Just Climate Transition

Sectoral Dialogues on Green Job Creation

FINAL REPORT · 2026

ORGANIZED BY

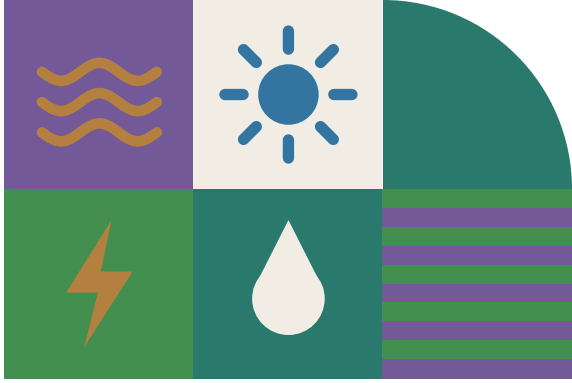
Instituto Democracia e Sustentabilidade

SUPPORT

OPEN SOCIETY FOUNDATIONS

PARTNERS

ABCD · CEERT 35 · DIEESE · instituto ethos · gaia social · ie] Instituto de Estudos Avançados da Universidade de São Paulo · InPACTO



Just Climate Transition

Sectoral Dialogues on Green Job Creation

FINAL REPORT · 2026

ORGANIZED BY
Instituto Democracia e Sustentabilidade

IDS BOARD OF DIRECTORS
Dulce Maria Pereira (President)
Caio Magri (Vice-President)
Adriana Ramos
Luana Maia
Caetano Scannavino

IDS EXECUTIVE TEAM
Carolina Riberti Mattar - Executive Director
Paolla Yoshie - Graphic Designer and Digital Content Producer
Vinicius Moraes da Cunha - Socioenvironmental Public Policy Researcher
Renato Rodrigues - Climate Policy Consultant (Focus on Methane)
Ana Luiza Canalli Santos - Green Economy Researcher
Elisabete Fernandes - Finance and Controls Coordinator

RESEARCHER
Ana Luiza Canalli Santos

PARTNERSHIP
Ação Brasileira de Combate às Desigualdades (ABCD)
Centro de Estudos das Relações de Trabalho e Desigualdades (CEERT)
Departamento Intersindical de Estatística e Estudos Socioeconômicos (DIEESE)
Gaia Social
Instituto de Estudos Avançados da Universidade de São Paulo (IEA-USP)
Instituto Ethos de Empresas e Responsabilidade Social
Instituto InPacto

SUPPORT
Open Society Foundations

TEXT
Preparation: Ana Luiza Canalli Santos

REVIEW AND EDITING
Carolina Riberti Mattar

PROOFREADING
Carolina Machado Dziedzinski

PANELISTS AND MODERATORS
Alexandre Ferraz
Aline Contar
Ana Luiza Canalli Santos
Ana Nassar
Carlos Ramos Venâncio
Clauber Leite
Daniel Bento
Esteliano Pereira Gomes Neto
Janaína Fragoso
Júlia Margarida
Marcos Buckeridge
Nabil Bonduki
Natália Silva de Souza
Nicolas Santos
Nilton Moraes
Paula Pollini
Raquel Rolnik
Renata Boulos
Rogério Terena
Rud Rafael
Sarah Marques
Shigueo Watanabe

GRAPHIC DESIGN AND LAYOUT
José Roosevelt Junior | Mediacts

Contents

01 Introduction — Sectoral Dialogues 2026: Just Transition and Green Jobs 5
1.1. Objectives 7
1.2. Methodology 7

02 Overview of a just transition and green jobs in Brazil 10
2.1. Green jobs and just transition: concepts and challenges for Brazil 11
2.2. Green work beyond new professions 13
2.3. Race, gender, and structural inequalities in green jobs 14
2.4. Informality, social protection, and recognition of traditional knowledge 16
2.5. Youth and green jobs: opportunities and barriers to access 17
2.6. Good green jobs and public policies for a just transition 18

03 Agriculture and Livestock: just climate transition, sustainability, and labor in the countryside 20
3.1. Economic and environmental overview of Brazilian Agriculture and Livestock 21
3.2. Family farming, financing, and productive inequalities 22
3.3. Decent work, racial and gender inequalities 23
3.4. Indigenous peoples, traditional knowledge, and food sovereignty 24
3.5. Innovation, public policies, and green job opportunities 25
3.6. Challenges for a just transition in agriculture and livestock 26

04 Sanitation: universalization, climate adaptation, and decent work 28
4.1. Overview of sanitation and inequalities in access 29
4.2. Universalization, financing, and management models 30
4.3. Sanitation, water security, and climate adaptation 31
4.4. Circular economy, waste management, and green jobs 32
4.5. Technological innovation and decent work in sanitation 33
4.6. Perspectives for a just transition in the sector 34

05 Energy: energy transition, green jobs, and socio-environmental justice in Brazil 35
5.1. Overview of the Brazilian energy sector 36
5.2. Impacts of the energy transition on vulnerable populations 38
5.3. Gender and race in the energy transition: inequalities in access, labor and participation 40
5.4. Occupational health and social protection in energy chains 42
5.5. Workforce transition from polluting sectors to low-carbon activities 44
5.6. Challenges and pathways for a just energy transition 47

06 Mobility: just transition, right to the city, and green jobs in Brazil 49
6.1. Overview of Brazilian mobility and the challenges of decarbonization 50
6.2. Impacts on vulnerable populations: territorial inequalities and the right to the city 52
6.3. Gender and race: inequalities in commuting and in work opportunities 54
6.4. Occupational health and social protection: the challenges of uberization 55
6.5. Workforce migration and opportunities in low-carbon mobility 57
6.6. Challenges and pathways for a just transition in mobility 59

07 Housing: just transition, the right to housing, and green jobs in Brazil 61
7.1. Overview of Brazilian housing and the challenges of sustainability 62
7.2. Impacts on vulnerable populations: climate crisis, territorial inequalities, and the right to permanence 64
7.3. Gender and race: housing inequalities and women's leadership in local communities 66
7.4. Occupational health and social protection: the challenges of the construction industry 68
7.5. Workforce migration and opportunities in sustainable construction 69
7.6. Challenges and pathways for a just transition in housing 71

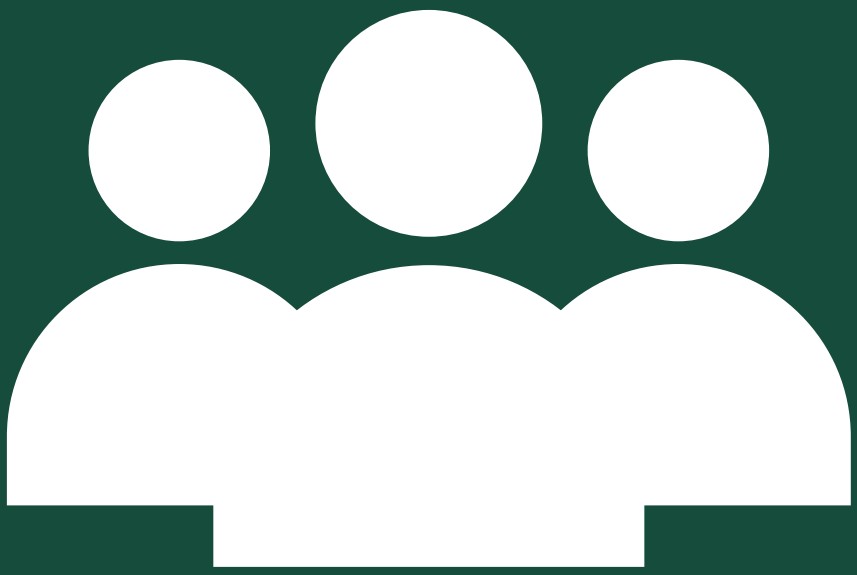
08 Recommendations for a just and inclusive transition in Brazil 73

09 Concluding remarks 79

References 83

01

Introduction — Sectoral Dialogues 2026: Just Transition and Green Jobs



The climate emergency poses to Brazil the challenge of transforming its models of production and economic development, reconciling the reduction of greenhouse gas emissions, environmental protection, the creation of decent jobs and efforts to address social inequalities. In this context, the transition to a low-carbon economy is not limited to technological replacement or the modernization of productive sectors, but is also a process of economic, political and social transformation.

In Brazil, this transformation takes place in a context marked by historical inequalities of race, gender, income and territory, which influence both exposure to climate impacts and access to economic opportunities. Decarbonization policies that disregard these conditions may perpetuate or exacerbate existing vulnerabilities.

The concept of a **just transition** offers a perspective for addressing these challenges. According to the International Labour Organization (ILO), the transformation of economies toward environmental sustainability must go hand in hand with decent work, social protection, social dialogue and the creation of quality employment opportunities (ILO, 2015). From this perspective, green jobs must combine environmental contribution with decent working conditions, adequate remuneration, occupational safety and access to social protection.

A just transition is also linked to Brazilian development strategies, such as the Ecological Transformation Plan and the New Industry Brazil, which present opportunities to articulate decarbonization, innovation, stronger supply chains and the job creation. For these initiatives to contribute to reducing inequalities, it is essential to incorporate criteria of racial equity, gender equality, territorial development and protection of workers.

Continuing the previous cycle, the **Institute for Democracy and Sustainability (IDS)** promoted, in 2026, a new edition of the Sectoral Dialogues, dedicated to the theme of **Just Transition and Green Jobs,** in partnership with the Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE), the Institute of Advanced Studies of the University of São Paulo (IEA-USP), the Brazilian Action to Combat Inequalities (ABCD), Gaia Social, the Center for the Study of Labor Relations and Inequalities (CEERT), the InPacto Institute and the Ethos Institute. The initiative brought together diverse perspectives to discuss the social and employment impacts of the ecological transformation of the Brazilian economy, identify challenges and opportunities and contribute to the formulation of inclusive public policies.

The cycle covered five strategic sectors: **Agriculture and Livestock, Sanitation, Energy, Mobility and Housing**. Although they have distinct characteristics, these sectors share challenges related to the reduction of emissions, climate adaptation, changes in production and ensuring decent working conditions.

1.1. Objectives

The second cycle of the Sectoral Dialogues aimed to contribute to the formulation of ecological transition strategies that integrate environmental sustainability, social justice, and the recognition of the value of work.

Specifically, it sought to identify the impacts of the transition on vulnerable populations and territories; to analyze racial and gender inequalities in access to economic opportunities; to examine the conditions of health, safety, and social protection of workers; to discuss the challenges of skills development and retraining; and to systematize contributions to public policies capable of promoting a just transition that reflects regional diversity.

1.2. Methodology

The methodology combined bibliographic and documentary review, the preparation of background papers, multisectoral meetings, and the synthesis of participants' contributions.

Initially, background papers were prepared for the five sectors, bringing together relevant data, studies, regulatory frameworks, and public policies. These materials supported the meetings and guided the identification of priority issues related to a just transition and green job creation.

The dialogues brought together representatives from academia, civil society organizations, public institutions, and workers, making it possible to incorporate different perspectives on the economic, social, and environmental impacts of the ongoing transformations.

Events held:

AGRICULTURE AND LIVESTOCK · 05/13/2026

Carlos Ramos Venâncio
Coordinator of Cooperation for Sustainable Development at the Ministry of Agriculture and Livestock (MAPA)

Natália Silva de Souza
Relationship and Partnerships Advisor at CEERT

Janaína Fragoso
Executive Director of the Ibiá Institute

Rogério Terena
Agricultural Engineer and professor at the State University of Mato Grosso do Sul (UEMS)

Alexandre Ferraz
Representative of DIEESE and CONTAG.

Moderator: Marcos Buckeridge (IEA - USP)

SANITATION · 05/24/2026

Nilton Moraes
Researcher and doctoral candidate at the University of São Paulo (USP)

Esteliano Pereira Gomes Neto
Union leader of the National Confederation of Urban Workers (CNU)

Paula Pollini
Architect, urban planner, and senior public policy researcher at the Water and Sanitation Institute (IAS)

Moderator: Marcos Buckeridge (IEA - USP)

ENERGY · 09/03/2026

Daniel Bento
Executive Director of CEERT

Júlia Margarida
Researcher at The Climate Reality Project Brasil

Clauber Leite
Director of Sustainable Energy and Bioeconomy at the E+ Energy Transition Institute

Shigueo Watanabe
Energy Specialist at the Observatório do Clima

Moderator: Marcos Buckeridge (IEA - USP)

MOBILITY · 10/15/2026

Aline Contar
Project Manager at the Ministry of Transport

Ana Nassar
Program Director at the Institute for Transportation and Development Policy (ITDP).

Nicolas Santos
National Alliance of App-Based Delivery Workers

Moderator: Ana Luiza Canalli (IDS)

HOUSING · 10/15/2026

Nabil Bonduki
Architect and urban planner, full professor at the Faculty of Architecture and Urbanism of the University of São Paulo (FAU-USP) and city councilor of the municipality of São Paulo

Sarah Marques
Co-founder of the Caranguejo Tabaiares Resiste Collective

Raquel Rolnik
Full professor at the Faculty of Architecture and Urbanism of the University of São Paulo (FAU-USP) and one of the coordinators of the Public Space and Right to the City Laboratory (LabCidade)

Rud Rafael
National coordinator of the Homeless Workers' Movement (MTST)

Moderator: Renata Boulos (ABCD - Ação Brasileira de Combate às Desigualdades).

We hereby record our profound gratitude to all panelists, participants, and moderators who shared their time, knowledge, and experiences, significantly enriching the Sectoral Dialogues. Our thanks also extend to the entire team of the Instituto Democracia e

Sustentabilidade (IDS) and to the Departamento Intersindical de Estatística e Estudos Socioeconômicos (DIEESE), for the partnership and for making their space available for the holding of the meetings. The dedication, commitment, and collaboration of all the people and institutions involved were fundamental to the realization of this project and to the strengthening of qualified and collective debates in favor of a just, inclusive, and sustainable climate transition.

The contributions of the panelists and the debates held throughout the meetings made it possible to identify challenges, opportunities, and points of convergence among the sectors, which were systematized based on four cross-cutting axes of analysis:

- **Impacts on vulnerable populations:** distribution of environmental, economic, and social risks, with attention to territorial inequalities.
- **Gender and race:** structural barriers to professional inclusion, access to qualification, and distribution of work opportunities.
- **Occupational health and social protection:** working conditions, occupational risks, informality, rights, and protection mechanisms.
- **Transition of the workforce:** qualification, requalification, and alternatives for economic inclusion for workers in carbon-intensive activities or those subject to technological transformation.

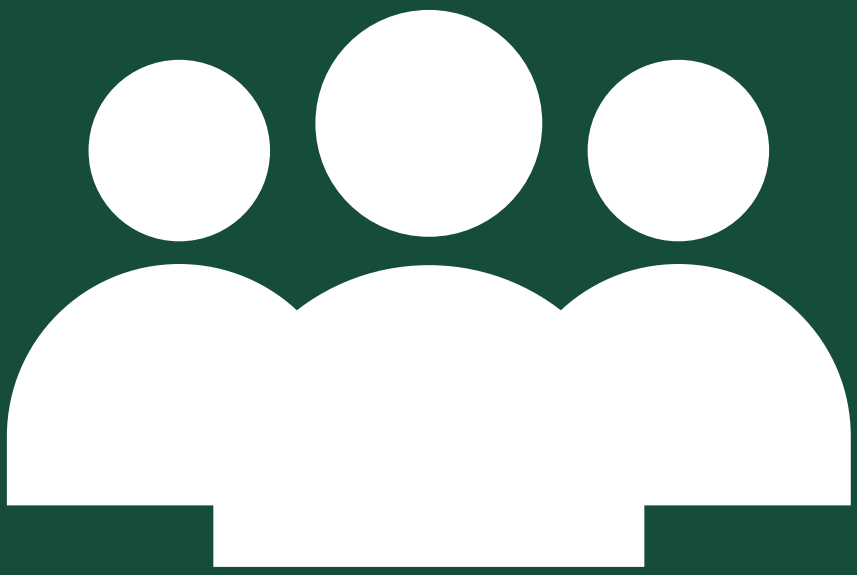
The discussions were recorded in reports and analyzed together with the background papers and specialized literature, seeking to identify convergences, divergences, structural challenges, and possibilities for intervention.

This report presents the findings of this synthesis, articulating documentary evidence and contributions from participants. The recommendations also incorporate the technical analysis developed from the materials researched, not being restricted to the proposals formulated during the meetings.

By bringing together these perspectives, the document aims to support public policies that associate the decarbonization of the Brazilian economy with the promotion of rights, reducing inequalities, and the creation of decent jobs opportunities.

02

Overview of a just transition and green jobs in Brazil



The transition to a low-carbon economy represents an opportunity for the transformation of Brazil's production structure, with the potential to expand sustainable investments, generate work and income, and promote new forms of economic development. However, this transformation takes place in a country marked by **inequalities of race, gender, income, and territory**, in addition to high informality and different forms of work organization.

In this context, the expansion of green jobs cannot be analyzed exclusively by the number of positions created or by the contribution of activities to the reduction of greenhouse gas emissions. It is necessary to understand **who occupies these positions, under what conditions they work, and how the economic benefits of the transition are distributed**.

The international debate offers important references, but its application to Brazilian circumstances requires consideration of the particularities of the labor market and the diversity of environmentally sustainable practices existing in the country. This perspective guides the analysis presented in this chapter, which articulates contributions from the International Labour Organization (ILO), the Departamento Intersindical de Estatística e Estudos Socioeconômicos (DIEESE), the United Nations Children's Fund (UNICEF), and the C40 Cities network.1

2.1. Green jobs and just transition: concepts and challenges for Brazil

The discussion on green jobs and just transition must start from the structural characteristics of the Brazilian labor market, marked by the concentration of occupations in services and commerce activities, by high informality, and by persistent inequalities of income, race, gender, and territory. According to the Continuous National Household Sample Survey (PNAD Contínua), Brazil recorded approximately **103 million employed persons in 2025**, with an average annual unemployment rate of 5.6%, the lowest in the historical series that began in 2012. Despite the improvement in employment indicators, informality remained high, encompassing **38.1% of the employed population**, while the labor force underutilization rate reached 14.5% (IBGE, 2026).

The distribution of occupations highlights the importance of services and commerce activities in Brazil's production structure. In 2025, trade and vehicle repair employed approximately **19.5 million workers**, while the category encompassing public administration, education, health, and social services gathered about 19 million. Industry employed 13.3 million people, agriculture and livestock 7.9 million, and the construction industry 7.4 million. These figures demonstrate that the transition to a low-carbon economy must reach consolidated economic activities, not being restricted to the creation of work positions in emerging sectors (IBGE, 2026).

The occupational structure also reveals different forms of participation in the labor market. In 2025, approximately **38.9 million people worked in the private sector with a formal em-**

1 C40 Cities is a global network of major cities dedicated to tackling climate change, promoting policies for the reduction of emissions, climate adaptation, social justice, and the generation of green jobs.

ployment registration, while 13.8 million were employees without formal employment registration and 26.1 million were self-employed. These categories do not correspond directly to the division between formal and informal work, since self-employment may occur with or without formalization. The large number of workers in diverse employment relationships highlights the challenges of expanding social protection and guaranteeing workers' rights amid changes in production (IBGE, 2026).

Income inequalities constitute another fundamental dimension of this scenario. In 2025, the average real monthly earnings from all jobs reached **R$ 3,560**, but this national indicator conceals significant differences. While the Federal District recorded an average income of R$ 6,320, in Maranhão the figure was R$ 2,228. Informality also varied by region: it reached 58.7% in Maranhão and 58.5% in Pará, compared with 26.3% in Santa Catarina. These contrasts highlight the unequal conditions of economic inclusion among Brazilian territories (IBGE, 2026).

Racial inequalities also remain structuring. According to the *Synthesis of Social Indicators 2025*, in 2024, the average earnings of White people was **65.9% higher than that of Black or mixed-race people**. Considering the average income per hour worked, White people earned R$ 24.60, while Black or mixed-race people earned approximately R$ 15.00. These differences demonstrate that the expansion of economic opportunities does not, in itself, guarantee the reduction of historical inequalities in access to more highly valued and better-paid occupations (IBGE, 2025).

65.9%

is how much higher the average earnings of White people were than those of Black or mixed-race people in 2024 (IBGE)

This overview shows that the expansion of green jobs occurs in a structurally unequal labor market. Therefore, **the challenge of a just transition does not consist only in creating new environmentally sustainable occupations, but also in transforming existing working conditions**, expanding formalization, social protection, vocational training, and equitable access to economic opportunities. In this sense, green jobs must be understood as part of a broader strategy of economic development, recognition of the value of work, and confrontation of Brazilian inequalities.

