# GEF-8 PROJECT IDENTIFICATION FORM (PIF)

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## General Project Information

| | |
|---|---|
| Project Title | |
| Promoting zero-emission buildings in Brazil through climate technologies and policies (EDinova) | |
| Region | GEF Project ID |
| Brazil | 11072 |
| Country(ies) | Type of Project |
| Brazil | FSP |
| GEF Agency(ies): | GEF Agency ID |
| UNEP | N/A |
| Executing Partner | Executing Partner Type |
| Ministry of Science, Technology and Innovation (MCTI) | Government |
| GEF Focal Area (s) | Submission Date |
| Climate Change | 4/5/2023 |
| Project Sector (CCM Only) | |
| Technology Transfer/Innovative Low-Carbon Technologies | |
| Taxonomy | |
| Focal Areas, Climate Change, Climate Change Mitigation, Influencing models, Transform policy and regulatory environments, Deploy innovative financial instruments, Demonstrate innovative approache, Stakeholders, Civil Society, Academia, Private Sector, Gender Equality, Gender results areas, Gender Mainstreaming, Sex-disaggregated indicators, Capacity, Knowledge and Research, Capacity Development | |
| Type of Trust Fund | Project Duration (Months) |
| GET | 48 |
| GEF Project Grant: (a) | GEF Project Non-Grant: (b) |
| 9,167,443.00 | 0.00 |
| Agency Fee(s) Grant: (c) | Agency Fee(s) Non-Grant (d) |
| 870,907.00 | 0.00 |
| Total GEF Financing: (a+b+c+d) | Total Co-financing |
| 10,038,350.00 | 66,657,355.00 |
| PPG Amount: (e) | PPG Agency Fee(s): (f) |
| 70,000.00 | 6,650.00 |
| PPG total amount: (e+f) | Total GEF Resources: (a+b+c+d+e+f) |
| 76,650.00 | 10,115,000.00 |

Project Tags

CBIT: No NGI: No SGP: No Innovation: Yes

Project Summary

Provide a brief summary description of the project, including: (i) what is the problem and issues to be addressed? (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? iii), how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the project should be in section B "project description".(max. 250 words, approximately 1/2 page)

In Brazil, greenhouse gas emissions from the construction and buildings sector are equal to 6% of national GHG emissions; annual emissions of 139 million tonnes of CO2e. Furthermore, such emissions are growing over time, due to: growth and increasing purchasing power of the Brazilian middle class; a growing building stock, as the Brazilian government works to address a housing deficit of over 5.9 million households; decreasing prices of household appliances and continued low energy efficiency of Brazilian buildings; and increasing contribution of non-renewable energy sources to the national electricity grid. While the Brazilian government and other key national stakeholders have taken steps to address this challenge, the country faces four key barriers to transitioning to net-zero buildings. There is:

1. An absence of integrated and coherent public policies and government actions towards net-zero in the building sector;
2. A lack of evidence in the country of the economic, social and environmental viability of net-zero buildings;
3. Insufficient financial incentives and catalysing financial instruments for net-zero buildings;
4. Insufficient knowledge management and capacity to promote the transition to net-zero buildings.

This project aims to address this global environmental challenge by promoting the decarbonization of the Brazilian building and construction sector through the adoption of innovative technologies and public policies. This objective will be achieved through four components that directly address the four key barriers:

1. *Creating an enabling environment for the net-zero building transition*. The expected outcome from this component is that the Brazilian government enhances strategic planning, innovation, policy coherence and regulatory guidance for net-zero buildings.
2. *Demonstrating the economic, social and environmental viability of net-zero buildings*. The expected outcome from this component is that the federal, state and local governments gain confidence in the benefits, feasibility and cost-effectiveness of net-zero schools buildings in Brazil's eight bioclimatic zones.
3. *Financing to accelerate the transition to net-zero buildings*. Through this component the expected output is that national actors strengthen innovative financing instruments for scaling-up and ensuring long-term investment in net-zero buildings;
4. *Knowledge management and capacity-building*. Through this component the expected output is that government and private sector actors commit to greater ambition on net-zero buildings by drawing on a knowledge platform and strengthened capacity

Through achievement of the four outcomes above, the project is expected to be transformative in supporting Brazil to transition to a net-zero building and construction sector by 2050. The project is expected to achieve greenhouse gas emissions mitigation over the project's lifetime of 980,000 tonnes of CO2eq.

