disclosure. Once these activities were properly implemented, it was expected that stakeholders would have greater knowledge about the sector and its impacts, that there would be greater trust in

the process, and that the results of the assessment would be used in decision-making, contributing to achieving the main goal of ensuring a just energy transition.

With the objective of evaluating the just energy transition specifically related to the expansion of renewable energies in Brazil, the study relied on different data collection methods (literature review, document analysis, stakeholder mapping, and interviews) aimed at answering three evaluative questions: Q1) What are the key principles that must be considered to ensure a just energy transition in the renewable energy expansion in Brazil? Q2) What renewable energy transition is planned, what are the identified problems, and what needs to change to ensure it is just and fair? and Q3) How can these principles be incorporated into an ideal framework for a Just Energy Transition within the renewable energy expansion in Brazil?

The analysis showed that, in general, the initial framework proposed in the Theory of Change was quite adequate. This would already be reasonably expected, given that it was developed based on previous knowledge already acquired from other studies. However, the evaluation's analysis helped bring new elements to elaborate recommendations on how this initial framework could be improved

A first aspect identified concerns the need to consider the benefits of expanding renewable energy sources for society, for example, as a vector for the country's socioeconomic development, seeking the reindustrialization of the country through the preferential use of locally produced products. Emphasis was placed on pursuing local economic growth, particularly in the Northeast region, which has historically had fewer opportunities and where most of the wind and solar energy potential is located, potentially contributing to job creation and income generation to reduce regional inequalities. Ensuring energy security and access to energy for the entire population must also be considered.

These issues corroborate the importance of stakeholder engagement, as outlined in the Theory of Change, but also expand the scope of this activity beyond the project level. Although there was already awareness of the issues related to stakeholder consultation during project implementation, the issues identified above highlight the importance of society's participation in higher-level decisions, such as those related to the country's

development paths. Furthermore, these decisions must consider the population's historical challenges, such as the lack of secure access to energy. In this sense, the following recommendations can be made:

- at the project/enterprise level (local) – improve mechanisms for listening to affected stakeholders, not only by complying with legal requirements (such as those of environmental licensing) and ILO Convention 169, but also by adopting a proactive attitude with active listening on the part of entrepreneurs (both individuals and sector associations) and the government;
- at the policy and program level (regional and local) – create instruments and/or ensure that existing instruments for society's participation in decision-making (such as FONTE) are effective in their objective, promoting greater balance among different groups;
- identify existing historical challenges in society that may be exacerbated by sector interventions and consider them in decision-making.

Another set of elements identified through the analyses are more directly related to the impacts caused by enterprises, allowing for greater detail in the impact assessment activities of the Theory of Change. These elements include issues such as: i) the need for greater attention to traditional communities due to the history of oppression and impacts caused by enterprises; ii) related to the above, the potential loss of traditional practices, especially those with a strong connection to the land; iii) attention to low-income populations, who have less access to technology (such as solar panel installations), which may deepen pre-existing inequalities; iv) the importance of reviewing past mistakes of enterprises and learning from the past to improve practices; v) ensuring adequate compensation for impacts, avoiding the perception that an action is implemented merely for appearances (in this sense, the idea of going beyond legal requirements reemerges); and vi) providing training for the local population to support the development of the region where the enterprise is located.

In this case, recommendations can also be organized according to the level of intervention, as follows:

- at the project/enterprise level (local) – properly identify impacts and affected groups during installation and operation phases and implement actions to avoid, minimize, and/or mitigate them. This includes attention to traditional communities (and other more affected groups, such as women and the elderly), the importance of maintaining the population’s way of life, and the provision of training;
- at the policy and program level (regional and local) – have instruments and actions to ensure that advances and benefits are accessible to the entire population, avoiding deepening inequalities, and incorporate actions into policy design to prevent repeating past mistakes.

For this last element, it is important that the concept of just transition is more widely disseminated and becomes part of the design and implementation of interventions. A relevant and useful practice in this regard is to establish a vision of the just transition to be adopted for the sector, which should incorporate the challenges and define the actions to achieve it.