The International Labour Organization (ILO) defines **green jobs as decent work that contributes to preserving or restoring the environment**, both in traditional sectors, such as industry and the construction industry, and in emerging activities, such as renewable energy. These occupations can contribute to increasing energy efficiency, reducing emissions, minimizing waste, and protecting ecosystems (ILO, 2015).

The definition articulates two fundamental dimensions: **the activity's environmental contribution and the quality of working conditions**. This understanding is related to the ILO guidelines for a just transition, which advocate the integration of environmental sustainability, social protection, employment policies, vocational training, and social dialogue (ILO, 2015).

However, the application of these references to Brazil presents challenges. Part of the international methodologies was developed considering the production structures and labor markets of Global North countries, whose patterns of formal employment and industrial organization differ from those found in the Brazilian context.

In Brazil, the coexistence of salaried, self-employed, family-based, cooperative, community, and informal work requires a more comprehensive approach. **Classifications restricted to formal employment relationships or to emerging technological professions may fail to recognize activities that contribute to environmental conservation and the sustainable use of natural resources.**

The study *Green Skills and Jobs for Adolescents and Young People in Brazil*, published by UNICEF in 2025, highlights the need to consider these specificities. The publication mentions activities such as artisanal fishing, extractivism, and babassu coconut processing, which can contribute to environmental sustainability even when they do not correspond to conventional forms of salaried employment (UNICEF, 2025, p. 7).

This conceptual expansion makes it possible to understand that **the green economy is not limited to the creation of new professions, also involving the recognition and transformation of working conditions in already existing activities**.

At the same time, it is necessary to avoid automatic classifications. Not every occupation carried out in a sector considered sustainable presents an effective environmental contribution, just as not every environmentally relevant activity offers decent work conditions. The assessment must consider the concrete characteristics of the work, the environmental impacts, and the methodological criteria used.

2.2. Green work beyond new professions

Green jobs are often associated with specialized professions, such as environmental engineering, installation of renewable energy systems, and development of low-carbon technologies. Although these activities are important, they represent only part of the full range of work related to sustainability.

In Brazil, activities such as **collection and sorting of recyclable materials, public transportation, recovery of degraded areas, sustainable agriculture, and maintenance and repair of machinery and equipment** can also contribute to reducing environmental impacts and promoting the efficient use of natural resources. In the case of maintenance and repair, these activities contribute to extending the service life of equipment, reducing the demand

for new products, and consequently avoiding part of the consumption of raw materials, energy, and the emissions associated with manufacturing processes.

Waste pickers, for example, participate directly in material recovery supply chains. Public transit workers are part of systems that, when efficient and adequately planned, can reduce the dependence on private motorized transportation. Likewise, farmers and workers involved in environmental recovery can contribute to the conservation of ecosystems.

The study *Green Jobs 2025*, prepared by DIEESE in partnership with the Central Única dos Trabalhadores (CUT), contributes to this debate by combining the analysis of occupations with the environmental characteristics of economic sectors. The research distinguishes **green occupations in green sectors from green occupations in potentially green sectors**, recognizing that the environmental contribution of an activity also depends on the production context in which it occurs (DIEESE, 2025).

This approach highlights that **environmentally relevant work is distributed across different economic activities and is not restricted to emerging technological segments**.

The recognition of these occupations is fundamental to broadening the debate on a just transition. More than creating new professional opportunities, the ecological transformation needs to value workers who already contribute to sustainability, often without economic recognition, social protection, or adequate working conditions.

2.3. Race, gender, and structural inequalities in green jobs

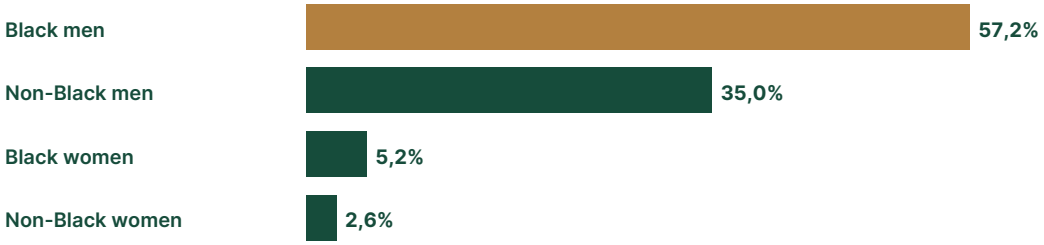
The racial and gender composition of green occupations reveals a central dimension of the Brazilian ecological transition. The data show that a significant part of environmentally relevant work is carried out by groups historically subjected to inequalities of access to income, qualification, and social protection.

The DIEESE study, based on data from the Continuous National Household Sample Survey (PNAD Contínua) referring to the first quarter of 2025, presents important information on this reality.

Among people in **green occupations in green sectors**, **57.2% are Black men**, while this group represents 32.5% of the total employed persons in Brazil. Non-Black men account for 35.0% of the category; Black women, 5.2%; and non-Black women, only 2.6% (DIEESE, 2025, p. 28).

Racial and gender composition of green occupations in green sectors

Source: DIEESE (2025, p. 28), Continuous PNAD, 1st quarter of 2025.



Percentage of workers in the category of green occupations in green sectors. The percentages refer to green occupations in green sectors, not to all green jobs in the country.

The predominance of Black men should be interpreted considering the racial structure of the Brazilian labor market. **Their significant participation does not necessarily mean access to better-quality jobs or higher remuneration.**

The educational attainment and informality indicators presented by DIEESE reinforce this concern. Among workers in green occupations in green sectors, **51.2% had not completed secondary education**, compared to 30.7% among the total employed persons in the country. Only 5.0% held a completed higher education degree, a percentage significantly lower than the national average of 24.7% (DIEESE, 2025, p. 28–29).

Informality is also higher in these activities. In **green occupations in green sectors, the rate reaches 48.9%**, while in **green occupations in potentially green sectors it reaches 73.7%**. Both exceed the national average of 38.0%, revealing varying degrees of precariousness in the activities analyzed (DIEESE, 2025, p. 26–27).

These findings demonstrate that the presence of Black workers in environmentally beneficial occupations cannot be dissociated from the historical inequalities in educational attainment, participation in the workforce, and social protection. The aggregate percentages, however, do not allow this racial composition to be attributed to a single cause nor to identify which specific professions concentrate these workers.

Female participation also deserves attention. Together, **Black and non-Black women represent only 7.8% of the persons employed in the category analyzed**. This result points to the need to address gender barriers in professional training, hiring, and career progression associated with the green economy.

The construction of a just transition therefore requires **recognizing the contribution of Black workers who already work in these activities, improving their working conditions, and expanding women's access**, especially that of Black women, to opportunities for qualification, remuneration, and professional development.

2.4. Informality, social protection, and recognition of traditional knowledge

Informality constitutes a central challenge for the construction of a Brazilian green jobs agenda. Activities that contribute to recycling, environmental conservation, and sustainable production may be carried out by workers without adequate remuneration, social protection, or safe working conditions.

The case of **recyclable material collectors** exemplifies this contradiction. Although they perform important functions in the recovery of materials and the reduction of waste destined for final disposal, their environmental contribution does not automatically ensure decent income, protective equipment, or occupational safety.

Similar problems may occur in rural, sustainable management, and environmental recovery activities. In addition to the precariousness of their employment ties, these workers may be exposed to physical risks, contaminated materials, intense exertion, and adverse weather conditions.

Therefore, the creation of green jobs must incorporate **policies on occupational health and safety, social protection, qualification, and professional valorization**. Formalization, however, should not be treated as a single solution, since Brazil presents different forms of economic organization, including cooperatives, associations, and community activities.

This diversity is also present in the productive practices of **Indigenous peoples, quilombola communities, and other traditional populations**. Cultivation systems, forest management, extractivism, artisanal fishing, seed conservation, and community forms of natural resource management demonstrate that knowledge related to sustainability, **biodiversity conservation, and the responsible use of natural resources** predates contemporary green economy policies.

UNICEF (2025) recognizes the importance of considering these activities in the discussion on green jobs, even when they do not correspond to the employment ties conventionally identified by statistics.

However, this recognition should not reduce traditional peoples and communities to merely providers of environmental services. **Their knowledge and practices are associated with territorial rights, cultural identities, their own forms of social organization, and collective relationships with nature.**

Thus, valorizing environmentally sustainable work implies strengthening territorial rights, respecting the autonomy of communities, expanding access to financing and technical assistance, and ensuring their participation in decisions on the investments and the distribution of the benefits of the ecological transition.

2.5. Youth and green jobs: opportunities and barriers to access

The transformation of economic activities may create professional opportunities and alter the competencies demanded by the labor market. For Brazilian youth, however, access to these opportunities depends on educational, economic, and territorial conditions.

The UNICEF study, based on records from the Annual Social Information Report (RAIS) of 2022, identified **6,856,271 formal employment ties classified as green**, corresponding to 8.7% of the ties analyzed. Of this set, **2,073,755 were held by adolescents and young people aged 14 to 29**, representing 30.2% of the green ties identified by the research methodology (UNICEF, 2025, p. 23 and 27).

Youth participation in formal green jobs in Brazil, 2022

6.86 M	2.07 M	30.2%
Formal green jobs	Green jobs held by young people	Share of young people

Age group from 14 to 29 years. Figures refer to the formal jobs identified by the UNICEF methodology.
Source: UNICEF, *Habilidades e empregos verdes para adolescentes e jovens no Brasil*, pp. 21–27, based on RAIS 2022 data.

These figures demonstrate the presence of youth in activities formally classified as green, but they **do not represent the totality of environmentally relevant labor**, especially that carried out in informality.

It is important to highlight that the estimates from UNICEF and DIEESE are not directly comparable. While UNICEF uses records of formal employment relationships from RAIS 2022 and a classification based on economic activities, DIEESE combines occupational and sectoral criteria and uses, among other sources, the Continuous PNAD, which also encompasses informal workers (UNICEF, 2025; DIEESE, 2025).

The distribution of opportunities also presents territorial and gender differences. According to UNICEF, among the green employment relationships held by young people, **56.1% corresponded to men and approximately 43.9% to women**, evidencing a higher male participation, although less concentrated than that identified by DIEESE in its specific category of green occupations in green sectors (UNICEF, 2025, p. 29).

In Brazil, barriers to accessing technical training, higher education, transportation, and hiring networks may be linked to racial and territorial inequalities, especially affecting Black, Indigenous, and quilombola youth and residents of urban peripheries and rural territories.

For this reason, training policies for the green economy need to be accompanied by measures to support educational retention, income support, mobility, and economic inclusion. They must also recognize knowledge related to sustainable production, community organization, and environmental management, beyond the technical skills required by new technologies.

The participation of youth in the ecological transition should be understood **not only as workforce preparation, but as part of a strategy to expand rights** and strengthen the participation of young people in decisions regarding the development of their territories.

2.6. Good green jobs and public policies for a just transition

The discussion on **good green jobs** stems from the understanding that the environmental contribution of an activity does not, in itself, guarantee decent working conditions. For C40, good green jobs are those that contribute to reducing greenhouse gases emissions, protecting nature, and improving the population's well-being, while simultaneously offering **fair remuneration, job stability, and safe working conditions**. The concept encompasses both new occupations and the transformation of existing labor in sectors such as transportation, energy, the construction industry, and waste management. Thus, a just transition should not be assessed solely by the number of jobs created, but also by the quality of these opportunities and their capacity to promote economic and social inclusion (C40 Cities, 2025).

This approach dialogues with the ILO's definition of decent work and with the perspective advocated by CUT and DIEESE, which emphasize the need to associate environmental transformation with the guarantee of workers' rights, social protection, and quality of life (DIEESE, 2025).

In the Brazilian context, building good green jobs requires considering complementary dimensions: **effective environmental contribution; remuneration and social protection; occupational health and safety; racial and gender equity; recognition of existing labor; vocational training; and territorial distribution of economic benefits**.

These criteria constitute an analytical synthesis adopted in this report, articulating institutional references and the specificities of Brazilian inequalities.

The distinction is relevant because environmentally sustainable investments may generate temporary jobs, maintain precarious hiring conditions, or concentrate their economic benefits outside the territories where they are carried out.

The expansion of recycling, for example, does not necessarily imply better conditions for waste pickers. Likewise, the electrification of public transportation may reduce emissions without producing advances in the working conditions of drivers and maintenance professionals.

In Brazil, initiatives such as the **Ecological Transformation Plan (PTE)**, launched by the Ministry of Finance in 2023, and the **New Brazilian Industry (NIB)**, launched in 2024, present opportunities to articulate productive transformation, decarbonization, innovation, and the generation of labor and income (Brasil, 2023; Brasil, 2024).

However, the distributive results of these policies depend on instruments capable of associating investments with the generation of quality jobs, the protection of workers, and reducing inequalities.

DIEESE (2025) highlights the need for public policies on employment and income aimed at green job creation, also considering the quality of occupations, vocational training, and the protection of workers' health.

In this sense, the Brazilian just transition agenda should **integrate environmental and industrial policies with strategies for education, vocational training, social protection, occupational health, and territorial development**.

It is also necessary to improve the instruments for producing and monitoring data, especially to identify environmentally beneficial occupations that remain poorly visible in statistics and to allow disaggregated analyses by race, gender, age, and territory.

Finally, **social participation should constitute an effective dimension of planning**. Workers, trade union organizations, social movements, traditional communities, and affected populations need to participate in decisions regarding the direction of productive transformation and the distribution of its benefits.

The analysis presented demonstrates that **a just transition in Brazil cannot be guided exclusively by the creation of new green occupations**. It needs to recognize existing environmentally sustainable labor, transform its conditions of exercise, and ensure that economic opportunities do not reproduce the country's historical inequalities.

From this perspective, the following chapters examine the challenges and possibilities of a just transition in the sectors of Agriculture and Livestock, Sanitation, Energy, Mobility, and Housing, considering the impacts on vulnerable populations, racial and gender inequalities, health and social protection conditions, and the challenges of qualifying the workforce.

03

Agriculture and Livestock: just climate transition, sustainability, and labor in the countryside





Agriculture and Livestock occupies a strategic position in the Brazilian economy, in food production, and in the organization of rural territories. At the same time, it concentrates challenges related to greenhouse gases emissions, deforestation, land concentration, and inequalities in production and working conditions. Building a **just climate transition** in this sector therefore requires reconciling environmental sustainability, food security and sovereignty, the valuation of labor, and the democratization of access to land, credit, and technologies.

The analysis of the transformations necessary for Brazilian Agriculture and Livestock evidences different conceptions of sustainability. While some strategies prioritize gains in productivity and technological efficiency, others emphasize agroecology, environmental conservation, and the strengthening of family farming, Indigenous peoples, and traditional communities. These approaches are not necessarily incompatible, but they present important differences regarding the distribution of investments, the use of natural resources, and the leading role of social groups.

3.1. Economic and environmental overview of Brazilian Agriculture and Livestock

Agribusiness has a significant participation in the national economy. According to the Center for Advanced Studies in Applied Economics (Cepea/USP) and the Confederation of Agriculture and Livestock of Brazil (CNA), the set of agribusiness chains accounted for **23.8% of Brazilian GDP in 2023**, considering agricultural and livestock production, inputs, agroindustry, and associated services (Cepea/CNA, 2024). This indicator does not correspond exclusively to activities carried out on rural establishments.

The economic importance of the sector coexists with significant environmental impacts. According to the Greenhouse Gas Emissions Estimation System (SEEG), in 2024 Agriculture and Livestock emitted approximately **626 million tons of CO_2 equivalent**, considering mainly enteric fermentation of herds, manure management, and emissions related to agricultural soils (SEEG, 2025).

626 M

tons of CO_2e emitted by agriculture and livestock in 2024 (SEEG, 2025)

Land and forest use change constitutes another central source of Brazilian emissions, mainly due to deforestation and the conversion of native vegetation. Although it is accounted for separately from Agriculture and Livestock in the sectoral inventory, an important part of these territorial transformations is associated with the expansion of pastures and agricultural activities.

In 2024, Brazilian gross emissions totaled approximately **2.145 billion tons of CO_2 equivalent**, a reduction of 16.7% compared to 2023, driven mainly by the decrease in emissions associated with deforestation (SEEG, 2025).

The reduction of emissions depends on strategies that articulate combating deforestation, recovery of degraded areas, sustainable soil management, improvement of production systems, and protection of biomes. However, the solutions need to consider the differences among regions, types of production, and economic capacities of producers.

- **Carlos Ramos Venâncio, coordinator of Cooperation for Sustainable Development at the Ministry of Agriculture and Livestock (MAPA)**, highlights the importance of strategies adapted to the particularities of Brazilian biomes. His contribution emphasizes the sustainable intensification of production, the recovery of degraded areas, and the strengthening of technical assistance as instruments to reconcile productivity and the reduction of environmental impacts.

This perspective evidences the potential of policies such as the ABC+ Plan, aimed at adaptation and the reduction of emissions in Agriculture and Livestock. However, its effectiveness depends on implementation conditions that enable reaching producers with different levels of income, infrastructure, and access to technical knowledge.

3.2. Family farming, financing, and productive inequalities

The Brazilian agrarian structure presents significant differences between family-run and non-family agricultural establishments. According to the 2017 Agricultural and Livestock Census, family farming represented **76.8% of agricultural establishments**, but occupied only **23% of the total area**. At the same time, it accounted for approximately **67% of the people employed in rural establishments** (IBGE, 2019).

These data show the relevance of family farming for rural labor and food production, but they also reveal the unequal distribution of land and productive resources.

Access to financing constitutes one of the main obstacles to the adoption of sustainable practices. In the 2024/2025 Agricultural and Livestock Plan (Plano Safra), **R$ 400.59 billion in credit was announced for commercial agriculture**, while the National Program for Strengthening Family Farming (Pronaf) was earmarked to receive **R$ 76 billion** in financing (MAPA, 2024; MDA, 2024). The amounts represent resources announced for distinct modalities and do not necessarily correspond to the amounts actually contracted.

This difference in scale must be analyzed together with the profile of beneficiaries, financing conditions, and productive needs. Unequal access to credit, technical assistance, and infrastructure may limit the participation of small producers in the economic opportunities associated with the transition.

- **Alexandre Ferraz, representative of the Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE)**, questions the distribution of public incentives and highlights the need to reorient economic instruments to strengthen family farming and agroecology. His analysis relates the concentration of resources to the persistence of productive and employment inequalities in rural areas.

- **Janaína Fragoso, executive director of the Ibiá Institute**, also identifies difficulties faced by family farmers and organic producers in accessing public policies and markets. Her contribution underscores the need to integrate financing, technical assistance, participatory certification, and marketing channels.

Agroecology has the potential to strengthen locally rooted food systems, diversify production, and reduce dependence on certain external inputs. However, its expansion requires continued investments, market infrastructure, and policies that ensure economic conditions for producers.

In this context, programs such as Pronaf, the National Policy for Agroecology and Organic Production (PNAPO), technical assistance and rural extension (ATER), and public food procurement constitute relevant instruments. Coordination among these policies can contribute to expanding economic inclusion and strengthening food security.

Family farming and land concentration in Brazil

Who occupies the land and who generates work in the countryside?

Percentage share by type of agricultural establishment — Brazil, 2017



3.9 million
Family farming establishments
Approximately

10.1 million
Workers in family farming
Approximately

Source: IBGE, 2017 Agricultural Census, final results (2019). Rounded percentages; the non-family category is the complement of the total.

3.3. Decent work, racial and gender inequalities

The climate transition in agriculture and livestock cannot be dissociated from working conditions. Informality, the seasonality of occupations, exposure to environmental risks, and

inequalities in remuneration represent obstacles to ensuring that modernization of production results in social development.

The impacts of climate change add new challenges. Prolonged droughts, heat waves, floods, and crop losses affect the stability of production and income, with consequences for wage workers, family farmers, and rural communities.

Racial and gender inequalities also structure opportunities in rural areas. Land concentration and barriers to accessing credit and technical assistance are related to historical processes of exclusion, which particularly affect the Black population, Indigenous peoples, and quilombola communities.

- **Natália Silva de Souza, advisor for Relationships and Partnerships at the Center for Studies of Labor Relations and Inequalities (CEERT)**, emphasizes that a just transition must confront structural racism and gender-based violence, recognizing the modes of production and knowledge developed by Black and quilombola women.

This perspective shifts the debate from the mere inclusion of vulnerable groups in new supply chains toward the recognition of their economic and political leadership. The sustainable production practices already developed by traditional communities need to be valued and strengthened, rather than treated as experiences external to innovation.

Janaína Fragoso also highlights the invisibility of women's labor in family farming and the importance of initiatives that promote economic autonomy for women. Food production, seed conservation, and community organization are frequently linked to domestic and care work, which is not always recognized or remunerated.

The promotion of green jobs must therefore consider **formalization, adequate remuneration, occupational health and safety, social protection, and racial and gender equity**. The adoption of sustainable technologies does not, on its own, guarantee these conditions.