## Indicative Project Overview

### Project Objective

Promote the decarbonization of the Brazilian building and construction sector through the adoption of innovative technologies and public policies

## Project Components

### 1. Enabling environment for the net-zero building transition

| Component Type | Trust Fund |
|---|---|
| Technical Assistance | GET |
| GEF Project Financing ($) | Co-financing ($) |

| | |
|---|---|
| 1,430,000.00 | 3,500,000.00 |

Outcome:

1. Federal, state and local governments adopt roadmaps and regulations, increase policy coherence, and strengthen innovation ecosystems for accelerating the scale-up of net-zero buildings

Output:

1.1 A national roadmap for net-zero buildings in 2050, which takes into account, inter alia, embodied carbon, energy efficiency, behavioural change and distributed renewable energy, and incorporating just transition and gender equality principles, is submitted for adoption by the Federal government

1.2 A multisectoral and inter-federal governance structure is created for promoting policy coherence on net-zero buildings at the federal level, including with regards to the national roadmap

1.3 Entrepreneurs and other innovation stakeholders have access to a national innovation network on net-zero building materials, designs, technologies and construction systems

1.4 The National Fund for Educational Development (FNDE), Caixa Econômica Federal (CAIXA) and Brazilian Development Bank (BNDES), local governments and the construction sector have access to a guide of cost-effective technical recommendations and design guidelines for developing and operating low-emission and net-zero buildings in Brazil's eight bioclimatic zones

1.5 Policies and regulations packages for low-emission and net-zero buildings (including technical standards and procurement specifications) are made available by federal, state and local governments for adoption by a minimum of three municipalities

1.6 Ambition, regulatory change and action on net-zero buildings is promoted with local governments, including through the creation of an alliance of municipalities for net-zero schools

## 2. Demonstration of the feasibility of net-zero buildings

| Component Type | Trust Fund |
|---|---|
| Investment | GET |
| GEF Project Financing ($) | Co-financing ($) |
| 3,200,000.00 | 18,242,284.00 |

Outcome:

2. Federal, state and local governments take steps to replicate the pilot net-zero school buildings

Output:

2.1 The feasibility of net-zero school buildings is demonstrated to key stakeholders in Brazil's eight bioclimatic zones and documented on SIS+ for replication

## 2. Demonstration of the feasibility of net-zero buildings

| Component Type | Trust Fund |
|---|---|
| Technical Assistance | GET |
| GEF Project Financing ($) | Co-financing ($) |
| 600,000.00 | 1,000,000.00 |

Outcome:

2. Federal, state and local governments take steps to replicate the pilot net-zero school buildings

Output:

2.2 Municipal managers, school directors and other school building stakeholders are trained to operate the demonstration net-zero school buildings

2.3 A monitoring and evaluation system is established for measuring the impact (emission reduction, energy and cost savings, cost-benefit, environmental comfort) of the demonstration net-zero school buildings vis-à-vis baseline school buildings and data made available through SIS+

2.4 A gender-responsive multi-stakeholder engagement and ambition-raising strategy engages local stakeholders and communities in the demonstration and promotion of the net-zero school buildings

## 3. Finance for a sustainable transformation to net-zero buildings

| Component Type | Trust Fund |
|---|---|
| Technical Assistance | GET |
| **GEF Project Financing ($)** | **Co-financing ($)** |
| 1,880,000.00 | 38,000,000.00 |

Outcome:

3. National actors strengthen innovative financing instruments for scaling-up and ensuring long-term investment in low-emission and net-zero buildings

Output:

3.1 CAIXA and BNDES credit lines are strengthened through tailored technical assistance to incentivize the scale-up of low-emission and net-zero social housing, private buildings, schools and other public buildings

3.2 FNDE funding lines are strengthened through targeted technical assistance to promote the construction of low-emission and net-zero school buildings and net-zero retrofitting of existing ones

3.3 Funding Authority for Studies and Projects (FINEP) credit lines are strengthened through targeted technical assistance to promote innovation in and certification of net-zero building materials, designs, technologies and construction systems

3.4 Energy-as-a-Service (EaaS) business models are made available to private enterprises for retrofitting Brazilian schools to be low-emission and net-zero