In conclusion, the results of this study show that ensuring a just energy transition involves well-known practices, such as impact assessment and stakeholder engagement, but also provides additional details to refine these actions. Furthermore, the results highlight the importance of considering just transition principles in strategic decision-making. In this sense, this study contributes to filling the gap of having a framework for the inclusion of just transition in the planning and implementation of interventions in the renewable energy sector.

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## Appendix I – Complete stakeholder mapping tool

Stakeholder	Category	Reason	Website	Level of Influence (low, medium, high)	Level of Interest (low, medium, high)
<b>Conexão Povos da Floresta</b>	Civil Society	Organisation that works closely with local communities organisations (CNS, COIAB and CONAQ) in the Amazon to provide electricity and internet access	<a href="https://conexaopovosdafloresta.org/">https://conexaopovosdafloresta.org/</a>	Medium	High
<b>Empresa de Pesquisa Energética (EPE)</b>	Public Sector	Currently elaborating a database in energy poverty in Brazil	<a href="https://www.epe.gov.br/">https://www.epe.gov.br/</a>	High	High
<b>Instituto Arapyau</b>	Civil Society	Promotes sustainable development with civil society, academia, private and public sector and local communities networks.	<a href="https://arapyau.org.br/">https://arapyau.org.br/</a>	Low	Low
<b>Instituto Clima e Sociedade</b>	Civil Society	Works closely with civil society organisations to promote sustainable development in Brazil. Energy transition is one of their focal areas.	<a href="https://climaesociedade.org/">https://climaesociedade.org/</a>	High	Medium
<b>Instituto E+</b>	Civil Society	Think thank promoting a just energy transition	<a href="https://emaisenergia.org/">https://emaisenergia.org/</a>	Low	High

<b>Instituto Escolhas</b>	Civil Society	Develop studies on sustainable development in Brazil in areas like energy and mining sector	<a href="https://escolhas.org/">https://escolhas.org/</a>	Low	Low
<b>Instituto Igarapé</b>	Civil Society	Think and tank focused on the areas of public, climate and digital security and its consequences for democracy in Brazil	<a href="https://igarape.org.br/">https://igarape.org.br/</a>	Low	Low
<b>Instituto Pólis</b>	Civil Society	Civil society organisation promoting just, sustainable and democratic cities. It promotes solar energy projects in low income urban communities. Together with Revolusolar conducted an online course on Energy Justice and Just Transition. It is currently mapping energy poverty indicators.	<a href="https://polis.org.br/">https://polis.org.br/</a>	Low	Medium
<b>Instituto Cipó</b>	Civil Society	Research institute conducting studies in climate and environmental justice	<a href="https://plataformacipo.org/">https://plataformacipo.org/</a>	Low	Medium
<b>Rede Energia e Comunidades</b>	Civil Society	Coalition of civil society organisation advocating for the right to clean and sustainable energy access for all. This coalition works closely with traditional communities in the Amazon, as well as rural and low-income urban communities	<a href="https://energiaecomunidades.com.br/">https://energiaecomunidades.com.br/</a>	Medium	High

<b>Revolusolar</b>	Civil Society	NGO that promotes just, inclusive and popular energy transition with focus in low income urban communities	<a href="https://revolusolar.org.br/">https://revolusolar.org.br/</a>	Medium	High
<b>Instituto Socioambiental (ISA)</b>	Civil Society	NGO that works closely with traditional and indigenous communities. It has conducted projects taking decentralised solar energy systems to indigenous communities that became reference in the country, like the project Xingu Solar	<a href="https://www.socioambiental.org/">https://www.socioambiental.org/</a>	Medium	Low
<b>Instituto de Energia e Meio Ambiente (IEMA)</b>	Civil Society	NGO that conducts studies on just and sustainable development with a primary focus on the energy and transport sectors.	<a href="https://energiaeambiente.org.br/">https://energiaeambiente.org.br/</a>	Low	High
<b>Conselho Nacional das Populações Extrativistas (CNS)</b>	Traditional, Indigenous and 'Quilombola' Communities	Created by Chico Mendes in 1985, the group mobilise, organise and represent the extrativist community in the Amazon	<a href="https://cnsbrasil.org/">https://cnsbrasil.org/</a>	Low	Medium
<b>Coordenação das Organizações Indígenas da Amazônia (COIAB)</b>	Traditional, Indigenous and 'Quilombola' Communities	Network of indigenous organisations acting in nine states of the Legal Amazon	<a href="https://coiab.org.br/">https://coiab.org.br/</a>	Low	Medium
<b>Coordenação Nacional de Articulação das Comunidades</b>	Traditional, Indigenous and 'Quilombola' Communities	National representative organisation for quilombola communities. The institution's goal is to advocate for rights at	<a href="https://www.instagram.com/onaquilombos/">https://www.instagram.com/onaquilombos/</a>	Low	Medium