It is also necessary to strengthen labor law enforcement, professional training, and protection mechanisms in the face of climate impacts on the health and income of rural workers.

3.4. Indigenous peoples, traditional knowledge, and food sovereignty

The sustainability of Brazilian agriculture and livestock depends on the recognition of the diversity of productive systems existing in the country. Indigenous peoples, quilombola communities, and traditional populations develop management and conservation practices related to the ecological and cultural characteristics of their territories.

- **Rogério Terena, agronomist engineer, professor, and researcher at the State University of Mato Grosso do Sul (UEMS)**, highlights the limits of agricultural models based exclusively on technological standardization and the intensive use of inputs. His

contribution emphasizes the importance of dialogue between scientific knowledge and Indigenous wisdom for building more sustainable productive systems.

The experience of higher education in Agroecology and Agronomy directed at Indigenous peoples demonstrates the possibility of developing educational processes that recognize different ways of producing knowledge, respecting the autonomy and ways of life of the communities.

This approach also questions the understanding of innovation as the exclusive result of introducing technologies external to the territories. Traditional management practices, crop diversification, and biodiversity conservation can contribute to climate adaptation and to the sustainability of agri-food systems.

The guarantee of territorial rights constitutes a fundamental condition for the continuity of these practices. Without protection of land and natural resources, communities face greater difficulties in maintaining their productive systems and transmitting knowledge between generations.

Food sovereignty adds a political dimension to the debate by recognizing the right of peoples and communities to participate in decisions about the production, distribution, and consumption of food, respecting their needs and cultural practices.

Thus, a just transition requires not only expanding productivity or reducing emissions, but also **guaranteeing territorial autonomy, strengthening local food systems, and recognizing the leadership of Indigenous peoples and traditional communities**, **valuing their knowledge, technologies, and practices of production and management of natural resources**.

3.5. Innovation, public policies, and green job opportunities

The sustainable transformation of Brazilian agriculture and livestock involves different technological and productive strategies. Among them are the recovery of degraded pastures, crop-livestock-forest integration (ILPF), the production of bioinputs, sustainable soil management, agroecology, and the use of digital tools for monitoring and managing production.

These activities can contribute to reducing environmental impacts and expanding professional opportunities in technical assistance, research, environmental recovery, production of sustainable inputs, and management of agri-food systems.

The **ABC+ Plan (2020–2030)** constitutes one of the federal instruments aimed at disseminating low-carbon agricultural and livestock technologies and practices. Its implementation is related to the recovery of degraded areas, climate adaptation, and the improvement of productive systems (MAPA, 2021).

The **New Brazil Industry (NIB)** also presents interfaces with the sector, especially through the development of machinery and equipment, bioinputs, biotechnology, and sustainable agro-industrial chains (MDIC, 2024).

However, the expansion of these opportunities depends on the democratization of access to technologies. The digitalization of rural areas, for example, can contribute to productive efficiency, but it requires connectivity, training, and financial resources that are not equally available to all producers.

The expansion of digital agriculture may modify the demand for labor, valuing technical and digital skills and reducing the need for certain operational activities. Without qualification and social protection policies, this process may deepen inequalities.

The contributions of Carlos Ramos Venâncio and Alexandre Ferraz reveal complementary perspectives and tensions of this transformation: on one hand, the importance of technologies and instruments to increase productive efficiency; on the other, the need to assess who is able to access these resources and how the economic benefits are distributed.

Janaína Fragoso adds the importance of building markets and certification mechanisms accessible to small producers, while Rogério Terena reinforces that innovation must dialogue with local knowledge and needs.

The potential for generating green jobs therefore depends on coordination among environmental, industrial, agricultural, educational, and labor policies. The expansion of sustainable activities must be accompanied by the recognition of existing work and by the inclusion of producers historically least served.

3.6. Challenges for a just transition in agriculture and livestock

The construction of a just climate transition in Brazilian agriculture and livestock requires confronting challenges that go beyond the adoption of low-carbon technologies. The reduction of emissions, environmental conservation, and climate adaptation must be associated with the democratization of productive resources and the guarantee of rights.

The analysis of the sector points to four priorities: **expanding family farming's access to financing and technical assistance; strengthening decent work and social protection; recognizing the knowledge and territorial rights of Indigenous peoples and traditional communities; and ensuring that investments in innovation contribute to reducing racial, gender, and regional inequalities**.

These priorities require coordination among public policies and monitoring mechanisms capable of evaluating not only environmental results, but also the effects on labor, income, and economic inclusion.

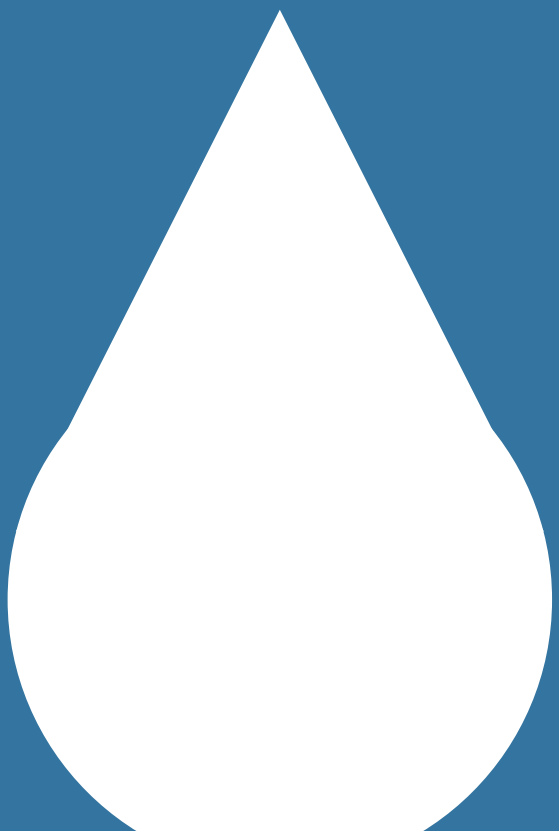
The participation of workers, family farmers, civil society organizations, and traditional communities is fundamental so that transition strategies correspond to the different realities of the Brazilian countryside.

An environmentally sustainable agricultural sector will only contribute to a truly just transition if the reduction of emissions is accompanied by the recognition of the value of work, the democratization of economic opportunities, and the recognition of the peoples and communities that have historically produced and conserved rural territories.

04

Sanitation: universalization, climate adaptation, and decent work





Sanitation is one of the strategic sectors for the construction of a just climate transition in Brazil. The expansion of water supply, sewerage, urban drainage, and solid waste management contributes to public health, environmental protection, and reducing inequalities. At the same time, service modernization can stimulate investments, technological innovation, and job opportunities.

However, the expansion of infrastructure does not, by itself, ensure a just transition. It is necessary to consider which areas receive investment, how services are financed, what working conditions are offered, and how communities participate in decisions. In the context of climate change, the challenge also involves adapting sanitation systems to droughts, floods, and other extreme events.

4.1. Overview of sanitation and inequalities in access

Brazil presents persistent deficits in access to sanitation services. According to the 2022 Demographic Census, 62.5% of the population resided in households with sewage disposal through a collection or stormwater drainage system. Taking into account also septic tanks or filter tanks not connected to the network, coverage by solutions considered adequate reached 75.7% of the population (IBGE, 2024).

The territorial distribution of these services is profoundly unequal. In 2022, access to the sewer or stormwater drainage network reached 86.1% of the population in the Southeast, but only 22.8% of the population in the North Region (IBGE, 2024). These differences reflect historical inequalities in infrastructure, public investment, and institutional capacity.

22.8%

of the population of the North Region had access to the sewer or stormwater drainage network in 2022, compared with 86.1% in the Southeast (IBGE, 2024)

Water supply also presents challenges. The 2022 Census identified that 82.9% of the population resided in households supplied by a general distribution network. This indicator, however, does not in itself ensure the regularity of supply or the potability of the water consumed (IBGE, 2024).

Racial and territorial inequalities are particularly significant. According to the 2022 Demographic Census, **95.94% of Indigenous residents living in Indigenous Lands presented at least one condition of precariousness in basic sanitation**, considering water supply, sewage disposal, or waste disposal. Among quilombola residents of officially delimited Quilombola Territories, **90.02% lived with some of these conditions of precariousness** (IBGE, 2024).

Inequalities in access to sanitation also present an important gender dimension, with impacts on health, autonomy, and the distribution of care work. According to a survey released by the National Water and Basic Sanitation Agency (ANA), **4.69 million women lived in households without piped water in Brazil**, considering data from the 2022 Demographic Census (ANA, 2024). The precariousness of supply may increase the time devoted to obtaining, storing, and managing water, activities frequently assigned to women, intensifying the burden of unpaid domestic and care work.

The absence of adequate infrastructure also compromises the **menstrual health and dignity of girls and women**, especially in socially vulnerable territories. According to a study by the United Nations Population Fund (UNFPA) and the United Nations Children's Fund (UNICEF), approximately **713,000 Brazilian girls lived without access to a toilet or shower in their households**, while more than 4 million faced some deprivation related to menstrual hygiene at school (UNFPA; UNICEF, 2021). These conditions may compromise health, school attendance, and well-being, demonstrating that the universalization of sanitation also constitutes a fundamental policy for the promotion of gender equity.

Gender inequalities in access to sanitation, however, cannot be understood in isolation, as they are intertwined with racial, social, and territorial inequalities, deepening the conditions of vulnerability of certain population groups. **This overlap of inequalities highlights the dimension of environmental racism**, expressed in the unequal distribution of infrastructure and sanitary risks. The absence of adequate services increases exposure to water contamination, diseases, and the impacts of extreme climate events, affecting mainly historically excluded populations.

- **Paula Pollini, architect, urban planner, and senior researcher in public policies at the Água e Saneamento Institute (IAS)**, emphasizes that universalization must incorporate the differences between urban and rural territories, considering geographic conditions, water availability, and the specific needs of populations. Her contribution reinforces that there is no single solution for the entire country: expanding access requires technological and institutional alternatives adapted to local realities.

4.2. Universalization, financing, and management models

Law No. 14,026/2020, which updated the regulatory framework for basic sanitation, established targets for providing **99% of the population with potable water and 90% with sewage collection and treatment by 2033**. The legislation also strengthened the regionalization of services and created conditions to expand private participation in investments and in the provision of services (Brasil, 2020).

Regionalization seeks to bring together municipalities with different economic capacities, allowing economies of scale and cross-subsidy mechanisms. However, the effectiveness of this model depends on governance rules capable of ensuring investments also in localities with lower financial return.

Paula Pollini observes that the expansion of concessions and private participation does not automatically resolve the financing needs of all territories. Remote regions, rural areas, and localities that require specific solutions may present high costs, making the expectation of financing universalization exclusively through tariff revenues insufficient.

This analysis highlights the need to combine public investments, long-term financing, territorial planning, and regulatory mechanisms that ensure coverage for historically excluded populations.

Management models also raise debates regarding tariffs, quality of services, social control, and working conditions. Although advocates of private participation point to the possibility of accelerating investments and modernizing infrastructure, workers' representatives warn of the risks of outsourcing, workforce reduction, and loss of technical knowledge.

- **Esteliano Pereira Gomes Neto, union leader of the National Confederation of Urban Workers (CNU)**, emphasizes that the debate on investments and the reorganization of the sector must incorporate the perspective of workers and the principles of decent work. His contribution highlights the need to assess the effects of institutional changes on employment, workers' rights, and the quality of services provided to the population.

Universalization, therefore, must be accompanied by mechanisms of transparency, social participation, and evaluation of results. The fulfillment of targets must not be measured solely by the physical expansion of networks, but also by the regularity, economic affordability, quality, and safety of services.

4.3. Sanitation, water security, and climate adaptation

Climate change amplifies the challenges of Brazilian sanitation. Prolonged droughts may compromise water availability, while intense rains and floods cause damage to networks, contaminate water sources, and hinder the operation of systems.

Climate adaptation therefore requires an integrated approach that considers the protection of supply sources, the modernization of existing infrastructure, urban drainage, and the management of water resources.

- **Nilton Moraes, researcher and doctoral candidate at the University of São Paulo (USP)**, emphasizes that sanitation must be understood as a cycle that begins with water intake and ends with its return to the environment. From this perspective, the conservation of water sources is fundamental both for water security and for reducing the complexity and costs of treatment.

The protection of water sources also requires attention to emerging contaminants, such as microplastics, pharmaceutical residues, and chemical substances that demand improvements in monitoring and treatment systems.

Paula Pollini adds that climate adaptation should not be limited to the expansion of conventional infrastructure. The adoption of reuse measures, reduction of consumption, and use of different water sources for specific purposes can contribute to a more efficient management of water resources. She also warns of the risk of solutions that increase dependence on ever more distant water sources without addressing the causes of water vulnerability.

In this context, **Nature-Based Solutions (NbS)**, such as rain gardens, constructed wetlands, restoration of riparian forests, and floodable parks, gain relevance. These initiatives can complement conventional infrastructure, contributing to reducing flooding, improving environmental quality, and strengthening the resilience of territories.

Climate adaptation of sanitation must prioritize areas subject to floods, water scarcity, and contamination, with special attention to urban peripheries, rural communities, and traditional territories.

4.4. Circular economy, waste management, and green jobs

Sanitation also plays an important role in the mitigation of climate change. According to the System for Estimating Greenhouse Gas Emissions and Removals (SEEG), the waste sector was responsible for **95.7 million tons of CO_2 equivalent in 2024**, an increase of 3.6% compared to the previous year. Of this total, approximately 65.9% of emissions were associated with the final disposal of solid waste, 26.3% with the treatment of domestic effluents, 6.2% with industrial effluents, and 1.5% with incineration and open burning. Biological treatment represented a share below 0.05% (SEEG, 2025).

The reduction of these emissions involves the expansion of selective collection, recycling, composting, adequate treatment of effluents, and biogas recovery. These activities can also stimulate supply chains linked to the circular economy.

The National Solid Waste Policy (Law No. 12,305/2010) establishes guidelines for reducing waste generation, shared responsibility for the life cycle of products, and the socioeconomic inclusion of recyclable material collectors (Brasil, 2010).

Waste pickers play an essential role in the recovery of materials and in reducing the amount of waste destined for final disposal. However, many workers still face informality, low remuneration, occupational risks, and difficulties in accessing equipment and infrastructure.

A just transition requires economically recognizing this work, expanding the contracting of cooperatives and associations by municipalities, and investing in vocational training, equipment, and social protection.

Technological modernization can contribute to improving working conditions. Sorting equipment, digital management systems, and alternative means of material transport can

increase productivity and reduce risks, provided they are accessible to workers and do not result in their exclusion from supply chains.

The circular economy must therefore be understood not only as a strategy of environmental efficiency, but also as an opportunity for **economic inclusion, professional valorization, and income generation**.

4.5. Technological innovation and decent work in sanitation

The modernization of sanitation involves the expansion of monitoring technologies, automation, artificial intelligence, and advanced treatment of water and effluents. These transformations can increase operational efficiency, reduce losses, and improve the systems' response capacity in emergency situations.

Nilton Moraes highlights the advance of automation in activities related to water quality analysis and systems operation. At the same time, he stresses that the use of intelligent equipment does not eliminate the need for qualified professionals to interpret information, monitor processes, and make decisions.

Esteliano Pereira Gomes Neto also recognizes the potential of new technologies, but argues that artificial intelligence must complement human work, and not be used as a justification for its indiscriminate replacement.

His analysis draws attention to two processes that simultaneously affect workers: technological transformation and climate change. Professionals who work on construction sites, network maintenance, urban cleaning, and other outdoor activities are subject to exposure to intense heat, extreme rainfall, and sanitary risks.

In this context, monitoring technologies can contribute to identifying risk situations and improving occupational health and safety measures. However, their implementation must be associated with professional training, social dialogue, and the protection of workers' rights.

The concept of **green jobs**, according to the guidelines of the International Labour Organization (ILO), encompasses both the environmental contribution of activities and conditions compatible with decent work. This includes adequate remuneration, safety, social protection, workers' rights, and the participation of workers in decision-making.

The expansion of sanitation can generate opportunities in engineering, systems operation, maintenance, research, environmental management, information technology, recycling, and resource recovery. However, the quality of these occupations will depend on qualification policies and the conditions established in labor relations.

Green jobs and just transition

Area of operation	Opportunities	Conditions for a just transition
Water and sanitation	Operation, maintenance, and treatment	Qualification, safety, and social protection
Resilient infrastructure	Sustainable drainage and environmental recovery	Local hiring and safe conditions
Waste management	Selective collection, sorting, and recycling	Inclusion and compensation of waste pickers
Technological innovation	Automation, monitoring, and data analysis	Re-skilling and protection of workers
Territorial management	Planning, inspection, and social participation	Territorial equity and democratic control

Source: Prepared by the authors

4.6. Perspectives for a just transition in the sector

Sanitation brings together the conditions to contribute simultaneously to public health, climate adaptation, emissions mitigation, and the job creation. However, these benefits depend on the coordination between investments, regulation, territorial planning, and social inclusion policies.

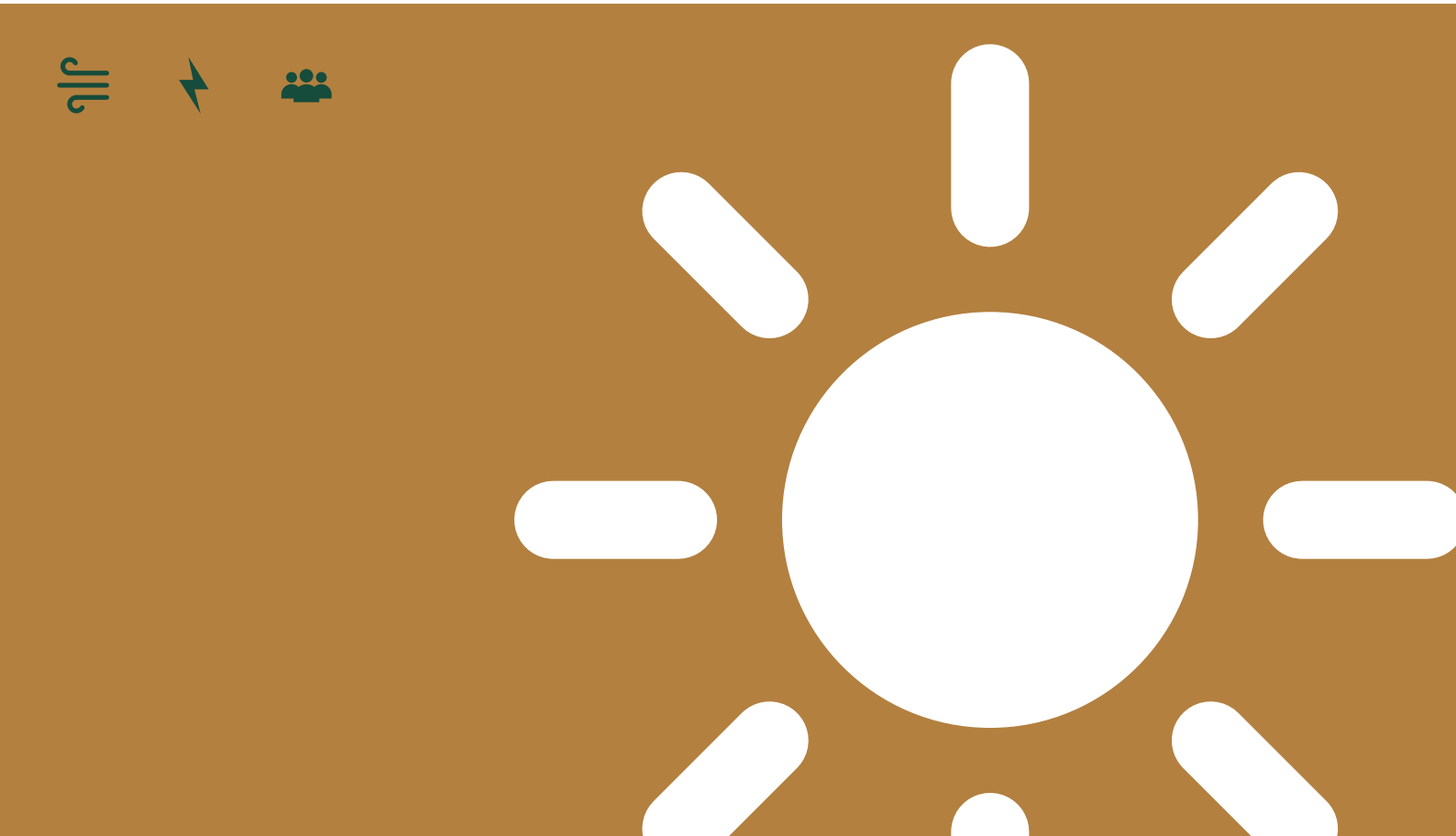
The contributions of Paula Pollini, Nilton Moraes, and Esteliano Pereira Gomes Neto highlight three complementary dimensions of this transformation: the need to universalize access with attention to territorial inequalities; the importance of protecting water resources and modernizing systems in the face of climate change; and the centrality of decent work in technological and institutional transformations.