## 4. Knowledge management and capacity-building

| Component Type | Trust Fund |
|---|---|
| Technical Assistance | GET |
| **GEF Project Financing ($)** | **Co-financing ($)** |
| 1,470,898.00 | 2,590,911.00 |

Outcome:

4. Government and private sector actors commit to greater ambition on net-zero buildings by drawing on a knowledge platform and strengthened capacity

Output:

4.1 An open-source module on net-zero and resilient construction and buildings, including a catalogue of certified innovative low-emission building materials, is made available on the Ministry of Science, Technology and Innovation online platform (SIS+) for use by federal entities, state and local governments, and building designers and constructors

4.2 Building designers and constructors, municipal managers, real estate and potential building owners, occupants, and operators are trained on technical and financial aspects of zero-emission, efficient, and resilient buildings through a gender-responsive capacity-building program executed by national partners

4.3 A gender-responsive strategic communication plan is developed and implemented for outreach, awareness raising and dissemination on zero-emission buildings with key stakeholders

## M&E

| Component Type | Trust Fund |
|---|---|
| Technical Assistance | GET |
| **GEF Project Financing ($)** | **Co-financing ($)** |
| 150,000.00 | 150,000.00 |

Outcome:

The GEF project is effectively monitored and evaluated

Output:

Monitoring and evaluation products are delivered

## Component Balances

| Project Components | GEF Project Financing ($) | Co-financing ($) |
|---|---|---|
| 1. Enabling environment for the net-zero building transition | 1,430,000.00 | 3,500,000.00 |
| 2. Demonstration of the feasibility of net-zero buildings | 3,200,000.00 | 18,242,284.00 |
| 2. Demonstration of the feasibility of net-zero buildings | 600,000.00 | 1,000,000.00 |
| 3. Finance for a sustainable transformation to net-zero buildings | 1,880,000.00 | 38,000,000.00 |
| 4. Knowledge management and capacity-building | 1,470,898.00 | 2,590,911.00 |
| M&E | 150,000.00 | 150,000.00 |
| **Subtotal** | **8,730,898.00** | **63,483,195.00** |
| Project Management Cost | 436,545.00 | 3,174,160.00 |
| **Total Project Cost ($)** | **9,167,443.00** | **66,657,355.00** |

Please provide justification

## PROJECT OUTLINE

### A. PROJECT RATIONALE

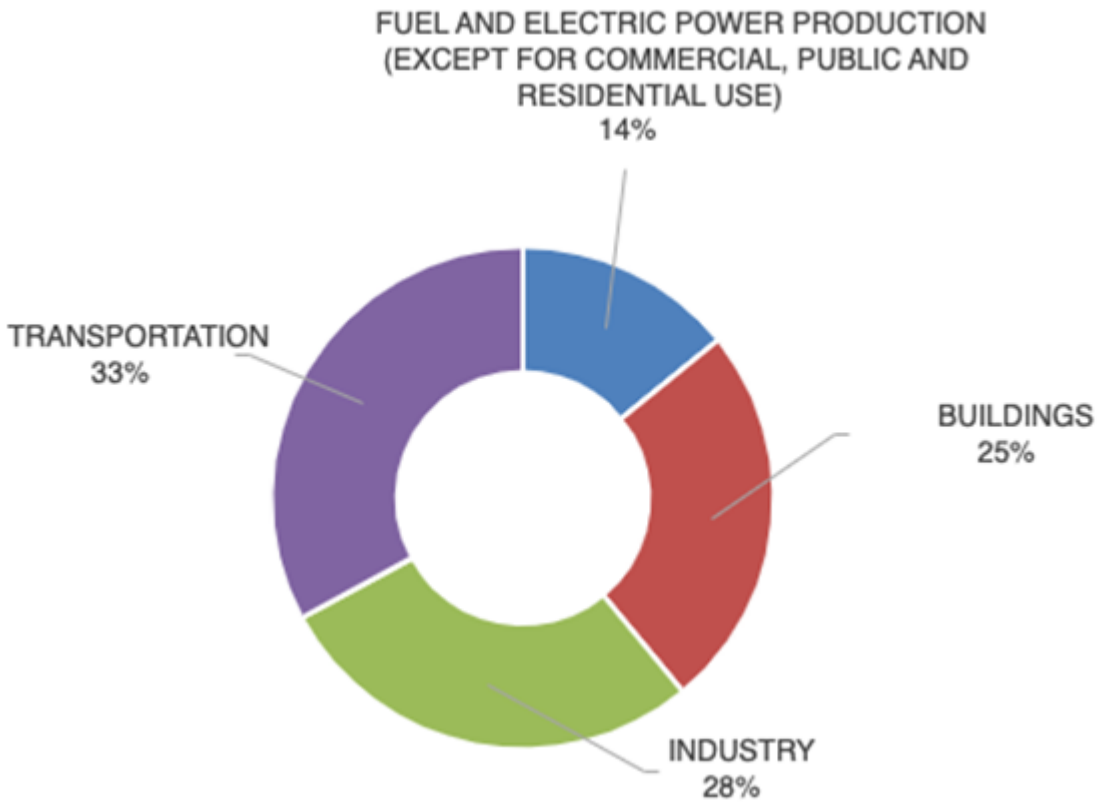
Briefly describe the current situation: the global environmental problems and/or climate vulnerabilities that the project will address, the key elements of the system, and underlying drivers of environmental change in the project context, such as population growth, economic development, climate change, sociocultural and political factors, including conflicts, or technological changes. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages) see guidance here