<b>Negras Rurais Quilombolas (CONAQ)</b>		national and international levels and to inform national public policies for these communities.			
<b>Movimento dos Atingidos por Barragens (MAB)</b>	Civil Society	Popular movement borned in the 80s to stand against social and environmental injustices of hidroelectric power plants	<a href="https://mab.org.br/">https://mab.org.br/</a>	Low	Medium
<b>Projeto Saúde e Alegria</b>	Traditional, Indigenous and 'Quilombola' Communities	NGO thar promotes sustainable development in communities located in the Amazon. Developing community renewable energy projects is among their activities	<a href="https://saudeealegria.org.br/">https://saudeealegria.org.br/</a>	Low	Medium
<b>World Wide Fund for Nature (WWF)</b>	Civil Society	NGO that promotes nature conservation. Works very close to other organisations that promote just energy transition, mainly in the Amazon	<a href="https://wwf.org.br/">https://wwf.org.br/</a>	Medium	Medium
<b>GIZ</b>	International Cooperation	Germany-Brazil international cooperation for sustainable development and international education work. In Brazil, GIZ works very actively in promoting renewable energy. Are focusing their future projects in energy justice and just transitions.	<a href="https://giz.de/">https://giz.de/</a>	Medium	Medium
<b>ARAYARA</b>	Civil Society	Civil society organisation that seeks to promote social change through environmental	<a href="https://arayara.org/">https://arayara.org/</a>	Low	Medium

		education, focusing on the energy and land rights sectors			
<b>Articulação dos Povos e Organizações Indígenas do Nordeste, Minas Gerais e Espírito Santo (APOINME)</b>	Traditional, Indigenous and 'Quilombola' Communities	Indigenous organisation acting in several states of the Northeast region plus Minas Gerais and Espírito Santo	<a href="https://apoinme.org/">https://apoinme.org/</a>	Low	Medium
<b>Associação AfroBrasileira Quilombo Erê</b>	Traditional, Indigenous and 'Quilombola' Communities	Quilombola association acting on the defense of afro communities in the state of Bahia. Are working with Salvaguardas Socioambientais in protecting local communities from the social and environmental injustices of big infrastructure renewable energy projects	<a href="https://atabaquejacobina.blogspot.com/">https://atabaquejacobina.blogspot.com/</a>	Low	Medium
<b>Nordeste Potência</b>	Civil Society	Network of civil society organisations to promote public debate on post-pandemic economic recovery in the Northeast based on green, fair, and inclusive principles. Energy is one of their core activities.	<a href="https://nordestepotencia.org.br/">https://nordestepotencia.org.br/</a>	Medium	High
<b>Comitê de Energia Renovável do Semiárido (CERSA)</b>	Civil Society	collective comprising various organisations, researchers, and collaborators united by the common goal of an efficient	<a href="https://cersa.org.br/">https://cersa.org.br/</a>	Low	High