In this scenario, four priorities stand out: **directing investments to the territories with the greatest deficits; incorporating climate adaptation into service planning; strengthening the qualification and protection of workers; and expanding social participation in the definition and monitoring of public policies**.

The just climate transition in sanitation thus requires that the modernization of infrastructure be accompanied by the democratization of access to services and the equitable distribution of their economic, social, and environmental benefits. The objective is not merely to expand networks and equipment, but to ensure that sanitation contributes to building healthier, more resilient, and less unequal territories.

05

Energy: energy transition, green jobs, and socio-environmental justice in Brazil



The energy transition holds a strategic position in building a low-carbon economy in Brazil. Reducing dependence on fossil fuels, expanding renewable sources, and developing new technologies offer opportunities to reduce greenhouse gas emissions, diversify the production structure, and generate jobs. However, **the expansion of renewable energy does not, in itself, guarantee a socially just transition**, especially in a country marked by racial, economic, and territorial inequalities.

Although it has a predominantly renewable electricity matrix, Brazil still faces challenges related to energy poverty, the socio-environmental impacts of projects, the quality of jobs, and the economic dependence on oil and natural gas chains. Thus, the energy transition must be understood as **a process of economic, social, and territorial transformation**, capable of combining decarbonization, democratization of access to energy, protection of workers, and distribution of economic benefits.

5.1. Overview of the Brazilian energy sector

Brazil has a significant share of renewable sources in its energy matrix. In 2025, these sources accounted for **49.4% of the Domestic Energy Supply (DES)**, while non-renewable sources accounted for 50.6%. Among the renewables, sugarcane biomass (15.8%), hydraulic energy (10.7%), firewood and charcoal (8.3%), as well as wind (3.0%) and solar (2.7%) sources stood out. Oil and its derivatives remained predominant among non-renewable sources, representing 33.7% of the national energy supply (EPE, 2026).

49.4%

of the Domestic Energy Supply came from renewable sources in 2025 (EPE, 2026)

In the electricity matrix, the renewable share reached **86.8%**, driven by hydroelectric generation and the expansion of wind and solar sources, which together accounted for **26.4% of electricity generation in 2025** (EPE, 2026).

The distinction between the two matrices is fundamental: while the energy matrix covers all sources used in the economy, including fuels and electricity, the electricity matrix corresponds specifically to the supply of electricity.

The expansion of renewable sources also occurs through decentralized generation. In 2025, distributed solar photovoltaic micro- and mini-generation produced approximately **53.1 thousand GWh**, equivalent to about 7% of Brazil's total electricity generation (EPE, 2026). This growth demonstrates the advance of systems installed in residences, commercial establishments, and other buildings.

However, the high renewability of electricity does not mean that the country has concluded its energy transition. Transportation, industry, and other economic activities still depend significantly on fossil fuels.

In 2025, the emissions associated with the production and consumption of energy reached **440.2 million tons of CO_2 equivalent ($MtCO_2e$)**, an increase of 2.5% compared to the previous year. Of this total, **220.8 $MtCO_2e$ came from transportation**, approximately half of Brazilian energy emissions. The transportation sector also concentrated 34% of the country's final energy consumption (EPE, 2026).

These indicators demonstrate that decarbonization also requires transformations in energy-consuming sectors, through electrification, energy efficiency, the expansion of lower-carbon-intensity fuels, and the reorganization of productive and transportation systems.

The complexity of this process can be understood from the perspective of **Marcos Buckeridge,** Vice-Director of the Institute of Advanced Studies at USP (IEA-USP), who proposes thinking of the transition as a **"multitransition,"** involving simultaneous transformations in the economy, in productive organization, and in social relations. Although Brazil has advanced in the renewable composition of its energy matrix, the economic and social effects of this transformation still need to be addressed.

This perspective dialogues with the analysis of **Clauber Leite, director of Sustainable Energy and Bioeconomy at the E+ Energy Transition Institute**, for whom the high share of renewable sources represents a Brazilian strategic advantage, but one that needs to be converted into **technological development, industrial capacity, and professional training**. Clauber draws attention to the need to overcome the position of raw material supplier, strengthening national supply chains and expanding Brazilian participation in the higher value-added stages of energy technology production.

On the international scene, considering exclusively carbon dioxide (CO_2) emissions from the burning of fossil fuels and industrial processes, Brazil has a relatively small share. In 2024, China, the United States, and India accounted, respectively, for approximately 31.8%, 12.7%, and 8.3% of these global emissions, while the Brazilian share was about 1.25% (Global Carbon Project, 2025). **These percentages do not represent the countries' share in total greenhouse gas (GHG) emissions**, as they do not include emissions arising from land-use changes, such as deforestation, nor all other greenhouse gases. This distinction is particularly relevant for Brazil, where land-use changes and agriculture and livestock have significant weight in the national emissions profile. Thus, although the Brazilian share in global fossil and industrial CO_2 emissions is relatively small, the analysis of its contribution to climate change also requires considering the emissions associated with deforestation and other economic activities.

The energy sector also plays a strategic role in the Brazilian economy. The exploration of oil and natural gas generates significant public revenues, influences industrial chains, and sustains direct and indirect jobs. In 2025, the National Agency of Petroleum, Natural Gas and Biofuels (ANP) recorded **R$ 36.74 billion in special participation**, a financial compen-

sation owed for fields of high production or profitability. This amount does not correspond to the total collection of royalties and other government participations (ANP, 2026).

This economic dependence increases the complexity of the transition. The progressive reduction in the use of fossil fuels involves not only technological changes, but also the planning of alternatives for workers, municipalities, and states linked to oil activity.

At the same time, the country maintains investments in new oil and gas exploration frontiers, such as the Equatorial Margin, bringing into debate the relationships between energy security, revenue collection, regional development, and climate commitments.

The main Brazilian challenge consists not only in expanding the share of renewable sources, but in transforming its energy advantages into low-carbon economic development, quality jobs, and reducing inequalities.

5.2. Impacts of the energy transition on vulnerable populations

The expansion of renewable energy can contribute to reducing emissions and expanding the supply of electricity. However, its benefits are not automatically distributed among territories and social groups. Energy justice requires considering both the difficulties of access to services and the environmental and social impacts of projects.

Energy poverty constitutes one of the main expressions of these inequalities. It is a multidimensional phenomenon that involves not only the absence of electricity, but also difficulties in paying for consumption, problems in the quality of supply, inadequate housing conditions, and insufficient access to essential energy equipment and services (EPE/OBEPE, 2026).

Inequalities of income, race, and territory directly influence families' ability to use energy under adequate conditions. According to the Brazilian Observatory for the Eradication of Energy Poverty, approximately **one in every three households headed by Black or mixed-race people commits 10% or more of their income to energy expenses**. In 2024, the average monthly income of white people was R$ 4,152, while among Black and mixed-race people the values were R$ 2,465 and R$ 2,499, respectively (EPE/OBEPE, 2026).

1 in 3

households headed by Black or mixed-race people commits 10% or more of its income to energy expenses

Low-income families may need to allocate a significant portion of their earnings to electricity and domestic fuels, reducing resources available for food, health, and transportation. These difficulties can be aggravated in urban peripheries, rural areas, traditional communities, and localities with insufficient infrastructure.

Addressing energy poverty therefore demands policies that go beyond the expansion of electricity generation. **Affordable tariffs, improvement of housing conditions, energy efficiency, and access to adequate equipment** are fundamental components of a socially just transition.

In this context, the Social Electricity Tariff constitutes an instrument of economic protection. Since July 2025, eligible consumers have free access to the tariff portion corresponding to the first **80 kWh consumed monthly**, according to the policy rules. This does not necessarily mean a zero-value bill, as other legally foreseen charges may remain (ANEEL, 2025).

Another dimension of energy justice is related to the territorial effects of renewable projects. The installation of wind farms, solar plants, and transmission lines can modify land use, landscapes, and the economic activities of nearby communities.

In the Brazilian Northeast, the expansion of wind generation raises debates about lease contracts, territorial occupation, impacts on traditional activities, and the distribution of economic benefits. These aspects demonstrate that **a low-emission energy source is not automatically free from socio-environmental impacts**.

A study by Irffi and collaborators (2025), published in the *Cadernos de Finanças Públicas*, analyzed the effects of financing from the Northeast Development Fund intended for the construction of wind farms. The research identified positive effects on the hiring of workers, GDP per capita, and industrial and service activities in the analyzed municipalities, in addition to temporary negative impacts on agriculture and livestock.

These results indicate that the projects can dynamize local economies, but do not allow the conclusion that their benefits are distributed equitably among workers, communities, and economic activities.

This contradiction is also evidenced by **Júlia Margarida, researcher at The Climate Reality Project Brasil**, who points out that the expansion of wind farms in the Northeast does not always translate into lasting development for local communities. Although the construction

of projects can temporarily expand economic circulation and the job creation, the operation phase tends to require smaller teams, reducing local employment opportunities.

Júlia also draws attention to situations in which communities near renewable generation facilities continue to face difficulties in paying their electricity bills. **Producing clean energy in a given territory does not necessarily mean democratizing its access or ensuring that economic benefits remain in the region.** This reality reinforces the need to incorporate criteria of territorial justice, community participation, and benefit-sharing into the planning and financing of the energy transition.

The **sharing of benefits** must therefore constitute a central dimension of energy planning. It can involve the hiring of local workers, the strengthening of regional suppliers, professional training, community investments, and mechanisms for participation in the economic results of the projects.

These measures must take into account the needs of each territory and ensure participation from the earliest stages of the projects. For the peoples covered by Convention No. 169 of the International Labor Organization, free, prior and informed consultation constitutes a fundamental guarantee, subject to the conditions set forth in the instrument (ILO, 1989).

Environmental assessment must also consider impacts on biodiversity, vegetation, ecosystems and traditional activities, including their cumulative effects.

Thus, energy justice requires that investments be evaluated not only by the amount of energy produced or by the emissions avoided, but also by their effects on the rights, labor and living conditions of the affected populations.

5.3. Gender and race in the energy transition: inequalities in access, labor and participation

Racial and gender inequalities run across different dimensions of the energy transition: access to electricity and fuels, professional opportunities, participation in decision-making processes and the distribution of economic benefits.

The study *Energy poverty from the perspective of gender inequalities*, published by EPE/OBEPE in 2026, highlights the relationship between energy vulnerability, income inequality and the overload of domestic and care work. According to IBGE data presented in the publication, **women devoted, on average, 9.6 hours more per week than men to domestic and care activities in 2022** (EPE/OBEPE, 2026).

These differences are relevant because the precariousness of energy services may increase the time and effort required to carry out domestic activities, affecting especially those who take on the greater part of these responsibilities.

In the labor market, the expansion of renewable sources opens opportunities in engineering, installation, equipment manufacturing, operation, maintenance and technological research. However, **the creation of new positions does not guarantee the overcoming of the historical barriers to access faced by women and Black people**.

The publication *Renewable Energy and Jobs: Annual Review 2025*, prepared by the International Renewable Energy Agency (IRENA) and the ILO and published in 2026, presents data on the Brazilian solar photovoltaic chain. According to a sectoral survey referring to 2024, **women represented 20% of the workers in the surveyed integrator companies and 41% of the employees in the surveyed equipment distributors** (IRENA; ILO, 2026).

These indicators do not represent the entire workforce of the Brazilian energy sector, but they demonstrate the importance of also assessing women's inclusion through access to technical occupations, better remuneration and leadership positions.

The expansion of green jobs also does not by itself guarantee the overcoming of racial inequalities historically present in the Brazilian labor market. **Daniel Bento, executive director of the Center for Studies of Labor Relations and Inequalities (CEERT)**, draws attention to the risk that the energy transition may reproduce these inequalities if policies focus exclusively on the creation of new occupations, without addressing the structural barriers that limit the access and professional advancement of the Black population. From this perspective, **a just transition must not only create new jobs, but also recognize and value the already existing forms of work, promote institutional equity policies and ensure real opportunities for professional development for Black workers**.

This reflection is especially relevant in light of DIEESE data on the racial composition of Brazilian green occupations. In the specific category of **green occupations in green sectors**, Black men represented **57.2% of the workers**, while Black women corresponded to only 5.2% (DIEESE, 2025).

These percentages do not correspond exclusively to the energy sector, but they highlight the importance of recognizing the Black workers who already perform environmentally relevant activities and of assessing their working conditions, remuneration and social protection.

The central issue is not only to ensure that Black people have access to the new professions of the green economy. It is also to **recognize, qualify and value the occupations already performed by these workers**, preventing the transition from producing a division between precarious traditional activities and new technological occupations reserved for the groups that already enjoy greater educational and economic opportunities.

Expanding the participation of women and Black people requires strategies that articulate professional training, hiring, retention and career progression. Qualification programs directed at underrepresented groups are important, but their effectiveness depends on the existence of concrete opportunities for entry and professional development.

It is also necessary to consider obstacles related to the organization of daily life. The offering of courses at times incompatible with domestic responsibilities, the distance from training centers and commuting costs may limit the participation of women and low-income workers.

Racial and gender equity must also guide corporate management, through inclusion targets, transparency in selection and promotion processes, monitoring of wage inequalities and the prevention of harassment and discrimination.

However, racial justice cannot be reduced to the diversity of teams. It also involves the participation of Black, Indigenous and traditional populations in decisions concerning the enterprises that affect their territories.

A just energy transition must simultaneously address inequalities in access to energy, the barriers to entry into the labor market and the concentration of opportunities for higher remuneration and decision-making power.

5.4. Occupational health and social protection in energy chains

The expansion of renewable energy and new low-carbon technologies presents opportunities for job generation, but it also requires attention to hiring conditions, occupational risks and social protection.

An environmentally sustainable occupation does not automatically constitute a good green job. The quality of work depends on adequate remuneration, safety, stability, rights and access to social protection.

Energy chains encompass diverse activities, such as equipment manufacturing, construction of wind and solar farms, installation of photovoltaic systems, maintenance of power grids and biofuel production. Each one presents specific risks and prevention needs.

In the construction and maintenance of renewable enterprises, workers may be exposed to falls from height, electric shocks, accidents with machinery, intense physical effort and

adverse weather conditions. Exposure to heat constitutes an additional concern for activities carried out outdoors.

In Brazil, the Regulatory Standards for Occupational Safety and Health offer important references, especially **NR-1**, related to the management of occupational risks; **NR-10**, on safety in electrical installations and services; and **NR-35**, concerning work at height (Brasil, 2026).

NR-10 underwent revision in 2026, with the new wording scheduled to come into force on **June 1, 2027**. Until that date, the previous wording remains applicable, in accordance with the rules of validity established by the Ministry of Labor and Employment.

Occupational risks and protection measures in energy supply chains

Activity	Main risks	Priority measures
Construction of wind and solar farms	Falls, heat exposure, and equipment-related accidents	Collective protection, training, and breaks
Electrical installation and maintenance	Electric shocks and electric arcs	Safety procedures and NR-10
Biomass and biofuels	Dust, chemical agents, and machinery	Exposure control and health surveillance
Operation and maintenance	Mechanical risks and physical strain	Risk management and preventive maintenance

Source: Analytical elaboration based on the Regulatory Standards of the Ministry of Labor and Employment.

The expansion of renewable energy may also intensify challenges associated with outsourcing and temporary hiring. During the construction of enterprises, different companies may operate simultaneously, requiring oversight and accountability mechanisms throughout the hiring chains.

Biomass and biofuel chains present additional risks related to agricultural, industrial and logistical activities, including exposure to chemical agents, machinery, dust, heat and repetitive efforts.

Occupational health must also consider the impacts of climate change. Rising temperatures and the occurrence of extreme events require measures to adapt working hours, the availability of water, rest periods and safety protocols.

In addition to physical risks, the transformation of supply chains may generate professional insecurity and psychosocial impacts associated with job loss, the need for requalification and changes in forms of hiring.

The quality of green jobs must also be analyzed in light of concrete working conditions. **Júlia Margarida**, researcher at The Climate Reality Project Brasil, problematizes the idea that the inclusion of an activity in the renewable energy chain automatically represents an improvement in working conditions. As an example, she mentions workers who come to perform the cleaning of solar panels without necessarily obtaining better wages or social

protection. This reflection makes clear that **the environmental contribution of an occupation cannot be confused with the guarantee of decent work** (IDS, 2026).

In this context, social protection must encompass unemployment insurance, social security, social assistance, vocational training and support for reemployment. Collective bargaining and social dialogue are equally important for anticipating changes, identifying risks and building protection mechanisms suited to the characteristics of each activity (ILO, 2015).

Thus, **the promotion of good green jobs requires incorporating labor and occupational health criteria from the very planning of investments**, including in financing instruments and public procurement.

5.5. Workforce transition from polluting sectors to low-carbon activities

The energy transition involves not only the creation of new occupations, but also the transformation of consolidated supply chains. The progressive reduction of dependence on fossil fuels may alter the demand for certain competencies and jobs, affecting workers, companies and territories linked to oil, natural gas and coal activities.

The **migration of the workforce to low-carbon activities** therefore constitutes a central challenge of a just transition. This process requires planning, vocational training and protection mechanisms capable of preventing the costs of the transformation from being concentrated on the workers and communities economically dependent on the sectors undergoing change.

This complexity is highlighted by **Shigueo Watanabe, Energy specialist at the Observatório do Clima**, who points out that the mitigation of climate change involves economic and political choices that will not necessarily produce immediate benefits for all sectors. In his assessment, confronting the climate crisis requires structural transformations capable of running counter to consolidated economic interests. In analyzing the Brazilian case, he draws attention to the dependence on diesel in freight transport and to the impacts that changes in this chain may produce on truck drivers and the national logistics structure (IDS, 2026).

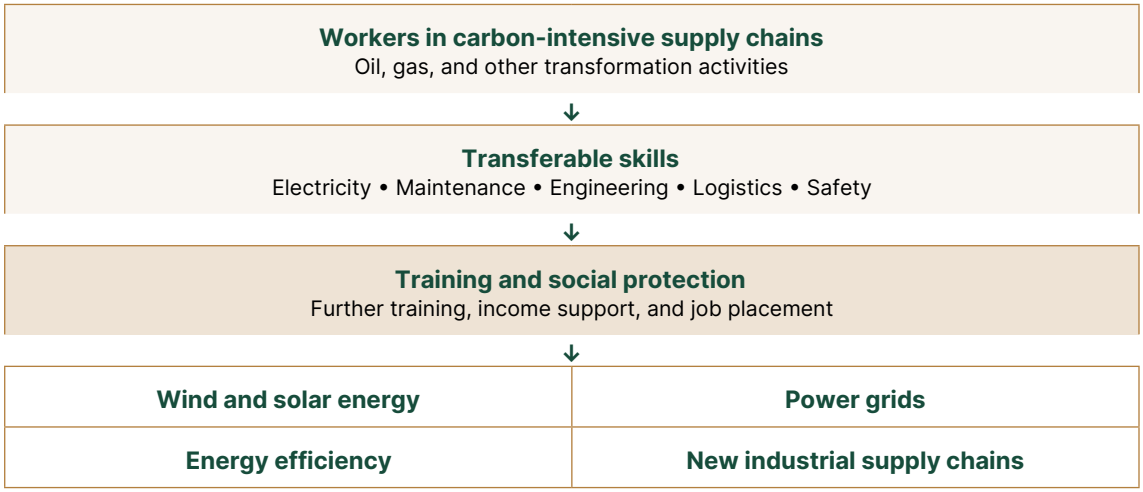
His contribution makes clear that **the reduction in the use of fossil fuels must be accompanied by economic planning, dialogue with workers and concrete alternatives for productive insertion**, preventing the costs of the transition from being transferred to the groups with the least capacity for protection.

The substitution of energy sources does not correspond to an automatic transfer of jobs. The new activities may present different requirements of training, geographic location, remuneration and work organization.

However, there are potentially transferable competencies among different supply chains. Knowledge related to industrial maintenance, electricity, instrumentation, logistics, engi-

neering and operational safety may contribute to insertion into lower carbon-intensity activities, provided it is accompanied by complementary training.

Possible professional transition pathways in the energy sector



Source: Analytical elaboration based on the ILO's guidelines for a just transition (2015). The pathways represent possibilities, not guarantees of hiring.