## Global problem, system elements, drivers and trends

In 2020, the buildings and construction sector was responsible for 36% of global energy consumption and 37% of global CO2 emissions.[1][1] The forecast is for an increase in energy demand due to the increase in built-up areas in the coming years, especially in developing countries, due to the growth of the urban population and an increase in the purchasing power of this population.[2][2] Given this context, this sector has an important role to play in meeting the objective of the Paris Agreement.

In Brazil, the buildings and construction sector emits greenhouse gas emissions which constitute an increasingly important percentage of national emissions. In 2020, this sector in Brazil were responsible for the emission of more than 139 million tons of CO2 equivalent. If we exclude emissions from agriculture, forestry and land use (AFOLU), emissions from buildings and construction represent 25% of total national GHG emissions.[3][3] considering emissions from the energy sector and the waste sector.

Figure 1 - EMISSIONS IN BRAZIL BY ECONOMIC ACTIVITY IN 2020

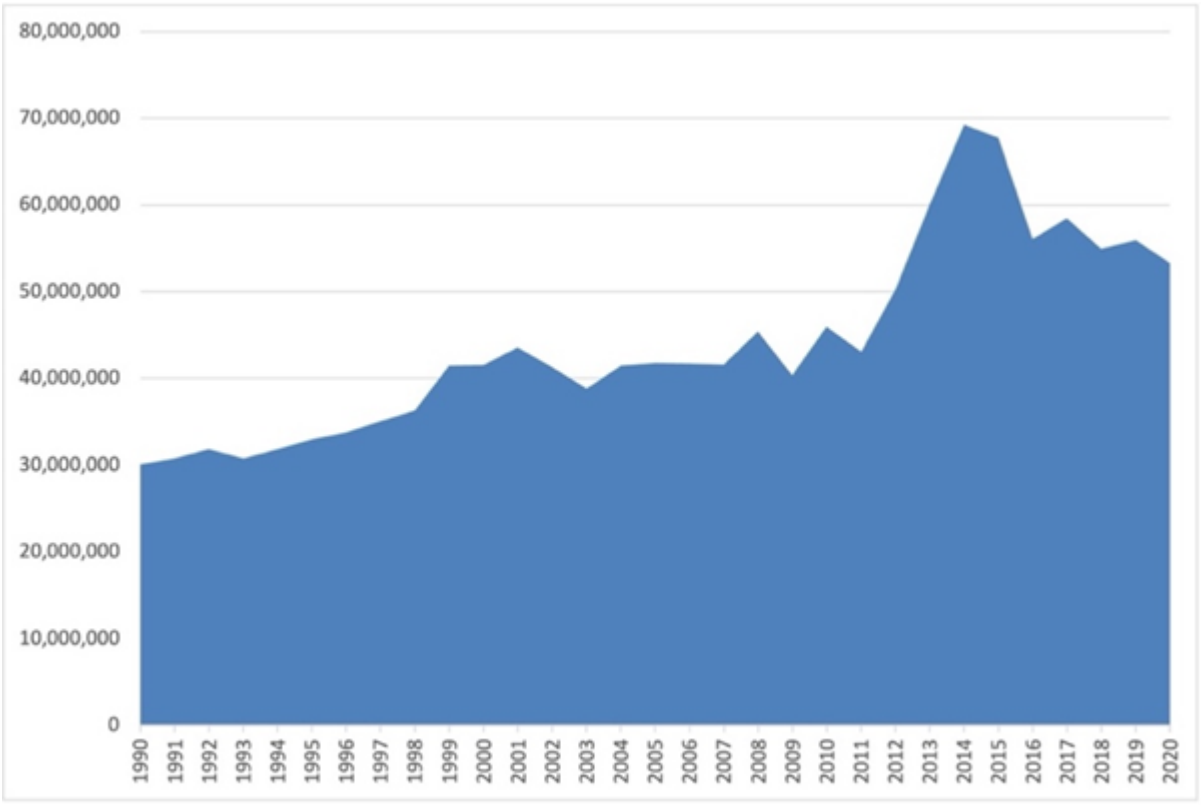



Source: Own elaboration, based on data from the System of Greenhouse Gas Emission Estimations (SEEG,2021) and the National Energy Balance (EPE, 2021).[4][4]

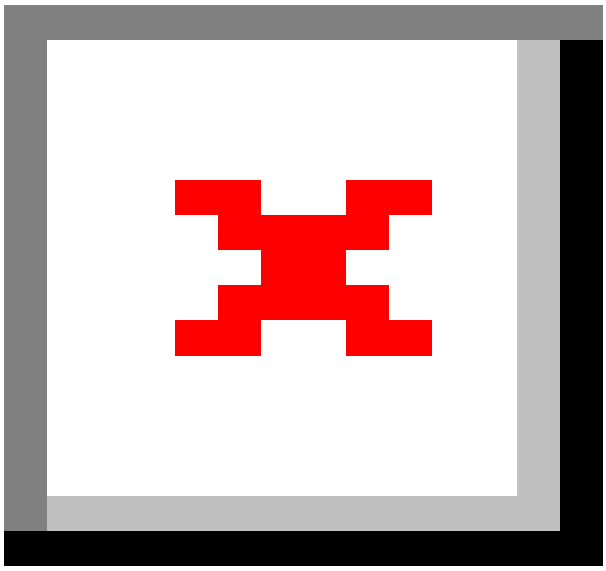
The above emission calculation considers the building operations only, excluding an important part of GHG emissions related to buildings. That is, the above calculation does not include emissions generated in the production and transportation of materials, those generated during building construction, as well as those arising from the demolition process and consequent disposal of waste. There is no data available on the emissions from the entire life-cycle of Brazilian buildings, but it is estimated that embedded emissions may exceed 40% of total emissions during the entire life of the building.[5][5]