		energy transition in the semi arid region			
<b>Comunidades Catalisadoras (Comcat)</b>	Civil Society	Is a non-profit favela advocacy organisation that operates as an adaptive collaborative network, working to support and empower favela residents in Rio and beyond. Conducted an unprecedented survey raising data on energy poverty and energy justice in favelas in Rio	<a href="https://comcat.org/">https://comcat.org/</a>	Low	Medium
<b>e-Amazonia</b>	Academia	Independent research institution associated with Universidade Federal do Acre. Promotes research and local capacity training in renewable energy and energy efficiency	<a href="https://eamazonia.org/">https://eamazonia.org/</a>	Low	High
<b>Litro de Luz</b>	Civil Society	International NGO with a branch in Brazil that promotes solar energy access to remote communities.	<a href="https://www.litrodeluz.com/">https://www.litrodeluz.com/</a>	Low	High
<b>Fórum de Energias Renováveis Roraima</b>	Civil Society	Organisation that formulates proposals for public policies, dialogue and institutional coordination in favour of energy development in Roraima.	<a href="https://energiasroraima.com.br/">https://energiasroraima.com.br/</a>	Low	High

<b>Rede Favela Sustentável</b>	Civil Society	Network of 700 members, community mobilisers from more than 300 favelas and technical allies. The network work together in the fight for climate justice by realising the potential of favelas as models of sustainable communities	<a href="https://www.favelasustentavel.org/">https://www.favelasustentavel.org/</a>	Low	Medium
<b>Observatório do Clima</b>	Civil Society	Civil society coalition to discuss climate change. Recently published a deep study on just energy transition in Brazil	<a href="https://oc.eco.br/">https://oc.eco.br/</a>	Medium	Medium
<b>Ministry of Mines and Energy</b>	Public Sector	Ministry responsible for policy making in the energy sector in Brazil	<a href="https://www.gov.br/mme">https://www.gov.br/mme</a>	High	High
<b>Ministry of the Environment and Climate Change</b>	Public Sector	Ministry responsible for policy making regarding environment and climate change in Brazil	<a href="https://www.gov.br/mma">https://www.gov.br/mma</a>	Medium	Medium
<b>Superintendência Estadual de Meio Ambiente do Ceará</b>	Public Sector	State body responsible for environmental licensing	<a href="https://www.semace.ce.gov.br/">https://www.semace.ce.gov.br/</a>	Medium	Medium
<b>Instituto do Meio Ambiente e Recursos Hídricos - INEMA (Bahia)</b>	Public Sector	State body responsible for environmental licensing	<a href="https://www.inema.ba.gov.br/">https://www.inema.ba.gov.br/</a>	Medium	Medium
<b>CUT - Central Única dos Trabalhadores</b>	Civil Society	Workers organization - interested on the impacts that the transition can cause to the category. Has already	<a href="https://www.cut.org.br/">https://www.cut.org.br/</a>	Low	Medium

		conducted analyses on the subject of just transition.			
<b>BNDES</b>	Financial sector	It is the national development bank, responsible for many infrastructure projects, including the energy sector	<a href="https://www.bndes.gov.br">https://www.bndes.gov.br</a>	high	medium
<b>Banco do Nordeste</b>	Financial sector	It is a regional development bank with focus in the Northeast region, but also in part of the states of Minas Gerais and Espírito Santo. These areas concentrate the potential for wind and solar power in Brazil.	<a href="https://www.bnb.gov.br/">https://www.bnb.gov.br/</a>	medium	medium
<b>IDB</b>	Financial sector	It is the development bank for Latina America and the Caribbean and finances infrastructure and energy projects in the region.	<a href="https://www.iadb.org/">https://www.iadb.org/</a>	Low	medium
<b>Banco Santander</b>	Financial sector	Private bank responsible for a significant share of financing for renewable energies in Brazil	<a href="https://www.santander.com.br/">https://www.santander.com.br/</a>	Low	Medium
<b>Ministérios Públicos Estaduais</b>	Public Sector	Play a critical role in ensuring legal compliance, protecting environmental and social rights, holding stakeholders accountable, and mediating conflicts to promote fair and equitable outcomes.	<a href="https://abrampa.org.br/">https://abrampa.org.br/</a>	Medium	Medium