Among the new opportunities, activities associated with the expansion of wind and solar sources, the modernization of electrical grids, energy efficiency, and the development of lower-carbon-intensity fuels stand out. In this context, **critical and strategic minerals assume growing importance for the energy transition**, especially lithium, nickel, and graphite, used in energy storage technologies; copper, fundamental for the expansion of electrical grids; and rare earth elements, employed in certain wind generation equipment and electric motors (IEA, 2025; EPE, 2025). For Brazil, this scenario represents an opportunity to strengthen national supply chains, expanding the beneficiation, processing, and industrial transformation of these resources, so as to add value to production, stimulate technological innovation, and generate skilled jobs, rather than restricting its participation to the export of raw materials. This direction gained institutional support with **Law No. 15,506/2026**, which established the National Policy on Critical and Strategic Minerals and set forth instruments aimed at the development of these supply chains (Brasil, 2026).

However, the expansion of mineral exploration also presents significant socio-environmental challenges, including impacts on water resources, biodiversity, the health of populations, and territories. **A just energy transition requires that the extraction and processing of these minerals be accompanied by rigorous socio-environmental safeguards, respect for territorial rights, free, prior, and informed consultation of indigenous peoples and traditional communities in the cases provided for by law, effective participation of affected populations, and mechanisms for sharing the economic benefits generated.** Environmental oversight, the guarantee of decent working conditions, and the recovery of degraded areas are also fundamental. Thus, the expansion of supply chains associated with decarbonization must contribute to national and territorial development without reproducing historical inequalities or transferring the socio-environmental costs of the transition to the most vulnerable communities.

The expansion of these new supply chains highlights the potential of the energy transition to diversify the economy, stimulate innovation, and generate employment opportunities. However, **the creation of green jobs does not, in itself, guarantee a just transition**, as it is necessary to consider who will have access to these opportunities, under which working conditions, and how the benefits and impacts of the investments will be distributed among territories and populations. In this sense, it becomes fundamental to analyze racial, gender, and territorial inequalities, the socio-environmental impacts of the enterprises, and the challenges related to vocational training, social protection, and the participation of communities in decisions about the country's energy future.

Biogas and biomethane, produced from the use of organic waste and other suitable substrates, present possibilities for energy diversification and the development of regional supply chains. Their environmental contribution depends on the raw materials, the processes used, and the control of emissions along the chain.

Low-emission hydrogen, including green hydrogen produced by electrolysis using renewable electricity, also represents a possibility for industrial transformation. However, the job creation in these activities depends on economic viability, technological consolidation, and the effective implementation of projects, and cannot be treated as an opportunity for the immediate and generalized absorption of workers.

The territorial dimension constitutes an important obstacle to professional migration. Oil and gas producing regions may present economic structures distinct from those where wind, solar, and industrial investments are concentrated.

The geographic displacement of workers may generate family costs, housing difficulties, and the rupture of community ties. For this reason, **the economic diversification of affected territories must be prioritized whenever possible**, avoiding that migration be treated as the only alternative.

Dependence on royalties and other government participations must also be considered. Municipalities and states linked to fossil fuel exploration may face fiscal challenges in scenarios of reduced activity.

In this sense, the planned use of part of the revenues from fossil chains to finance qualification, innovation, infrastructure, and new economic activities constitutes a possibility of preparation for long-term transformations.

The New Industry Brazil and the Ecological Transformation Plan offer instruments to articulate decarbonization, the strengthening of national production, and technological development. However, their effects on employment depend on the implementation of investments, the territorial distribution of activities, and the conditions of workers' participation.

Professional training is necessary but not sufficient. Courses disconnected from the opportunities effectively foreseen may result in qualified workers without concrete prospects of being hired.

For this reason, requalification programs need to be built on the basis of occupational and territorial assessments, with the participation of educational institutions, companies, unions, and public authorities.

It is also necessary to address inequalities in access to training. Workers with lower levels of education, women, Black people, and residents of regions with limited course offerings may face additional barriers to entering the new activities.

Income protection, labor intermediation, and union participation must accompany all stages of the process, in accordance with the ILO's just transition principles (OIT, 2015).

The transition of the workforce must be planned before productive transformation causes unemployment, loss of public revenues, and reduction of economic opportunities. Its objective is not merely to replace occupations, but to ensure alternatives of decent work and territorial development.

5.6. Challenges and pathways for a just energy transition

The analysis of the Brazilian energy sector demonstrates that the transition to a low-carbon economy goes beyond the substitution of generation sources. Although the country presents important advantages in its energy matrix, inequalities in access to services, territorial conflicts, occupational risks, and economic dependence on fossil chains persist.

The transformation of the sector requires an integrated development strategy that simultaneously considers the modernization of infrastructure, productive diversification, the quality of jobs, and the territorial distribution of investments.

Addressing energy poverty must constitute a priority, articulating tariff policies, energy efficiency, the improvement of housing conditions, and access to adequate equipment, with attention to inequalities of income, race, gender, and territory.

The planning of renewable enterprises must consider their environmental and social impacts, guaranteeing effective participation of affected communities and respect for territorial rights.

The **sharing of economic benefits** must be integrated into investment strategies, through local hiring, professional training, the strengthening of regional suppliers, and improvements in community infrastructure.

In the labor market, the priority must be the generation of **good green jobs**, with adequate remuneration, occupational safety, social protection, and mechanisms for workers' participation. Racial and gender equity must guide both access to the new technical occupations and the valuing of existing operational jobs.

The professional migration from carbon-intensive activities to new energy chains requires preventive planning, qualification, income protection, and the productive diversification of territories.

Finally, strengthening Brazilian industrial and technological capacity is fundamental to expanding the economic benefits of the transition, preventing the country from remaining concentrated in the stages of lower added value.

The energy transition will be effectively just when the reduction of emissions is associated with the democratization of access to energy, the protection of workers, racial and gender equity, and the equitable generation and distribution of economic benefits, through the strengthening of national supply chains, the local production of equipment and technologies necessary for the transition, and the expansion of added value, promoting quality jobs and development in local communities.

06

Mobility: just transition, right to the city, and green jobs in Brazil



The transition to low-carbon mobility constitutes one of the main challenges of the Brazilian climate agenda. The high dependence on road transport, the use of fossil fuels, and the territorial inequalities in access to services demonstrate that the transformation of the sector requires structural changes. **More than substituting vehicles and fuels, it involves reorganizing the circulation of people and goods, expanding access to opportunities, and guaranteeing decent working conditions.**

Mobility occupies a central position in the reproduction of social inequalities. The time devoted to commuting, the cost of fares, the quality of infrastructure, and the distribution of services directly influence access to employment, education, health, and leisure. At the same time, the sector brings together different economic activities and occupations, whose working conditions are affected by digitalization, by the expansion of platforms, and by the technological changes associated with decarbonization.

In this context, **a just transition must articulate the reduction of emissions with the democratization of access to mobility, the addressing of gender and racial inequalities, the protection of workers, and the creation of professional opportunities in low-carbon activities**.

6.1. Overview of Brazilian mobility and the challenges of decarbonization

The transport sector plays a strategic role in the Brazilian economy, ensuring both daily commuting and the circulation of goods and merchandise. In 2024, the transport, storage, and mail activity grew 3.9%, above the 3.4% expansion of the national Gross Domestic Product (GDP) (IBGE, 2025).

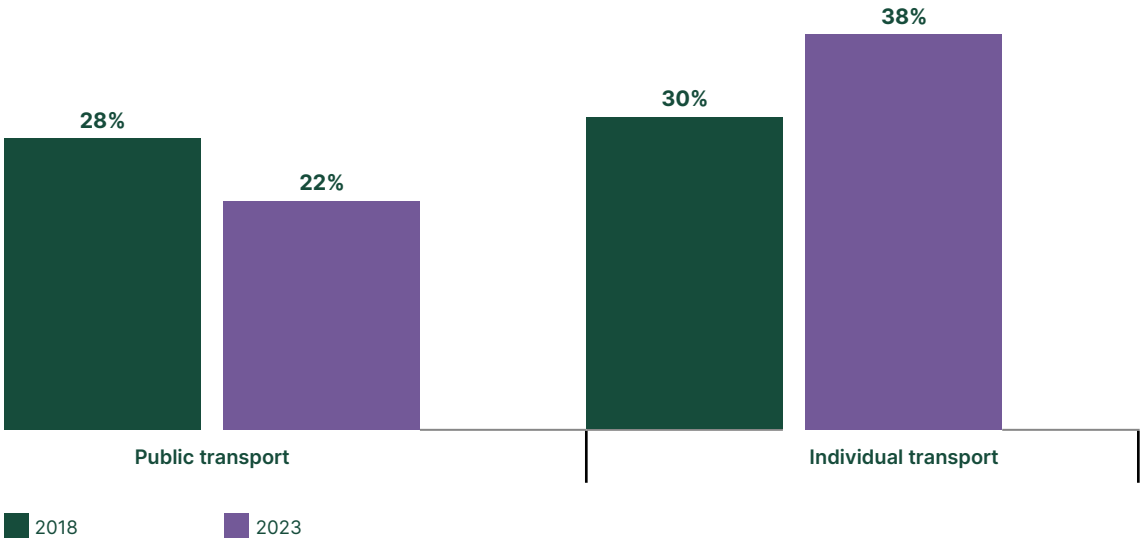
However, the Brazilian transport model remains strongly dependent on roads and fossil fuels. In 2025, the sector accounted for **220.8 million tons of CO_2 equivalent ($MtCO_2e$)**, while renewable sources represented **26.1% of its energy consumption**, driven mainly by the use of biofuels (EPE, 2026).

The reduction of these emissions requires a combination of strategies. The electrification of fleets, the expansion of biofuels, and the development of lower-carbon-intensity technologies can contribute to decarbonization, but they need to be accompanied by the diversification of transport modes and the reorganization of commuting.

In cities, the recent trajectory demonstrates the need to strengthen public transportation. According to the Urban Mobility Information System (SIMOB), of the National Association of Public Transport (ANTP), between 2018 and 2023, **trips made by collective transport decreased 34%, while those made by private motorized transportation increased 7%**. During this period, the share of collective transport in the modal split fell from **28% to 22%**, while that of individual transport rose from **30% to 38%**, considering 533 Brazilian municipalities (ANTP, 2026).

Changes in urban mobility patterns, 2018–2023

Share of modes in the modal split



Source: SIMOB/ANTP (2026). Data from 533 Brazilian municipalities.

This transformation amplifies challenges related to the occupation of urban space, congestion, air pollution, and access to services. The reduction in demand for collective transport may also compromise its financial sustainability, contributing to a cycle of loss of quality and migration of passengers to individual vehicles.

The National Urban Mobility Policy (PNMU), established by **Law No. 12,587/2012**, sets forth the priority of non-motorized modes over motorized ones and of public transportation over individual transport. Its implementation, however, requires continuous investments in infrastructure, the quality of services, and integration between transport and urban planning (Brasil, 2012).

For **Ana Nassar, Director of Programs at the Institute for Transportation and Development Policy (ITDP)**, the transformation of mobility must combine three strategies: **avoiding** unnecessary motorized commuting and excessively long trips; **shifting** to more sustainable transport modes; and **improving** the energy efficiency of existing systems. These dimensions need to be developed in an integrated manner, avoiding that the transition be limited to the technological modernization of fleets.

The electrification of automobiles, for example, can reduce the emissions associated with the circulation of vehicles, but it does not solve problems such as congestion, the unequal occupation of road space, and long commuting times. Ana Nassar draws attention to the risk of **"eco-congestion,"** a situation in which the substitution of conventional vehicles by electric ones does not modify the structural problems of urban mobility.

For this reason, electrification must also prioritize public transportation, especially buses, and be accompanied by investments in exclusive corridors, rail systems, cycling infrastructure, and adequate conditions for walking.

In freight transport, modal diversification constitutes another strategic challenge. **Aline Contar, Project Manager at the Ministry of Transport**, highlights the importance of the **National Logistics Plan 2050 (PNL 2050)** for expanding the integration between roads, railways, waterways, ports, and other infrastructure. This perspective considers not only logistical efficiency and the reduction of emissions, but also climate resilience, biodiversity, and the impacts on populations near the enterprises.

The transition of Brazilian mobility therefore depends on policies capable of reconciling decarbonization, access to services, territorial integration, and economic development. **Its success should not be measured exclusively by the reduction of emissions, but also by the capacity to improve commuting conditions and reduce inequalities.**

6.2. Impacts on vulnerable populations: territorial inequalities and the right to the city

Mobility constitutes a fundamental dimension of the **right to the city**. The unequal distribution of jobs, public facilities, and urban services means that residents of peripheral regions face greater distances and costs to access opportunities. These conditions demonstrate that territorial exclusion is expressed not only in the location of housing, but also in the concrete possibilities of circulation.

Studies by the Institute of Applied Economic Research (Ipea) reveal significant socio-spatial inequalities in access to jobs, health services, and educational institutions in Brazilian cities. The location of opportunities and the availability of transport directly influence the access conditions of the population, especially among lower-income groups (Pereira et al., 2019).

Commuting time represents one of the most significant consequences of these inequalities. Data from the 2022 Demographic Census indicate that approximately **1.3 million workers took more than two hours to reach work**, of whom nearly 700,000 were in the Southeast Region (IBGE, 2025). These commutes reduce the time available for rest, family life, cultural activities, and professional training.

Inequality is also manifested in the distribution of road space. Ana Nassar observes that, although automobiles represent approximately **26% of trips made in Brazil, they occupy between 70% and 90% of road space**. This distribution reveals a model historically oriented toward individual transport, even in cities where a significant portion of the population depends on public transit and walking.

70–90%

of road space is occupied by automobiles, which account for about 26% of trips

Transforming this model requires prioritizing people in urban planning. The expansion of accessible sidewalks, safe crossings, public lighting, connected cycle lanes, **urban tree planting, and quality public transit** contributes to democratizing the use of space and expanding commuting possibilities. In this context, tree planting plays a fundamental role in **reducing heat islands, improving thermal comfort, and creating more suitable conditions for walking and cycling**, especially in view of rising temperatures and the intensification of extreme weather events.

In this context, **active mobility** must be recognized as a structuring component of transport systems. Walking and cycling cannot be treated merely as individual alternatives, but as forms of commuting that depend on infrastructure, safety, and integration with other modes.

Mobility is also directly related to **climate adaptation**. Floods, landslides, and other extreme events can interrupt transport services, damage infrastructure, and isolate communities. These impacts tend to be more severe in territories with precarious infrastructure and high dependence on public transport.

In the Northern Region, vulnerability presents particular characteristics. River transport constitutes essential infrastructure for riverine communities, Indigenous populations, and isolated localities. The severe droughts of 2023 and 2024 compromised the navigability of Amazonian rivers, affecting commuting, supply, and access to public services.

Aline Contar points out that expanding accessibility in these regions requires solutions adapted to territorial conditions, including the upgrading of small-scale port facilities, the expansion of regional aviation with social purposes, and the development of connections that integrate isolated communities into transport systems.

The **logistics of sociobiodiversity** constitute another important dimension. The transport of products such as açaí, Brazil nuts, and pirarucu depends on adequate infrastructure to connect producer communities to consumer markets. Investments in logistics can strengthen local economies and sustainable activities, provided they respect the ways of life and rights of the populations involved.

These issues demonstrate that a just transition requires recognizing access to mobility as a right that takes on distinct characteristics according to the territory. In large cities, the priority may lie in expanding public transit and reducing long commutes; in isolated regions, it involves ensuring connectivity and access to essential services.

The articulation between mobility, housing, and urban planning is also fundamental. **Transit-Oriented Development (TOD)** proposes bringing housing, jobs, and services closer together, reducing the need for long commutes and strengthening public transit and active modes (ITDP Brasil, 2024).

Thus, decarbonization must be accompanied by policies capable of reducing distances, democratizing access to opportunities, and improving the living conditions of populations historically excluded from urban planning.

6.3. Gender and race: inequalities in commuting and in work opportunities

Racial and gender inequalities directly influence the way the population commutes and accesses urban opportunities. The traditional planning of transport systems frequently considers regular trips between residence and work, made at conventional times. However, this pattern does not encompass the diversity of daily commutes, especially those associated with domestic and care work.

Ana Nassar draws attention to the fact that **women frequently make chained trips**, combining commutes to paid work with activities such as taking children to school, accompanying family members to health services, and performing domestic tasks. These trips require integrated, accessible transport systems with adequate territorial coverage, including outside peak hours.

The overlap between gender, race, income, and territory amplifies mobility barriers. Black women and residents of peripheries face difficulties related to the cost of fares, the low frequency of services, insecurity, and the conditions of urban infrastructure. These inequalities demonstrate that **mobility cannot be understood merely as a matter of commuting, but also as a factor that conditions access to rights and opportunities**.

Safety constitutes a particularly important dimension. Inadequate lighting at bus stops, the precariousness of sidewalks, and insecurity along routes directly influence the mobility experiences of Black women. These conditions can restrict their circulation, affecting choices of times, routes, and work opportunities.

Inequalities are also manifested in active mobility. Expanding female participation in bicycle use depends not only on the expansion of cycle lanes, but on the existence of safe, connected infrastructure suited to women's commuting needs.

For this reason, **mobility planning must incorporate gender, race, and territory indicators**, allowing the identification of inequalities in access, safety, and the quality of services. The participation of female users in defining policies is also fundamental so that investments respond to different circulation experiences.

In the labor market, the transport sector presents significant inequalities. Among truck drivers with formal employment ties, **98.9% were men and approximately 1.06% women in**

2024, according to data from the Annual Social Information Report (RAIS) systematized by the National Land Transport Agency (ANTT, 2026).

The male predominance in certain occupations reveals historical barriers to access, training, and retention. The expansion of electromobility can create opportunities to broaden female participation in maintenance, operation, infrastructure, and technological development activities, provided it is accompanied by specific inclusion policies.

Ana Nassar identifies in the creation of new occupations associated with electrification an opportunity to broaden the presence of women in a historically male sector. However, this possibility depends on vocational training policies and measures that encourage their entry into the new functions.

Training programs, inclusive selection processes, and mechanisms to prevent harassment and discrimination can contribute to broadening the access of women and Black people to the new occupations. Inclusion, however, must also reach the positions of higher remuneration, specialization, and responsibility.

Racial and gender equity must guide both the planning of commuting and the transformation of the labor market. Sustainable mobility cannot reproduce systems that hinder the circulation of certain groups or restrict their participation in economic opportunities.

6.4. Occupational health and social protection: the challenges of uberization

The transition to low-carbon mobility must also consider the working conditions of the people responsible for the circulation of passengers and goods. The sector brings together drivers, metro-rail workers, logistics professionals, motorcyclists, delivery workers, and automotive industry workers, among other occupations.

In 2024, the transport, storage, and postal services grouping brought together approximately **5.9 million people employed in Brazil** (IBGE, 2025). Although this classification is broader than the urban mobility sector, it demonstrates the economic and social importance of transport-related activities.

Working conditions present challenges related to prolonged working hours, exposure to air pollution, accident risks, and productivity pressures. Technological modernization can contribute to reducing certain risks, but it does not eliminate problems associated with the organization of work.

The expansion of digital platforms adds new dimensions to this scenario. In the third quarter of 2024, approximately **1.7 million people worked through digital service platforms in their main occupation**, a figure 25.4% higher than that recorded in 2022 (IBGE, 2025). This contingent includes different modalities of platform work and does not correspond exclusively to drivers and delivery workers.

1.7 M

people worked through digital platforms in the 3rd quarter of 2024 (IBGE, 2025)

So-called **uberization** involves forms of work organization mediated by digital systems and algorithmic mechanisms that influence the distribution of tasks, remuneration, and the evaluation of workers. Although platforms may offer flexibility in organizing schedules, they also present challenges related to income predictability, transparency of rules, and access to social protection.

- **Nicolas Souza Santos, representative of the National Alliance of App Delivery Workers,** drawing on the experience of app delivery workers, draws attention to the growth in the number of motorcycles and bicycles used in these activities without a corresponding expansion of urban infrastructure. The absence of adequate spaces increases the competition for roadways with larger vehicles, heightening delivery workers' exposure to accident risks. In addition, **these workers face a scarcity of support spaces that provide adequate conditions for rest, meals, hydration, access to restrooms, and vehicle cleaning**. This precariousness makes clear that urban infrastructure intended for mobility must also consider the needs of the professionals who use the streets as a workspace, ensuring conditions of safety, health, and dignity in the exercise of their activities.

Another problem is related to the pressure exerted by apps on delivery times. The deadlines established by the platforms may encourage commuting at higher speeds, aggravating the risks faced by workers. **This dynamic can also result in penalties or financial losses for delivery workers** when the stipulated times are not met, in addition to transferring to them the costs of commuting and periods of work not remunerated by the platforms. In this way, the risks and costs of the activity end up being transferred, in part, to the workers themselves, deepening the precarization of working conditions.