In addition to the significant contribution that building emissions play in Brazil's national GHG emission profile, such emissions are also growing rapidly. Between 2010 to 2020, the growth rate of building emissions in the energy sector was more than 15%.

Figure 2 – GHG emissions from the ENERGY sector in buildings in Brazil (1990 to 2020)




Source: Own elaboration, based on data from the System of Greenhouse Gas Emission Estimations (SEEG,2021) and the National Energy Balance (EPE, 2021)



The number of emissions in the construction and buildings sector and the expected growth of these emissions in the future are due to four drivers.

Firstly, the growth of the Brazilian middle class, with increasing purchasing power, and the reduction in the prices of domestic equipment, combined with inefficient construction techniques, results in a progressive increase in GHG emissions. In Brazil, energy consumption in buildings in growing due in part to the greater demand for services with high energy consumption, such as air conditioning systems, refrigerators and televisions.

Secondly, the growth of the country's urban population and efforts to combat the national housing deficit are resulting in growing emissions due to the introduction of new energy users in the building sector. On the one hand, Brazil's population is estimated to grow by around 8% per year until 2050 and become even more urban.[6][6] In addition, Brazil is continuing to address its housing deficit, which in 2019 was estimated at 5,876 million households.[7][7] In relative terms, this represents 8% of the total stock of

permanent and improvised private households in the country. Considering that most buildings have a minimum lifespan of 50 years, construction currently carried out in the country will have an impact on the country's emissions even after 2050, when the national goal is to achieve carbon neutrality.