<b>Programa de Planejamento Energético (PPE/COPPE/UFRJ)</b>	Academia	Sector of the Federal University of Rio de Janeiro responsible for many analyses on the energy sector in Brazil	<a href="https://www.ppe.ufrj.br/index.php/en">https://www.ppe.ufrj.br/index.php/en</a>	High	High
<b>Observatório da Energia Eólica (Universidade Federal do Ceará)</b>	Academia	Group of the Federal university of Ceará specialized on the impacts of wind power	<a href="https://observatoriodaenergiaeolica.ufc.br/">https://observatoriodaenergiaeolica.ufc.br/</a>	Low	High
<b>GESEL</b>	Academia	Research group of the Federal University of Rio de Janeiro specialized on the power sector in Brazil	<a href="https://gesel.ie.ufrj.br/">https://gesel.ie.ufrj.br/</a>	Medium	High
<b>IEE</b>	Academia	Institute of the University of São Paulo with focus on the areas of energy and environment	<a href="https://www.iee.usp.br/">https://www.iee.usp.br/</a>	Low	High
<b>Centro de Energias Alternativas da Paraíba (CEAR) - UFPB</b>	Academia	Research center of the Federal University of Paraíba with focus on renewable energy	<a href="https://www.cear.ufpb.br/ppger">https://www.cear.ufpb.br/ppger</a>	Low	High
<b>MAR Movimento dos Atingidos pelas Renováveis</b>	Civil Society	Popular movement that fights for an energy policy carried out in a responsible manner, with effective social oversight of companies across the entire production chain and of financing institutions.	<a href="https://www.instagram.com/mar_atingidospelasrenovaveis/">https://www.instagram.com/mar_atingidospelasrenovaveis/</a>	Low	High
<b>ABEEÓLICA</b>	Private Sector	Association that brings together and represents the wind energy industry in the country, including companies from the entire production chain.	<a href="https://abeeolica.org.br/">https://abeeolica.org.br/</a>	Medium	High

<b>ABSOLAR</b>	Private Sector	Association that represents companies of the solar photovoltaic sector in Brazil.	<a href="https://www.absolar.org.br/">https://www.absolar.org.br/</a>	Medium	High
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## **Appendix II – Project presentation and interview questions**

The project “Evaluation of Just Transition in the renewable energy sector in Brazil”, implemented by Centro Brasil no Clima (CBC) with support from the Climate Investment Funds (CIF) and technical support from FGV EESP CLEAR (Center for Learning on Evaluation and Results for Lusophone Africa and Brazil), seeks to deepen the understanding of just transition aspects related to the expansion of centralized wind and solar photovoltaic energy projects in Brazil.

Focusing on the principles of a just transition, the main goal of the project is to identify foundational elements of a just transition and develop a conceptual and methodological framework for its planning, which serve as a basis to guide the formulation of renewable energy projects, policies, incentives and programs aligned with just transition principles.

The project is guided by three evaluation questions, structured to address critical aspects of the discussion, as follows:

- Q1: What are the key principles that must be considered to ensure a just energy transition in the renewable energy expansion in Brazil?
- Q2: What renewable energy transition is planned, what are the problems identified, and what needs to change to ensure it is just and fair?
- Q3: How can these principles be incorporated into an ideal framework for a Just Energy Transition within the renewable energy expansion in Brazil?

Thus, during the upcoming meeting, questions will be proposed to allow a deeper understanding and clarification of the topic, creating the conditions for the subsequent elucidation of the project’s central evaluation questions.

### **The questions to be asked during the interview are:**

1. How do you define a just energy transition?
2. In your opinion, are there injustices related to the expansion of centralized solar and wind energy? If so, what are they?

3. Who are the individuals or groups affected or overlooked in the injustices related to the expansion of renewables in Brazil?
  - a. *Considering the affected groups you mentioned, do you believe their values, needs, and motivations are being integrated into the process of centralized solar and wind energy expansion? If so, how is this being done? If not, how could it be done?*
4. Who is involved in the decision-making process for the expansion of centralized renewables?
5. Where and how are the costs and benefits of centralized renewable energy expansion being distributed in Brazil?
6. In your opinion, what are the key measures that need to be taken to promote a just energy transition in Brazil?
7. What political and regulatory instruments do you believe are necessary to ensure a just energy transition in Brazil?
8. Finally, is there any important point you would like to mention that was not addressed in the previous questions?