Traffic accidents produce consequences that go beyond physical harm. When the worker depends directly on carrying out deliveries to earn income, a leave of absence can immediately compromise their capacity to support themselves and their family.

Nicolas Souza Santos synthesizes this contradiction through the expression **"privatization of profit and democratization of loss."** While the platforms obtain gains from the provision of services, a significant portion of the risks associated with accidents and work interruptions falls on delivery workers, their families, and public health services.

This situation reveals the relationship between occupational health and social protection. The absence of adequate coverage mechanisms in situations of accident, illness, or temporary incapacity amplifies the vulnerability of workers and transfers part of the costs of the economic activity to those who perform the services. **This scenario can be aggravated**

by exposure to extreme weather events, such as heat waves, intense rains, and flooding, which can increase the risks to the health and safety of delivery workers, especially those who work with motorcycles and bicycles and remain exposed to weather conditions during their shifts.

Another challenge is related to effective remuneration. Drivers and delivery workers frequently use their own vehicles and must bear expenses for fuel, maintenance, tires, insurance, and depreciation. **The income received from the platforms, therefore, does not necessarily correspond to the income available after deducting the costs of the activity.**

The regulation of platform work constitutes, in this context, one of the main challenges of the decent work agenda. **Supplementary Bill No. 12/2024** proposes specific rules for app drivers, including social security, remuneration, and collective representation aspects. For delivery workers, an inter-ministerial technical working group presented, in March 2026, proposals aimed at improving working conditions, with the participation of organizations of the category (General Secretariat of the Presidency of the Republic, 2026).

The construction of protection mechanisms must take into account the demands for autonomy, without disregarding the need to ensure adequate income, health and safety, social security coverage, and participation in the decisions that affect labor.

Decent work and social protection in mobility

Dimension	Challenge	Required measures
Compensation	Fuel, maintenance, and depreciation costs reduce take-home income	Transparency in payments and adequate compensation
Health and safety	Traffic accidents, pressure to meet deadlines, and long working hours	Prevention, safe infrastructure, and protection in the event of accidents
Social protection	Vulnerability during work absences due to illness or accidents	Social security coverage and income protection mechanisms
Platform management	Algorithmic rules and decisions with little transparency	Transparency, participation, and grievance mechanisms
Training and qualification	Professional skills without formal recognition	Skills certification and accessible training

Source: Prepared by the authors

The just transition also requires recognizing that digitalization and technological innovation do not automatically represent improvements in working conditions. **The sustainability of mobility depends as much on the reduction of emissions as on the valuing of the people who work in the sector.**

6.5. Workforce migration and opportunities in low-carbon mobility

The decarbonization of mobility tends to modify the professional competencies demanded in different activities, especially in the automotive industry, vehicle maintenance, public

transport, and logistics. Electrification, digitalization, and the expansion of new technologies may generate work opportunities, but they also require planning to avoid the exclusion of workers tied to conventional chains.

The replacement of vehicles powered by fossil fuels with electric technologies alters components, manufacturing processes, and maintenance systems. These changes increase the demand for professionals with knowledge in electronics, high-voltage systems, batteries, and recharging infrastructure.

However, **workforce migration does not occur automatically**. The new activities may require competencies distinct from those used in existing occupations, making skills development and retraining policies necessary.

The use of knowledge already acquired by workers constitutes an important possibility. Professionals with experience in mechanical maintenance, motorcycle repairs, electrical installations, and equipment operation may possess competencies relevant to different segments of low-carbon mobility.

Nicolas Souza Santos emphasizes that many workers possess professional skills, such as performing motorcycle repairs, but carry out these activities informally. **The recognition of these competencies by the public authorities may contribute to expanding opportunities for training, certification, and insertion into the formal labor market.**

This approach allows for valuing existing knowledge, preventing the transition from being understood exclusively as the creation of new, highly specialized professions. At the same time, it highlights the importance of building qualification pathways accessible to workers who already operate in the sector.

Brazilian industrial policy also plays a strategic role. The **Green Mobility and Innovation Program (Mover)**, established by Law No. 14,902/2024, sets out instruments to stimulate innovation, energy efficiency, and sustainability in the automotive industry. Articulated with the Nova Indústria Brasil, the program may contribute to strengthening supply chains related to electromobility (Brasil, 2024; MDIC, 2024).

The expansion of these activities also presents opportunities associated with the circular economy. The manufacturing, maintenance, reuse, and recycling of batteries may stimulate new supply chains, reducing environmental impacts and creating employment possibilities.

However, the development of these activities depends on investments in technology, infrastructure, reverse logistics systems, and environmental and occupational protection mechanisms.

The transition also involves changes in public transport and logistics. The renewal of bus fleets may increase the demand for specialized professionals, while the diversification of transport systems may modify the territorial distribution of work opportunities.

Aline Contar stresses that Brazilian logistics planning must expand the integration among different transport modes, taking into account the expansion of infrastructure, its maintenance, and the implementation of strategic connections. These transformations may produce new professional demands in railway, waterway, port, and logistics activities.

Qualification must be articulated with concrete hiring opportunities. Offering courses disconnected from investments and productive needs may result in trained workers without effective employment possibilities.

It is also necessary to consider the inequalities in access to training. Women, Black people, lower-income workers, and professionals tied to informality may face greater obstacles to participating in requalification processes.

In this sense, transition policies must combine **professional training, income protection, recognition of competencies, strengthening of national supply chains, and inclusive hiring mechanisms**.

Workforce migration to low-carbon activities must therefore be part of a economic development strategy that values workers and contributes to the creation of quality jobs.

6.6. Challenges and pathways for a just transition in mobility

The transformation of Brazilian mobility requires an approach that articulates the reduction of emissions, territorial planning, economic development, and the protection of workers. The high dependence on road transport, the loss of participation of public transport, and the inequalities in access to services demonstrate that **decarbonization cannot be achieved solely through the replacement of vehicles and fuels**.

The strengthening of public transportation, active mobility, and the integration among different modes must constitute a priority. The reorganization of urban space, with greater safety for pedestrians and cyclists, also contributes to reducing emissions and expanding access to opportunities.

Inequalities of race, gender, and territory must guide the planning of mobility systems. The expansion of infrastructure and services must especially consider the needs of peripheral populations, Black women, and the communities that face historical difficulties in accessing transport.

In the field of labor, the expansion of digital platforms highlights the need for regulatory mechanisms capable of ensuring **social protection, adequate remuneration, health and safety, and the participation of workers**. Technological innovation cannot be accompanied by the transfer of the risks and costs of economic activity to those who perform the services.

Workforce migration to low-carbon activities also requires advance planning. The recognition of existing competencies, vocational training, and the strengthening of national supply chains may contribute to expanding opportunities, provided they are accompanied by policies of inclusion and protection for workers.

Finally, the transition must take into account Brazil's territorial particularities. In cities, this means reducing inequalities of access and prioritizing public transport. In isolated regions, especially in the Amazon, it means ensuring connectivity, protecting territories, and strengthening transport systems suited to the needs of communities.

A truly sustainable mobility is not merely one that emits less carbon, but one that expands the right to the city, protects workers, and distributes the benefits of economic transformation more fairly.

07

Housing: just transition, the right to housing, and green jobs in Brazil



Housing occupies a central position in the Brazilian agenda of just climate transition. Access to adequate housing remains marked by inequalities of income, race, gender, and territory, while the construction and use of buildings demand materials, energy, and natural resources. In parallel, the intensification of extreme climate events increases the exposure of families to floods, landslides, heat waves, and forced displacements.

The just transition in housing requires articulating the right to housing, climate adaptation, the decarbonization of the construction industry, and the creation of decent jobs. It is not merely a matter of constructing environmentally efficient buildings, but of confronting the mechanisms that determine who has access to urbanized land, where investments are made, and which populations may remain in their territories.

This transformation offers an opportunity to restructure the construction sector, expanding activities of property requalification, housing improvements, energy efficiency, and green infrastructure. For these opportunities to effectively contribute to social justice, they must be associated with the protection of workers, economic inclusion, and the participation of communities in decisions.

7.1. Overview of Brazilian housing and the challenges of sustainability

The Brazilian housing crisis involves both the insufficiency of dwellings and the inadequacy of existing conditions. In 2023, the housing deficit was estimated at **5,977,317 dwellings**, while **27,661,405 durable urban dwellings presented at least one condition of inadequacy**, corresponding to 40.8% of this universe (Fundação João Pinheiro, 2025).

These indicators represent different dimensions of the housing question. The deficit considers situations of unmet housing need, including precarious housing, cohabitation, and excessive burden of urban rent. Inadequacy, in turn, encompasses problems related to infrastructure, the conditions of buildings, and land tenure regularity. Therefore, **housing policy cannot be limited to the construction of new units: it must incorporate renovations, improvements, land tenure regularization, and the urbanization of existing territories**.

The economic dimension of the sector demonstrates its importance for national development. In 2024, the Gross Domestic Product (GDP) of the construction industry reached approximately **BRL 359.5 billion**, with real growth of **4.3%** relative to the previous year. The sector ended that year with about **2.86 million formal workers** (CBIC, 2024; IBGE, 2025).

The expansion continued in 2026. Between January and July, the construction industry recorded a positive balance of **180,449 formal jobs**, reaching approximately **3.13 million employment ties** in July, according to the Novo Caged data analyzed by the Brazilian Chamber of the Construction Industry (CBIC, 2024; MTE, 2026). These figures evidence the sector's job-generation capacity, although they do not indicate, in isolation, how many of these positions may be classified as green or decent jobs.

The economic importance of the construction industry coexists with environmental impacts associated with the production of cement, steel, and other materials, with energy consumption, with the extraction of natural resources, and with the generation of waste. Decarbonization requires combining efficiency in the use of resources, construction techniques of lower impact, the reuse of materials, and the extension of the useful life of buildings.

During the Sectoral Dialogue on Housing, **Nabil Bonduki drew attention to the need to rethink the logic of housing production in the face of climate challenges.** According to the urban planner, the demolition of existing buildings to make way for new developments, frequently associated with the dynamics of real estate appreciation, represents a significant environmental problem, considering the emissions related to the production of materials such as cement and steel. In this sense, he advocated that the construction industry expand its activity in the maintenance, recovery, and reuse of existing structures, recognizing that meeting housing needs does not depend exclusively on the production of new units.

In this context, the **requalification of existing properties (*retrofit*)** constitutes a strategic alternative. By recovering buildings and adapting their uses, this modality may take advantage of consolidated urban infrastructures, reduce the pressure for territorial expansion, and expand the supply of housing in areas with access to services and opportunities.

The existence of approximately **11.4 million vacant permanent private households in the 2022 Demographic Census** reveals another dimension of the housing issue (IBGE, 2024). The indicator refers to households that were neither occupied nor occasionally used on the survey's reference date. However, these properties do not automatically correspond to habitable units, available on the market, or suitable for allocation to social housing.

11.4 M

vacant permanent private households in the 2022 Demographic Census (IBGE, 2024)

- **Rud Rafael, national coordinator of the Homeless Workers' Movement (MTST)**, relates the existence of idle properties to the difficulties faced by millions of families in accessing adequate housing. His analysis points to the need to incorporate abandoned or underused buildings into strategies for addressing the housing crisis, especially in urban areas endowed with infrastructure.

The issue also involves the growing transformation of housing into a financial asset. **Raquel Rolnik, full professor at the Faculty of Architecture and Urbanism of the University of São Paulo (FAU-USP) and one of the coordinators of the Public Space and Right to the City Laboratory (LabCidade)**, analyzes how the financialization of the real estate sector progressively subordinates the production and use of housing to expectations of economic appreciation.

This dynamic manifests itself both in large developments and in rental markets, including in low-income territories. Excessive commitment of income to rent may reduce families' ability to meet other essential needs, highlighting the importance of **housing policies that are not restricted to home ownership, but that also contemplate affordable housing alternatives, such as social rental**, especially for low-income families that face difficulties in accessing real estate financing.

Raquel Rolnik's analysis also highlights the need to discuss mechanisms for regulating the rental market and alternatives to dependence on individual financing. In this sense, expanding access to housing requires diversifying public policy instruments, including **social rental, the use of idle properties, housing improvements, and the urbanization of settlements**, in addition to the construction of new units.

Housing sustainability therefore depends not only on how housing is built, but also on its location, use, economic accessibility, and capacity to ensure dignified conditions of permanence.

7.2. Impacts on vulnerable populations: climate crisis, territorial inequalities, and the right to permanence

Climate change deepens housing inequalities historically produced by Brazilian urbanization. Families residing in areas with insufficient infrastructure, poor drainage, **scarcity of green areas and urban tree cover**, and vulnerable buildings are more exposed to the effects of intense rainfall, landslides, and extreme temperatures. The absence of vegetation cover, combined with soil sealing, may intensify heat islands and surface runoff of rainwater, aggravating flooding risks and compromising the thermal comfort and quality of life of these populations.

This exposure does not derive exclusively from the environmental characteristics of the territories. It is related to inequalities in access to land, to the distribution of public investments, and to infrastructure conditions. **Climate vulnerability is also the result of political and economic decisions regarding the organization of cities.**

Raquel Rolnik draws attention to a contradiction in institutional responses to environmental risks: the identification of vulnerable territories may be used to justify the removal of communities, without offering adequate and lasting housing alternatives. In these situations, adaptation policy runs the risk of reproducing historical processes of territorial expulsion.

Territorial permanence must be recognized as a principle of adaptation policies. In situations where resettlement is indispensable to protect lives, it is necessary to ensure definitive solutions, resident participation, and adequate conditions of access to work, education, health, and transportation. The displacement of families does not resolve vulnerability when the new housing reproduces similar precariousness.

- **Sarah Marques, co-founder of the Caranguejo Tabaiares Resiste Collective**, presents the experience of her community, in Recife, as an example of the conflicts between real estate appreciation, housing production, and the right to territory. Caranguejo Tabaiares is a historic community situated on the banks of the Capibaribe River, whose formation is associated with the work of fishers and the self-construction of housing.

The collective emerged in 2018, in response to threats of removal related to urban interventions. The mobilization came to claim the right to permanence, environmental protection, and the effective participation of residents in the formulation of public policies.

The experience demonstrates that the construction of social housing, although it represents an achievement, does not automatically eliminate territorial conflicts. In the Caranguejo Tabaiares community, in Recife, the housing development provides for the construction of **280 units intended for approximately 1,400 people**, according to information released by the Recife City Hall (Jornal do Commercio, 2025). However, Sarah Marques, a leader of the Caranguejo Tabaiares Resiste collective, points out that **surveys carried out by the community itself identified housing needs exceeding the capacity planned for the development**, highlighting the importance of incorporating community diagnoses into the planning of urban interventions. The situation also reinforces the need to ensure transparency in defining the beneficiary families and the effective participation of residents in decisions about the future of the territory.

The criticism presented by the community is not directed at housing production itself, but at the implementation model, the insufficiency of resident participation, and the possibility that the projects may disregard social bonds, economic activities, spaces of coexistence, and cultural practices.

This experience expresses a national challenge: **the quality of housing policy should not be measured solely by the number of units delivered, but also by location, infrastructure, suitability to ways of life, and the capacity to preserve dignified conditions of permanence**.

The instruments provided for in the City Statute, such as the **Special Zones of Social Interest (ZEIS)** and the mechanisms intended for the fulfillment of the social function of property, offer possibilities for orienting urban policy toward reducing inequalities (Brasil, 2001). However, their implementation depends on political decisions, administrative capacity, investments, and social participation.

Raquel Rolnik recalls the experience of the Plan for the Regularization of Special Zones of Social Interest (PREZEIS), in Recife, to emphasize that these instruments were also conceived as spaces for the collective construction of urban projects. The institutionalization of ZEIS, however, does not by itself guarantee that communities have effective influence over the interventions carried out.

Rud Rafael adds that the mere delimitation of territories as areas of social interest does not ensure adequate housing conditions when there is a lack of investments in sanitation,

drainage, infrastructure, and public services. For this reason, he argues that urban planning instruments should be linked to budgetary priorities and concrete commitments to territorial transformation.

Extreme climate events also rapidly alter housing needs. The 2024 floods in Rio Grande do Sul demonstrated how disasters can produce housing losses and large-scale displacements, expanding demands for shelter, reconstruction, and resettlement.

Housing policy therefore needs to incorporate **preventive planning, risk monitoring, construction improvements, green infrastructure, and nature-based solutions**, articulating these measures with social protection and the response capacity of communities.

Housing responses to the climate crisis

Challenge	Priority intervention	Ensuring social justice
Flooding and landslides	Drainage, slope stabilization, and prevention	Safe tenure and dignified resettlement when indispensable
Extreme heat	Urban tree planting, ventilation, and thermal comfort	Priority for vulnerable housing
Precarious housing	Renovations and technical assistance	Access for low-income families
Evictions and speculation	Special Zones of Social Interest (ZEIS) and tenure protection	Participation and preservation of community ties
Insufficient infrastructure	Integrated urban development	Access to water and sewerage, mobility, and services

Source: Prepared by the authors

The just transition requires replacing approaches that treat vulnerable populations merely as recipients of interventions with models that recognize their capacity to formulate, monitor, and evaluate solutions.

7.3. Gender and race: housing inequalities and women's leadership in local communities

Racial and gender inequalities influence both access to housing and exposure to climate impacts. Brazilian socio-spatial segregation is related to historical processes of excluding the Black population from access to land, formal property, and investments in infrastructure.

Housing precariousness, tenure insecurity, and exposure to floods and landslides are not distributed randomly. These problems affect, more intensely, territories with lower investment capacity and lesser presence of public services, revealing the relationship between **environmental racism, urban inequality, and climate vulnerability**.

Raquel Rolnik emphasizes that policies to address risks need to consider the racial and economic dimensions of vulnerability. When climate adaptation is reduced to the removal

of residents, without addressing the structural conditions of inequality, there is a risk of deepening the exclusion of Black and low-income populations.

The gender perspective adds another dimension to the housing issue. Women responsible for the care of children, the elderly, and dependent family members are especially affected by the absence of sanitation, by precarious infrastructure, and by the distance from public services. These conditions increase the time needed to carry out domestic and care activities.

Housing insecurity also compromises networks of solidarity and support, which are essential for organizing the daily life of many families. Thus, **the location and quality of housing directly influence the distribution of care work and the professional insertion opportunities of women**.

However, Black women should not be understood merely as populations affected by housing problems. Their action in community organization, food security, and environmental care demonstrates their protagonism in the construction of solutions.

The experience of Caranguejo Tabaiares exemplifies this dimension. Sarah Marques highlights the action of Black women in organizing solidarity networks during the Covid-19 pandemic and in maintaining community initiatives aimed at food security, environmental protection, and the preservation of territorial memory.

Among these initiatives is a community garden created in 2020, which came to perform functions related to food production, coexistence, and the transmission of knowledge. The need to relocate the garden as a result of urban interventions made evident that physical changes in the territory may compromise social, cultural, and affective relationships.

The presence of species such as the baobab and the jurema-preta also demonstrates the symbolic and ancestral dimension of these spaces. **Climate adaptation must not disregard social technologies and environmental care practices already developed by the communities themselves.**

The valorization of these experiences requires overcoming a relationship in which technical knowledge is considered exclusively external to the territories. Community production of knowledge needs to integrate planning processes and receive material conditions for its continuity.

Inequalities also manifest themselves in the construction industry labor market. The expansion of energy efficiency activities, building recovery, and green infrastructure may open opportunities for women and Black people, but **the creation of new occupations does not automatically guarantee professional inclusion**.

Training and hiring programs need to incorporate criteria of racial and gender equity, contemplating not only operational functions, but also technical, supervisory, and higher-paid

occupations. The prevention of harassment, the guarantee of safe environments, and professional valorization are equally necessary.

A just housing transition must, therefore, articulate the **right to housing, recognition of care work, participation of Black women in decisions, and the expansion of their economic opportunities**.

7.4. Occupational health and social protection: the challenges of the construction industry

Civil construction has a high potential for the job creation associated with the climate transition. However, the expansion of sustainable works needs to be accompanied by improvements in working conditions, considering the occupational risks, informality, and inequalities existing in the sector.

Construction activities involve risks related to falls, the use of machines and equipment, the lifting of loads, exposure to dust and chemical products, and repetitive physical effort. Climate change adds challenges, especially for workers who carry out their activities outdoors.

Rising temperatures may intensify situations of **thermal stress, dehydration, fatigue, and accidents**. For this reason, climate adaptation also needs to reach construction sites, with access to water, adequate rest areas, protective measures, and the organization of working hours according to environmental conditions.

Technological transformation modifies, but does not eliminate, these risks. The installation of photovoltaic systems, the use of industrialized components, and the application of new materials require specific safety procedures and professional training.