Third, in addition to socio-economic factors, climate change impacts will also have an impact on energy consumption and GHG emissions. Brazilian studies[8] show an increase in energy demand due to the need to use air conditioning devices for different climate scenarios. Although varying across the country, studies indicate that there will be an increase in energy consumption in all regions of Brazil.

The significance of the increase in CO2 emissions by the three drivers aforementioned will depend on the electric generation matrix. EPE (2018) has conducted an analysis of national electricity demand growth scenarios up to the year 2050 and the results show that demand will double the consumption of 2015. In this context, the fourth driver is the displacement of hydroelectricity by thermal plants to meet the growing demand for electricity in the country.[9] In 2020, approximately 84% of electricity came from renewable sources. According to EPE,[10] in 2021 this number was reduced to 76% due to an increase of 113% in the generation of electricity from the use of petroleum products (from 8,556 GWh in 2020 to 18,243 GWh in 2021) and an 8.5% reduction in hydroelectric generation. GHG emissions from electricity generation in Brazil totalled 77.8 million tons (MT) of CO2 in 2021, around 45% higher than in 2020.

The main source of energy used in Brazilian buildings is electricity: buildings consume 51% of the country's electricity.[11] Thus, the first three drivers result in an increase in demand for electricity from a sector that increasingly has a greater percentage of electricity produced by non-renewable sources. In this context, GHG emissions from the building sector will continue to grow significantly. This situation represents an important challenge for the country in the context of meeting its NDC and decarbonization targets by 2050.

## Baseline – Brazil current and future existing efforts to address this global environmental problem

The Brazilian NDC sets a target of reducing greenhouse gas emissions by 37% by 2025 and by 43% by 2030, both compared to 2005 emissions (2.8 billion tons of carbon dioxide equivalent). To achieve these goals, it is necessary to define objectives at a sectoral level and to establish and implement an action plan. Brazil also notes that its NDC is compatible with an indicative long-term objective of reaching climate neutrality in 2050 (as communicated in October 2021),[12] although it affirms that the final determination of any long-term strategy for the country, in particular the year in which climate neutrality may be achieved, will depend on the proper functioning of the market mechanisms provided for in the Paris Agreement.

Brazil does not yet have a policy or program to actively promote net-zero buildings. However, the promotion of energy efficiency in buildings in Brazil at the federal level is established in the National Policy for the Conservation and Rational Use of Energy and carried out through the Management Committee of Indicators and Levels of Energy Efficiency, with support from the Technical Group for Energy Efficiency in Buildings in the country (GT-Edificações). GT- Edificações is a multi-ministerial working group on building energy efficiency (see below for information on the group's constitution). In addition, *Procel* (National Electric Energy Conservation Program) was established in 1985 and has six areas of activity: equipment; street lighting; public power; industry and commerce; knowledge; and buildings. The purpose of the buildings area is to promote the efficient use of electricity in the civil

construction sector, in residential, commercial and public buildings, through the provision of specialized recommendations, simulators, labelling (*PBE Edifica*) and certification (*Selo Procel Edifica*). These and other government initiatives, especially those related to energy efficiency, are presented below, in chronological order:

1985 – National Electric Energy Program (PROCEL)

1996 – Creation of the National Electric Energy Agency (ANEEL)

2001 – National Policy for Conservation and Rational Use of Energy (PNCURE - Law 10.295/2001)

- The PNCURE determines that the government will establish maximum levels of specific energy consumption, or minimum energy efficiency levels, of energy-consuming machines and appliances manufactured or sold in the country. It makes no mention of the energy efficiency of buildings.
- Law 10295/2001 was regulated by Decree nº4059/2001 and revised by Decree nº9864/2019, in which (i) the Energy Efficiency Indicators and Levels Management Committee (CGIEE) was established; (ii) established that mechanisms to promote energy efficiency in buildings will be developed under the coordination of the Ministry of Mines and Energy (MME); and (iii) instituted the Technical Group for Energy Efficiency in Buildings in the Country (GT Edificações), composed of:
    - Ministry of Mines and Energy (MME);
    - Ministry of Science, Technology and Innovation (MCTI);
    - Management Secretariat of the Special Secretariat for De-bureaucratization, Management and Digital Government of the Ministry of Finance;
    - National Housing Secretariat of the Ministry of Integration and Regional Development;
    - Electric Energy Research Center;
    - Energy Research Company (EPE);
    - National Electric Energy Conservation Program (PROCEL);
    - National Program for the Rationalization of the Use of Oil Derivatives and Natural Gas;
    - Brazilian Chamber of the Construction Industry (CBIC);
    - Council of Architecture and Urbanism of Brazil (CAU/BR);
    - Federal Council of Engineering, Architecture and Agronomy (CREA/BR); and
    - Civil society experts in building and energy matters, linked to a Brazilian university.

2002 - Actions to reduce electricity consumption in Federal Public Administration buildings

- Decree 4,145, of February 25, 2002. Provides for emergency measures to reduce electricity consumption within the scope of the Federal Public Administration.
- Ordinance 113, of March 15, 2002. Provides for the electric energy consumption target of municipalities, public companies and mixed-capital companies linked to the Ministry of Mines and Energy.

2003 – Procel Edifica

- The Procel Edifications seal was created in 2003 through the National Electric Energy Conservation Program (PROCEL), with the objective of reducing energy consumption by 50% in new buildings and 30% in renovated buildings, as part of a government program coordinated by the Ministry of Mines and Energy and executed by Eletrobrás.

2004 – Creation of the Energy Research Company (EPE)

2007 – Beginning of the preparation of the Decennial Energy Expansion Plans (PDE)

- The latest PDE, published in 2021 with a horizon of 2031, indicates the prospects for the expansion of the energy sector for the following 10 years (2022 to 2031), and was prepared by the Energy Research Company (EPE) under the guidelines and support of the Ministry of Mines and Energy. The PDE 2021 presents the potential for energy efficiency in various sectors, highlighting the potential for gains in electrical efficiency in the residential and commercial sectors, but does not provide specific guidelines for energy efficiency in buildings in Brazil.

2009 – Brazilian Building Labelling Program

- The labelling of buildings in Brazil began in 2009, with the publication of methodologies for classifying the level of energy efficiency for commercial, service and public buildings and for residential buildings. It is a mechanism for analysing and evaluating the energy consumption of buildings in the design and construction stages.
- The National Energy Conservation Label is one of the PBE Edifica instruments and assesses the buildings' compliance with the requirements of the Technical Quality Regulation (RTQ-C, for commercial, service and public buildings).
- The three building systems evaluated in the labelling process are the envelope, lighting and air conditioning, each contributing to the final assessment of the building in proportions of 30, 30 and 40%, respectively.
- In 2014, labelling became mandatory for federal public buildings with an area larger than 500m2.

> Originally called the Electricity Conservation Program in Appliances and launched in 1984, the Brazilian Labelling Program is a labelling policy with consumer-oriented information about the EE level of appliances available in the country. The objective is to promote the reduction of electricity consumption. Currently, several actions continue to be carried out within the scope of the program, such as the labelling of household appliances (such as refrigerators, air conditioners, fans, televisions), vehicles and buildings, electric motors, among others.

2009 – National Policy on Climate Change (Law 12.187/2009)

2010 – National Solid Waste Policy - PNRS (Law 12.305/2010)

- The policy establishes shared responsibility, which makes the entire consumption chain responsible for the correct disposal of waste.
- According to the study Panorama of Solid Waste in Brazil 2020, carried out by the Brazilian Association of Public Cleaning and Special Waste Companies (Abrelpe), in 2010, the year of the promulgation of the PNRS, construction waste amounted to just over 33 thousand tons annuals; in 2019, they reached 44,500 tons, up 33% in a decade, while total solid waste grew much less, around 17%.

2011 – National Energy Efficiency Plan - Basic Assumptions and Guidelines - PNEf

- The Ministry of Mines and Energy published, through Ordinance 594, the document National Energy Efficiency Plan – Basic Assumptions and Guidelines. The document presents a diagnosis of energy use in Brazil, from the point of view of efficiency, and proposals for actions to solve the problems identified and increase the scope and effectiveness of the actions currently underway.