Regulatory Norm No. 18 (NR-18) establishes occupational safety and health guidelines in the construction industry. Its revised wording was approved by SEPRT Ordinance No. 3,733/2020, with subsequent updates, including amendments in 2026 (Brasil, 2020; MTE, 2026).

Informality represents an additional challenge. Workers without formal employment relationships may face difficulties accessing social security, training, and protection mechanisms in the event of accidents and illnesses. In this sense, **it is not enough for the activity to be environmentally sustainable: the job must also offer decent conditions of remuneration, safety, and social protection**.

Housing self-management experiences also offer elements for rethinking the organization of labor in the construction industry. Nabil Bonduki recovered the trajectory of collective self-help efforts (mutirões) and self-managed projects, highlighting the importance of the participation of future residents in the design of projects and in the management of interventions. However, he observed that advances in community participation were not always accompanied by trans-

formations in labor relations on construction sites. The urban planner also drew attention to the overload that may result from residents' participation in carrying out the works during their rest periods. This reflection shows that self-management must be associated with the guarantee of financing, technical assistance, decent working conditions, and social protection, avoiding the transfer of responsibilities and costs to the families themselves.

Rud Rafael also advocates reorganizing the construction industry investments to meet the concrete needs of the population, including the rehabilitation of idle properties, the improvement of existing housing, and the urbanization of peripheral areas.

These activities can generate professional opportunities at different scales, from small renovations to structural interventions. However, **for these occupations to be characterized as green jobs, they must reconcile the adoption of environmentally sustainable practices, such as the reduction of emissions, water and energy efficiency, and the responsible use of natural resources, with the guarantee of decent work**, including formalization, adequate remuneration, occupational safety, social protection, and the valuing of technical and practical knowledge (OIT, 2015).

The transformation of the sector therefore depends on integrating **decarbonization, accident prevention, social protection, and the participation of workers**. The environmental performance of construction works cannot be dissociated from the working conditions of those who carry them out.

7.5. Workforce migration and opportunities in sustainable construction

The transition to low-carbon housing models tends to modify the production processes and the professional skills demanded by the construction industry. The adoption of materials with lower environmental impact, **the promotion of** energy **and water** efficiency, and the expansion of climate adaptation interventions can create new occupations and transform existing activities.

Among the opportunities are the installation of solar systems, the improvement of thermal comfort, the rehabilitation of buildings, the implementation of water reuse systems, waste management, and the implementation of green infrastructure.

The **requalification of existing properties (*retrofit*)** constitutes a particularly relevant front. These interventions can mobilize bricklayers, electricians, plumbers, building technicians, architects, engineers, and maintenance professionals, while contributing to making use of the built heritage and reducing the need for urban expansion.

Rud Rafael highlights the potential of rehabilitating abandoned buildings to simultaneously address real estate idleness and housing needs. The experience of the **Maria da Conceição Tavares Occupation**, organized by the MTST in a previously vacant building in the center of Porto Alegre, was presented as an example of mobilization for the social allocation of

idle properties and for coordination of public instruments to enable their housing requalification. This is an initiative in pursuit of this transformation, not a completed work.

Brazilian industrial policy can also contribute to the transformation of the sector. The **Nova Indústria Brasil (NIB)**, launched in 2024, has a specific mission focused on sustainable infrastructure, sanitation, housing, and mobility. Among its objectives are the strengthening of national supply chains, low-carbon construction, digitalization, and the use of sustainable materials (MDIC, 2024).

The NIB 2024–2026 Action Plan also recognizes workforce qualification, the expansion of national production of inputs, and the adaptation of construction solutions to regional particularities as challenges for the development of the sector (MDIC, 2024).

However, the incorporation of these technologies requires professional training and updating policies. Workers experienced in conventional construction may require additional knowledge about energy efficiency, electrical installations, sustainable materials, and safety procedures.

The professional transition must value existing skills, including those developed by informal workers and professionals involved in renovations and self-construction. Certification programs and the recognition of practical knowledge can reduce barriers to accessing new opportunities.

The territorial dimension must also guide qualification. Investments in housing improvements and green infrastructure in peripheral areas can stimulate the hiring of local workers, strengthen small enterprises, and expand the circulation of income in the communities.

Sarah Marques draws attention to the knowledge developed by populations themselves in climate adaptation and environmental care practices. The recognition of these experiences can contribute to bringing together technical training, social technologies, and territorial needs.

Rud Rafael also proposes strengthening **public-popular partnerships**, in which community organizations can participate in the formulation and execution of projects, with financing and decision-making capacity. This approach can contribute to connecting investments in housing, income generation, climate adaptation, and local development.

Job opportunities in the housing transition

Area of operation	Professional opportunities
Building retrofitting	Construction, installations, architecture, and maintenance
Energy efficiency	Electricians, solar installers, and building technicians
Climate adaptation	Drainage, landscaping, afforestation, and green infrastructure
Circular economy	Sorting, reuse, and waste management
Housing improvements	Masons, plumbers, technicians, and community technical assistance

Source: Prepared based on the 2026 Housing Background Paper. These are potential opportunities, not estimates of jobs to be created.

The creation of green jobs in housing should not be restricted to highly specialized occupations. It also involves the updating of traditional professions and the strengthening of maintenance, renovation, environmental recovery, and urban infrastructure activities.

For these opportunities to contribute to social justice, it is necessary to articulate **vocational training, inclusive hiring, social protection, recognition of skills, and investments oriented toward the needs of the territories**.

7.6. Challenges and pathways for a just transition in housing

The just transition in housing requires overcoming a narrow understanding of sustainability, centered exclusively on the energy efficiency of buildings or the substitution of materials. These measures are important, but insufficient in the face of the inequalities that condition access to land, infrastructure, and adequate housing.

The reduction of the housing deficit and inadequacy must be articulated with climate adaptation, prioritizing territories with precarious infrastructure and greater exposure to extreme events. In this process, **the rehabilitation of properties, housing improvements, and the urbanization of settlements must complement the production of new units**, favoring the use of existing urban infrastructure and avoiding the disorderly expansion of cities. The implementation of new housing projects must also consider their impacts on land use and land cover, especially when it involves the removal of vegetation, the occupation of environmentally sensitive areas, or the opening of new urbanization fronts. **This concern extends to the formation of urban centers associated with large works and projects**, whose implementation, when not accompanied by long-term territorial planning, may encourage disorderly occupation processes and increase pressures on ecosystems.

The guarantee of the right to permanence constitutes another priority. The analyses of Raquel Rolnik, Sarah Marques, and Rud Rafael demonstrate that housing policies must confront the processes of real estate speculation, removal of communities, and concentration of decisions over the planning of urban space.

The strengthening of the social function of property, of the ZEIS, and of other urban planning instruments must be accompanied by financing, investments in infrastructure, and effective mechanisms of popular participation. The **progressive IPTU over time**, provided for in the City Statute, is one of the instruments that can be used by municipalities to address situations of non-compliance with the social function of property, subject to the legal requirements (Brasil, 2001).

The transformation of the construction industry also offers opportunities to expand employment and strengthen supply chains associated with sustainability. However, these benefits depend on policies that guarantee formalization, adequate remuneration, occupational health and safety, as well as the inclusion of women and Black people.

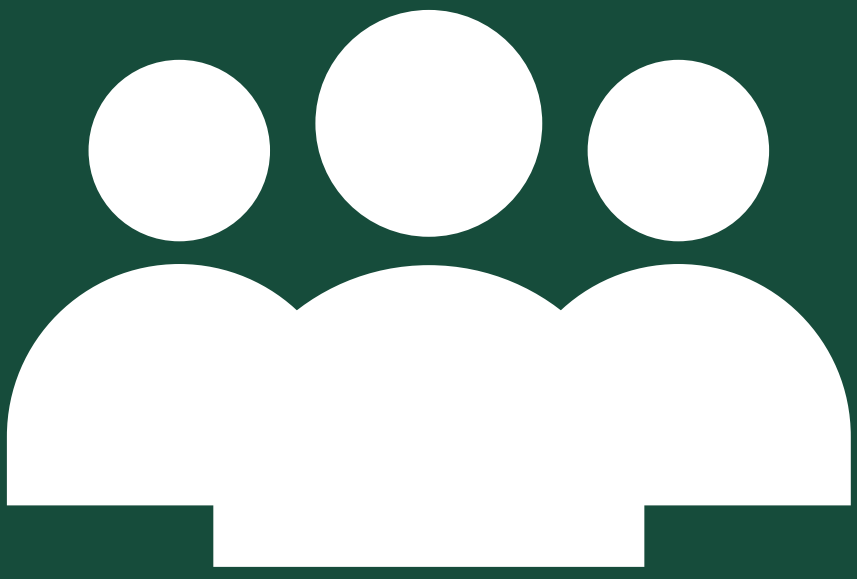
The articulation between housing policy, industrial development, and vocational training must consider the concrete needs of each territory. Climate adaptation interventions, rehabilitation of properties, sanitation, afforestation, and urban infrastructure can produce environmental and social benefits simultaneously, provided that investments are accompanied by equity criteria.

Communities need to participate in defining investment priorities, not merely be consulted after the elaboration of projects. The recognition of social technologies, the valuing of territorial knowledge, and the expansion of financing for popular initiatives can contribute to producing more adequate and lasting solutions.

A just transition in housing does not transform only the way in which homes are built. It also modifies the economic, social, and territorial relations that determine who can reside, remain, and live with dignity in Brazilian cities.

08

Recommendations for a just and inclusive transition in Brazil



INCORPORATE.
CONDITION.
DEVELOP.
ENSURE.
PRIORITIZE.
STRENGTHEN.
RECOGNIZE.
CONSOLIDATE.

The construction of a socially just low-carbon economy requires that environmental commitments be accompanied by policies of economic inclusion, social protection, reduction of inequalities, and democratic participation. The transformations needed in the agriculture and livestock, sanitation, energy, mobility, and housing sectors represent opportunities to modernize infrastructure, strengthen productive capacities, and improve the living conditions of the population. However, they also present risks of reproducing historical inequalities should investments and their benefits remain concentrated in certain groups and territories.

The analyses developed in the 2026 Sectoral Dialogues show that a just transition cannot be understood merely as a process of technological substitution or reduction of emissions. It is an economic and social transformation that must recognize the differences between territories, guarantee rights, and ensure that workers and communities participate in the decisions that affect their living conditions.

Building on these reflections, eight cross-cutting recommendations are presented to guide public policies, investments, and sustainable development strategies in Brazil.

01 Incorporate racial, gender, and territorial equity into transition policies

Climate transition policies must incorporate the reduction of racial, gender, and territorial inequalities as a central objective. This requires that investments, financing, and green jobs programs prioritize historically excluded populations, taking into account inequalities in access to land, credit, infrastructure, essential services, and work opportunities.

In agriculture and livestock, it is essential to strengthen family farming, rural women, and traditional communities. In sanitation, territories with the greatest service deficits must be prioritized, while energy, mobility, and housing must ensure equitable access to the services and benefits of the transition. The monitoring of these policies must use indicators disaggregated by race, gender, income, and territory.

02 Condition green economy incentives on the creation of decent jobs

The expansion of the green economy must be linked to the creation of quality jobs, with adequate remuneration, formalization, social protection, occupational health and safety. **These guarantees must also address the risks associated with climate change, especially rising temperatures and exposure to extreme heat**, which can intensify situations of heat stress, dehydration, fatigue, and workplace accidents. In this sense, it is recommended to adopt preventive measures, such as access to drinking water, rest breaks, adequate spaces for thermal recovery, and the adaptation of working hours and conditions. Public financing, concessions, and economic incentives must establish labor and health protection

commitments, ensuring that environmental sustainability is accompanied by the valuing and safety of workers.

This guideline must address the informality and precariousness of rural labor, protect sanitation professionals, and value recyclable material collectors. It must also ensure decent conditions in the energy and the construction industry sectors, as well as contemplate public transport and digital platform workers. Oversight, collective bargaining, and social dialogue are fundamental to monitoring the quality of the jobs generated.

03 Develop training and retraining policies for a just transition

The transformation of economic activities requires skills development and retraining policies that prepare workers for new technologies and sustainable practices. It is recommended to strengthen public professional education networks, recognize knowledge acquired in practice, and expand access to training, **ensuring accessibility, digital connectivity, and conditions for permanence**, especially for women, Black people, people with disabilities, and workers with less access to technical education. These policies must consider the productive demands and economic opportunities of each territory, contributing to the strengthening of local economies and the generation of quality jobs.

In Agriculture and Livestock, training must encompass agroecology, sustainable management, and traditional knowledge; in Sanitation, new technologies and Climate Adaptation. In the Energy, Mobility, and Housing sectors, it must keep pace with productive and technological changes, considering local specificities and opportunities. These initiatives need to be articulated with professional insertion, **income guarantees, and financial support during training and retraining processes**, as well as with recognition of Labor, preventing the costs of the Transition from falling upon workers.

04 Ensure effective participation and sharing of benefits across territories

The participation of communities and workers must occur at all stages of climate transition projects, from planning to the evaluation of results. It is necessary to move beyond merely consultative mechanisms, ensuring effective influence over decisions, transparency of information, and monitoring of investments, with respect for territorial rights and free, prior, and informed consent where applicable.

In Agriculture and Livestock, this involves recognizing the autonomy of family farmers, Indigenous peoples, and traditional communities. In Sanitation, it means strengthening social oversight of services. In the Energy, Mobility, and Housing sectors, participation must ensure concrete benefits to territories, such as local hiring, vocational training, improvement of infrastructure, and expansion of access to essential services.

05 Prioritize investments with integrated environmental and social benefits

Investments allocated to the climate transition must produce environmental and social results simultaneously, articulating reduction of emissions, Climate Adaptation, access to essential services, and generation of decent work. The distribution of public resources must consider regional, racial, and economic inequalities, preventing exclusively financial criteria from determining priorities.

In Agriculture and Livestock, it is recommended to finance family farming, agroecology, and the recovery of degraded areas. In Sanitation, prioritize universalization, protection of water sources, and sustainable waste management. In Energy, combat energy poverty and ensure benefits to affected communities. In Mobility and Housing, expand quality public transportation, accessibility, adequate housing, and resilient urban infrastructure.

06 Strengthen institutional coordination and monitoring of results

The implementation of a Just Transition requires permanent articulation among governments, public institutions, companies, workers, and civil society organizations. It is recommended to integrate climate, industrial, agricultural, urban, educational, and labor policies, strengthening cooperation among different sectors and levels of government to ensure coherence and effectiveness of actions.

It is also necessary to develop monitoring mechanisms that evaluate not only environmental results, but their social and economic impacts. Indicators of emissions, access to services, employment, income, social protection, racial and gender equity, and community participation must guide the evaluation of policies. Data transparency is fundamental for social oversight and the improvement of strategies.

07 Recognize and finance the solutions developed in local communities

Community organizations, cooperatives, social movements, family farmers, Indigenous peoples, and traditional communities develop practices and knowledge that are fundamental for sustainability and Climate Adaptation. It is recommended to expand financing, technical assistance, and institutional support for these initiatives, recognizing their leading role in building solutions suited to local realities.

In Agriculture and Livestock, agroecological experiences and local commercialization circuits must be strengthened; in Sanitation, community-based water management solutions and recycling cooperatives. In Housing and Mobility, popular organization initiatives and participatory planning must also be valued. Financing mechanisms need to be accessible

and to strengthen the autonomy of these organizations, without transferring to communities responsibilities of the State.

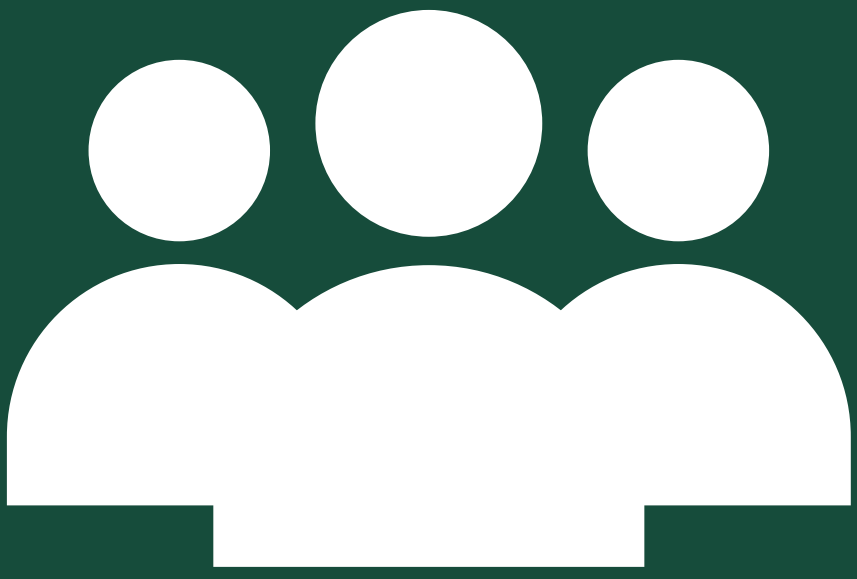
08 Consolidate the Just Transition as a national development strategy

The transition to a low-carbon Economy must constitute a long-term national development strategy, articulating industrial policy, technological innovation, valorization of Labor, and the confrontation of inequalities. To this end, it is recommended to establish common commitments to social justice in planning and financing instruments, ensuring coherence among environmental, economic, and social objectives.

This strategy must recognize the interdependence among the analyzed sectors. Sustainable Agriculture and Livestock depends on water, Energy, and transportation; Sanitation is directly related to Housing, health, and Climate Adaptation; and housing, Mobility, and Energy influence access to Labor and economic opportunities. Integrating these agendas is fundamental so that the benefits of the Transition reach different populations and territories.

09

Concluding remarks



The 2026 Sectoral Dialogues demonstrate that the Just Climate Transition represents one of the main challenges for Brazilian development in the coming decades. Beyond promoting the reduction of greenhouse gas emissions and the modernization of productive sectors, it is a matter of building a development model capable of reconciling environmental sustainability, economic dynamism, generation of decent work, and reduction of social inequalities.

The reflections developed throughout the cycle show that **the transition to a low-carbon Economy is not, in itself, a guarantee of social justice, even though confronting climate change is in itself fundamental to mitigating the risks that fall, above all, on the most vulnerable populations**. The expansion of sustainable investments, the incorporation of new technologies, and the creation of green jobs may reproduce historical inequalities if they are not accompanied by policies of redistribution of opportunities, social protection, and valorization of territories.

In this context, confronting racial, gender, and territorial inequalities must occupy a central position in transition strategies. In Brazil, the impacts of the climate crisis and the conditions of access to infrastructure, productive resources, and essential services are deeply marked by historical processes of exclusion. Recognizing these asymmetries means understanding that climate policies need to consider different starting points and direct efforts toward historically vulnerable populations and territories, creating conditions for lasting development.

Another fundamental lesson concerns the centrality of Labor. The green job creation must be associated with the principles of decent work, ensuring adequate remuneration, social protection, safe conditions, vocational training, and the participation of workers in decisions. Likewise, technological transformation needs to be accompanied by policies that ensure opportunities for training and requalification, preventing the costs of modernization from being transferred to groups that already face greater difficulties in economic insertion.

The debates also reinforce that **there is no Just Transition without effective participation of the territories**. Building sustainable solutions requires recognizing the knowledge, experiences, and forms of organization developed by communities, workers, social movements, and traditional peoples. More than consulting these populations, it is necessary to ensure their influence over decisions and to create mechanisms that allow for the sharing of the economic and social benefits of the investments made.

The realization of this agenda depends on a State capable of coordinating Public Policies, directing investments, and establishing long-term commitments. The articulation among climate, industrial, social, and labor policies is fundamental to overcome fragmented approaches and ensure that environmental advances are accompanied by concrete and lasting results in reducing inequalities.

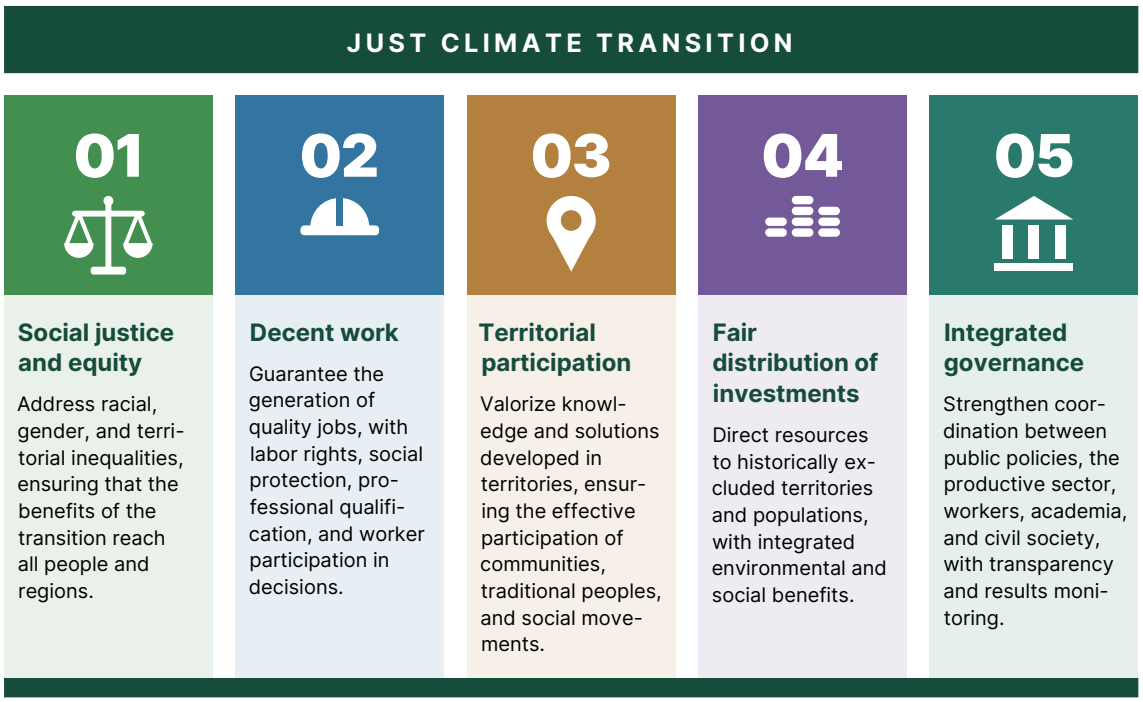
Based on the reflections built throughout the Sectoral Dialogues, it is possible to identify **five fundamental pillars to guide a Just Climate Transition in Brazil: social justice and equity, decent work, territorial participation, fair distribution of investments, and inte-**

grated governance. These pillars synthesize the main lessons and recommendations of the different sectors analyzed and demonstrate that the environmental, economic, and social results of the Transition need to be built in an articulated manner, with attention to the guarantee of rights and the equitable distribution of their benefits.

The five pillars of a just climate transition

Cross-cutting synthesis of the 2026 Sectoral Dialogues

The different sectors analyzed — agriculture and livestock, sanitation, energy, mobility, and housing — converge toward five essential pillars for low-carbon, inclusive, and sustainable development in Brazil.



In this sense, the Just Transition must be understood not only as a set of measures aimed at reducing the social impacts of decarbonization, but as **a structuring strategy of national development**, guided by the guarantee of rights, by the democratization of economic opportunities, and by recognition of the diversity of Brazilian territories.

The Sectoral Dialogues thus demonstrate the importance of strengthening spaces of articulation among public authorities, workers, the productive sector, academia, and civil society. The continuity of this dialogue, associated with the implementation and monitoring of the recommendations presented, can contribute to transforming climate commitments into policies capable of producing tangible benefits for the population.

The challenge is not only to build an environmentally sustainable Economy, but to ensure that this transformation also contributes to a more democratic, inclusive, and socially just Brazil.

References

AGÊNCIA NACIONAL DE ÁGUAS E SANEAMENTO BÁSICO (ANA). *Panorama da qualidade das águas superficiais no Brasil*. Brasília, DF: ANA, 2024.

AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA (ANEEL). *Tarifa Social de Energia Elétrica*. Brasília, DF: ANEEL, 2025.

AGÊNCIA NACIONAL DE MINERAÇÃO (ANM). *Minerais críticos e estratégicos*. Brasília, DF: ANM, 2026.

AGÊNCIA NACIONAL DO PETRÓLEO, GÁS NATURAL E BIOCOMBUSTÍVEIS (ANP). *Programa Nacional de Descarbonização do Produtor e Importador de Gás Natural e de Incentivo ao Biometano*. Brasília, DF: ANP, 2026.

ASSOCIAÇÃO BRASILEIRA DE RESÍDUOS E MEIO AMBIENTE (ABREMA). *Panorama dos resíduos sólidos no Brasil 2025*. São Paulo: ABREMA, 2025.

ASSOCIAÇÃO NACIONAL DE TRANSPORTES PÚBLICOS (ANTP). *Sistema de Informações da Mobilidade Urbana (SIMOB): relatório geral 2024*. São Paulo: ANTP, 2026.

BANCO NACIONAL DE DESENVOLVIMENTO ECONÔMICO E SOCIAL (BNDES). *Infraestrutura sustentável e transição climática*. Rio de Janeiro: BNDES, 2024.

BRASIL. *Lei nº 9.433, de 8 de janeiro de 1997*. Institui a Política Nacional de Recursos Hídricos. Brasília, DF: Presidência da República, 1997.

BRASIL. *Lei nº 10.257, de 10 de julho de 2001*. Regulamenta os arts. 182 e 183 da Constituição Federal e estabelece diretrizes gerais da política urbana. Brasília, DF: Presidência da República, 2001.

BRASIL. *Lei nº 11.445, de 5 de janeiro de 2007*. Estabelece as diretrizes nacionais para o saneamento básico. Brasília, DF: Presidência da República, 2007.

BRASIL. *Lei nº 12.305, de 2 de agosto de 2010*. Institui a Política Nacional de Resíduos Sólidos. Brasília, DF: Presidência da República, 2010.

BRASIL. *Lei nº 12.587, de 3 de janeiro de 2012*. Institui as diretrizes da Política Nacional de Mobilidade Urbana. Brasília, DF: Presidência da República, 2012.

BRASIL. *Lei nº 13.576, de 26 de dezembro de 2017*. Dispõe sobre a Política Nacional de Biocombustíveis (RenovaBio). Brasília, DF: Presidência da República, 2017.

BRASIL. *Lei nº 13.724, de 4 de outubro de 2018*. Institui o Programa Bicicleta Brasil. Brasília, DF: Presidência da República, 2018.

BRASIL. *Lei nº 14.026, de 15 de julho de 2020*. Atualiza o marco legal do saneamento básico. Brasília, DF: Presidência da República, 2020.

BRASIL. *Lei nº 14.273, de 23 de dezembro de 2021*. Estabelece a Lei das Ferrovias. Brasília, DF: Presidência da República, 2021.

BRASIL. *Lei nº 14.300, de 6 de janeiro de 2022*. Institui o marco legal da microgeração e minigeração distribuída. Brasília, DF: Presidência da República, 2022.

BRASIL. *Lei nº 14.902, de 27 de junho de 2024*. Institui o Programa Mobilidade Verde e Inovação (Programa Mover). Brasília, DF: Presidência da República, 2024.

BRASIL. *Lei nº 14.993, de 8 de outubro de 2024*. Dispõe sobre a promoção da mobilidade sustentável de baixo carbono. Brasília, DF: Presidência da República, 2024.

BRASIL. *Decreto nº 12.614, de 5 de setembro de 2025*. Regulamenta dispositivos relativos à descarbonização do gás natural e ao incentivo ao biometano. Brasília, DF: Presidência da República, 2025.

BRASIL. Ministério da Agricultura e Pecuária. *Plano Safra 2024/2025*. Brasília, DF: MAPA, 2024. Available at: https://www.gov.br/agricultura/pt-br/assuntos/plano-safra. Accessed on: Feb. 9, 2026.

BRASIL. Ministério da Ciência, Tecnologia e Inovação. *Bioeconomia*. Brasília, DF: MCTI, 2024.

BRASIL. Ministério da Ciência, Tecnologia e Inovação. *Dados do AdaptaBrasil embasam diagnóstico sobre vulnerabilidade climática das cidades brasileiras*. Brasília, DF: MCTI, 2025.

BRASIL. Ministério da Educação. *Profissionais do Futuro: competências para a economia verde*. Brasília, DF: MEC, 2026.

BRASIL. Ministério da Fazenda. *Plano de Transformação Ecológica*. Brasília, DF: Ministério da Fazenda, 2024.

BRASIL. Ministério das Cidades. *Ministério das Cidades investe R$ 51,4 bilhões em mobilidade urbana*. Brasília, DF: Ministério das Cidades, 12 mar. 2026.

BRASIL. Ministério das Cidades. *Mobilidade urbana sustentável – renovação de frota: Novo PAC*. Brasília, DF: Ministério das Cidades, 2026.

BRASIL. Ministério das Cidades. *Programa Bicicleta Brasil*. Brasília, DF: Ministério das Cidades, 2026.

BRASIL. Ministério das Cidades. Secretaria Nacional de Saneamento Ambiental. *Sistema Nacional de Informações em Saneamento Básico (SINISA)*. Brasília, DF: Ministério das Cidades, 2024.

BRASIL. Ministério de Minas e Energia. *Combustível do Futuro*. Brasília, DF: MME, 2026.

BRASIL. Ministério de Minas e Energia. *Minerais críticos do Brasil: guia para investidores estrangeiros 2026*. Brasília, DF: MME, 2026.

BRASIL. Ministério de Minas e Energia. *Plano Nacional de Transição Energética (Plante): caderno de ações*. Brasília, DF: MME, 2026.

BRASIL. Ministério de Minas e Energia; EMPRESA DE PESQUISA ENERGÉTICA (EPE). *Plano Decenal de Expansão de Energia 2035*. Brasília, DF: MME; Rio de Janeiro: EPE, 2026.

BRASIL. Ministério de Minas e Energia; EMPRESA DE PESQUISA ENERGÉTICA (EPE). *Plano Nacional de Energia 2055*. Brasília, DF: MME; Rio de Janeiro: EPE, 2026.

BRASIL. Ministério do Desenvolvimento Agrário e Agricultura Familiar. *Agricultura familiar no Brasil*. Brasília, DF: MDA, 2024.

BRASIL. Ministério do Desenvolvimento, Indústria, Comércio e Serviços. *Nova Indústria Brasil: plano de ação para a neoindustrialização 2024–2026*. Brasília, DF: MDIC, 2024.

BRASIL. Ministério do Meio Ambiente e Mudança do Clima. *Estratégias para economia circular e gestão sustentável de resíduos*. Brasília, DF: MMA, 2024.

BRASIL. Ministério do Meio Ambiente e Mudança do Clima. *Plano Clima 2024–2035*. Brasília, DF: MMA, 2026.

BRASIL. Ministério do Meio Ambiente e Mudança do Clima. *Programa Cidades Verdes Resilientes*. Brasília, DF: MMA, 2026.

BRASIL. Ministério do Trabalho e Emprego. *Mercado formal celetista gera 58.568 empregos em julho e acumula 972.203 postos no ano*. Brasília, DF: MTE, 28 ago. 2026.

BRASIL. Ministério dos Transportes; INFRA S.A. *Plano Nacional de Logística 2050*. Brasília, DF: Ministério dos Transportes, 2026.

BRASIL. Secretaria-Geral da Presidência da República. *GTT dos Entregadores por Aplicativo apresenta relatório nesta terça-feira (24)*. Brasília, DF: Secretaria-Geral da Presidência da República, 2026.

C40 CITIES CLIMATE LEADERSHIP GROUP (C40). *Criação de bons empregos verdes locais no Rio de Janeiro*. [n.p.]: C40 Cities, [n.d.]. Available at: https://www.c40.org/wp-content/uploads/2024/05/Creating-local-good-green-jobs-in-Rio_Final-Portuguese.pdf. Accessed on: Oct. 29, 2026.

CÂMARA BRASILEIRA DA INDÚSTRIA DA CONSTRUÇÃO (CBIC). *Construção respondeu por mais de 21% dos novos empregos formais do país em julho*. Brasília, DF: CBIC, 28 ago. 2026.

CÂMARA BRASILEIRA DA INDÚSTRIA DA CONSTRUÇÃO (CBIC). *Estudo mostra perfil do trabalhador da construção civil*. Brasília, DF: CBIC, 9 out. 2024.

CENTRO DE ESTUDOS AVANÇADOS EM ECONOMIA APLICADA (CEPEA); CONFEDERAÇÃO DA AGRICULTURA E PECUÁRIA DO BRASIL (CNA). *PIB do agronegócio brasileiro*. Piracicaba: CEPEA; Brasília, DF: CNA, 2024.

CONECTAS DIREITOS HUMANOS. *Racismo ambiental e desigualdades no acesso ao saneamento no Brasil*. São Paulo: Conectas, 2024.

CONFEDERAÇÃO NACIONAL DOS TRABALHADORES ASSALARIADOS E ASSALARIADAS RURAIS (CONTAR). *Igualdade étnico-racial e trabalho no campo*. Brasília, DF: CONTAR, [n.d.].

CONSELHO NACIONAL DE POLÍTICA ENERGÉTICA (CNPE). *Resolução nº 5, de 26 de agosto de 2024*. Institui a Política Nacional de Transição Energética e o Fórum Nacional de Transição Energética. Brasília, DF: CNPE, 2024.

CONSELHO NACIONAL DE POLÍTICA ENERGÉTICA (CNPE). *Resolução nº 4, de 1º de abril de 2026*. Estabelece meta de redução de emissões de gases de efeito estufa no mercado de gás natural. Brasília, DF: CNPE, 2026.

DEPARTAMENTO INTERSINDICAL DE ESTATÍSTICA E ESTUDOS SOCIOECONÔMICOS (DIEESE). *Empregos verdes e sustentáveis no Brasil*. São Paulo: DIEESE, 2022. 25 p. Available at: https://www.dieese.org.br/outraspublicacoes/2022/empregosVerdesSustentaveisBrasil092022.pdf. Accessed on: Oct. 29, 2026.

DEPARTAMENTO INTERSINDICAL DE ESTATÍSTICA E ESTUDOS SOCIOECONÔMICOS (DIEESE). *Empregos verdes e sustentáveis no Brasil*. São Paulo: DIEESE, 2025.

DEPARTAMENTO INTERSINDICAL DE ESTATÍSTICA E ESTUDOS SOCIOECONÔMICOS (DIEESE). *A inserção da população negra no mercado de trabalho*. São Paulo: DIEESE, 2024. (Boletim Especial).

DEPARTAMENTO INTERSINDICAL DE ESTATÍSTICA E ESTUDOS SOCIOECONÔMICOS (DIEESE). *Desigualdades no mercado de trabalho brasileiro*. São Paulo: DIEESE, 2023.

EMPRESA DE PESQUISA ENERGÉTICA (EPE). *Balanço Energético Nacional 2026: relatório síntese: ano-base 2025*. Rio de Janeiro: EPE, 2026.

EMPRESA DE PESQUISA ENERGÉTICA (EPE). *Fact sheet: uso de hidrogênio no transporte*. Rio de Janeiro: EPE, 2026.

EMPRESA DE PESQUISA ENERGÉTICA (EPE). *Minerais críticos e estratégicos para a transição energética*. Rio de Janeiro: EPE, 2025.

EMPRESA DE PESQUISA ENERGÉTICA (EPE); OBSERVATÓRIO BRASILEIRO DE ERRADICAÇÃO DA POBREZA ENERGÉTICA (OBEPE). *Pobreza energética sob a ótica das desigualdades de gênero*. Rio de Janeiro: EPE, 2026.

EMPRESA DE PESQUISA ENERGÉTICA (EPE); OBSERVATÓRIO BRASILEIRO DE ERRADICAÇÃO DA POBREZA ENERGÉTICA (OBEPE). *Pobreza energética sob a ótica das desigualdades raciais*. Rio de Janeiro: EPE, 2026.

FINANCIADORA DE ESTUDOS E PROJETOS (FINEP). *Finep Mais Inovação Brasil – Rodada 2: economia circular e cidades sustentáveis*. Rio de Janeiro: Finep, 2026.

FUNDAÇÃO JOÃO PINHEIRO. *Déficit habitacional: PNAD Contínua 2023*. Belo Horizonte: Fundação João Pinheiro, 2025.

FUNDAÇÃO JOÃO PINHEIRO. *Inadequação de domicílios no Brasil 2023*. Belo Horizonte: Fundação João Pinheiro, 2025.

FUNDAÇÃO JORGE DUPRAT FIGUEIREDO DE SEGURANÇA E MEDICINA DO TRABALHO (FUNDACENTRO). *Mobilizações de entregadores de aplicativos ainda têm efeito limitado nas condições de trabalho*. São Paulo: Fundacentro, 2026.

FUNDO DAS NAÇÕES UNIDAS PARA A INFÂNCIA (UNICEF). *Habilidades e empregos verdes para adolescentes e jovens no Brasil*. Brasília, DF: UNICEF, 2025. Available at: https://www.unicef.org/brazil/relatorios/habilidades-e-empregos-verdes-para-adolescentes-e-jovens-no-brasil. Accessed on: Oct. 29, 2026.

GO ASSOCIADOS. *Benefícios econômicos e sociais da expansão do saneamento básico no Brasil*. São Paulo: GO Associados, 2023.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Censo Agropecuário 2017*. Rio de Janeiro: IBGE, 2017.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Censo Demográfico 2022: características dos domicílios: saneamento básico*. Rio de Janeiro: IBGE, 2024.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Censo Demográfico 2022: deslocamentos para trabalho e estudo: resultados preliminares da amostra*. Rio de Janeiro: IBGE, 2025.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Censo Demográfico 2022: favelas e comunidades urbanas: resultados do universo*. 2nd ed. Rio de Janeiro: IBGE, 2025.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Pesquisa Nacional por Amostra de Domicílios Contínua: trabalho*. Rio de Janeiro: IBGE, 2021.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *PIB cresce 2,3% em 2025 e fecha o ano em R$ 12,7 trilhões*. Rio de Janeiro: IBGE, 2026.

INSTITUTO DE DEMOCRACIA E SUSTENTABILIDADE (IDS). *Diálogos Setoriais para a Promoção de uma Economia Verde: transição climática justa*. São Paulo: IDS, 2026.

INSTITUTO DE PESQUISA ECONÔMICA APLICADA (IPEA). *Catadores de materiais recicláveis no Brasil: diagnóstico e desafios para inclusão produtiva*. Brasília, DF: Ipea, 2023.

INSTITUTO DE PESQUISA ECONÔMICA APLICADA (IPEA). *Projeto Acesso a Oportunidades*. Brasília, DF: Ipea, [n.d.].

INSTITUTO PEREGUM. *Mobilidade interseccional, inclusiva e sustentável*. São Paulo: Instituto Peregum, 2026.

INSTITUTO TRATA BRASIL. *Painel do Saneamento Brasil*. São Paulo: Instituto Trata Brasil, 2025.

INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA); INTERNATIONAL LABOUR ORGANIZATION (ILO). *Renewable energy and jobs: annual review 2025*. Abu Dhabi: IRENA; Geneva: ILO, 2026.

MOVIMENTO NACIONAL DOS CATADORES DE MATERIAIS RECICLÁVEIS (MNCR). *Catadores e catadoras na construção da economia circular*. São Paulo: MNCR, 2024.

OBSERVATÓRIO DO CLIMA. *Análise das emissões de gases de efeito estufa e suas implicações para as metas climáticas do Brasil: 1970–2024*. São Paulo: Observatório do Clima, 2025. (SEEG).

OBSERVATÓRIO DO CLIMA. *Emissões de gases de efeito estufa no Brasil: relatório 2024*. São Paulo: Observatório do Clima, 2024.

ORGANIZAÇÃO INTERNACIONAL DO TRABALHO (OIT). *Convenção nº 169 sobre povos indígenas e tribais*. Genebra: OIT, 1989.

ORGANIZAÇÃO INTERNACIONAL DO TRABALHO (OIT). *Guidelines for a just transition towards environmentally sustainable economies and societies for all*. Geneva: ILO, 2015.

PEREIRA, Rafael H. M. et al. *Desigualdades socioespaciais de acesso a oportunidades nas cidades brasileiras*. Brasília, DF: Ipea, 2019.

REPÓRTER BRASIL. *Escravo, nem pensar!: educação para a prevenção ao trabalho escravo*. São Paulo: Repórter Brasil, 2022.

SINDICATO DA INDÚSTRIA DA CONSTRUÇÃO CIVIL DO ESTADO DE SÃO PAULO (SINDUSCON-SP); ECCONIT. *Perfil do trabalhador da construção civil*. São Paulo: SindusCon-SP; Ecconit, 2024.

SINDICATO NACIONAL DA INDÚSTRIA DO CIMENTO (SNIC). *Dados do setor*. São Paulo: SNIC, 2026.

Just Climate Transition

Sectoral Dialogues on Green Job Creation

FINAL REPORT · 2026

Follow IDS on our channels:

www.idsbrasil.org |

ORGANIZED BY

Instituto Democracia e Sustentabilidade

SUPPORT

OPEN SOCIETY FOUNDATIONS

PARTNERS

ABCD Ação Brasileira de Combate às Desigualdades

CEERT 35 anos

DIEESE

instituto ethos por uma sociedade justa e responsável

gaia social

ie] Instituto de Estudos Avançados da Universidade de São Paulo

InPACTO