- A working group was created to propose strategies, made up of representatives from the following institutions: MME, MCTI, MMA (Ministry of the Environment), EPE, Cepel (Center for Electric Energy Research), Eletrobras, Petrobras, Inmetro and Unifei (Federal University of Itajubá).

2013 – Technical Standard for Building Performance – NBR 15.575

- Establishes mandatory performance requirements for all new constructions, in 7 requirements: (i) water tightness; (ii) thermal performance; (iii) acoustic performance; (iv) lighting performance; (v) health, hygiene and air quality; (vi) functionality and accessibility; (vii) Tactile and anthropodynamic comfort.

- Defined the 8 bioclimatic regions of the country, which are under review.

- In addition to the problem of lack of knowledge of regulation, there are challenges in its inspection. Furthermore, there is still no punishment in case of non-compliance with the rule, although the Consumer Defence Code vetoes the supply of products or services in disagreement with existing technical standards.

2016 – National Plan for Adaptation to Climate Change

- The PNA was developed based on sectoral and thematic strategies. The Infrastructure Strategy encompasses the development of the Transport, Urban Mobility and Energy sectors. With regard to the energy sector, the PNA indicates aspects of the electrical system that must be considered when analysing the impacts of climate change on the electrical system:

    - Impact of the insertion of new technologies, such as electric vehicles and energy efficiency policies.

    - Impact of future consumption patterns on residential and commercial construction (housing and “smart” buildings).

    - Penetration of technologies, such as smart grids and ultra-voltage transmission lines.

    - Greater penetration of generation distributed by different sources, such as photovoltaic generation on building roofs.

    - Self-production of electricity by large consumers, using renewable and fossil sources, as in the case of natural gas cogeneration.

- In addition to these aspects related to energy generation and consumption, the Cities Strategy establishes in its priority guidelines the need to review technical standards and regulation of building and urban parameters, in search of greater resilience and sustainability in new constructions.

There are also some projects and programs in the country implemented by the national government in partnership with international organizations, private sector associations and academia, of which we can highlight:

- Project Energy Efficiency in Sustainable Urban Development, implemented between 2018 and 2021, by the Ministry of Integration and Regional Development, in partnership with the Federal Ministry of Economic Cooperation and Development (BMZ) of Germany, through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) . The project's focus is to promote energy efficiency in social housing produced by federal housing programs, especially the *Minha Casa Minha Vida* program.

- CeCarbon Platform - https://www.cecarbon.com.br/ – coordinated by Sinduscon SP, in partnership with the Ministry of Integration and Regional Development and GIZ. Tool for calculating greenhouse gas (GHG) emissions and energy consumption related to the construction of a building, taking into account the life cycle of the work's inputs, from its exploitation to the moment of its use in the construction phase.

- Project 3E, implemented between 2010 and 2017, by the Ministry of Environment, with resources from the GEF-4, through the UNDP. We can highlight two results of the project:
  - Block B retrofit project of the Ministry of Environment, through an architectural competition.
  - ProjetEEE Platform: tool that guides the construction of sustainable buildings, with bioclimatic information from 413 Brazilian cities. This platform was initially financed by Eletrobrás, through Procel, and had improvements and support in its maintenance in the 3E Project.

- DEO Project – Operational Energy Performance in Buildings
  - Developed by the Brazilian Council for Sustainable Construction (CBCS) with the objective of evaluating and proposing improvements in the energy performance of buildings during their use phase. It is precisely in the use phase that the biggest differences between projected consumption and what is measured appear.
  - A set of online and freely accessible calculation platforms, in which the user is responsible for entering the consumption data, dimensions and location of the enterprise, while the program performs the calculations through benchmarking equations and demonstrates the results in the form of an indicator, pointing out the performance of the building and which category it is in: inefficient, typical or efficient

- A3P - Environmental Agenda in Public Administration: a program of the Ministry of Environment that aims to encourage public institutions in the country to implement sustainability practices. The Program is intended for public institutions in the three spheres (federal, state and municipal) and in the three branches of government (executive, legislative and judicial). It is a voluntary adherence agenda that enables the partner institution to promote the preservation of the environment, while optimizing the use of public resources. The program is structured around six thematic axes: Rational use of natural resources and public goods; Management of generated waste; Quality of life in the work environment; Awareness and training of servers; Sustainable public procurement; Sustainable buildings. Access to this service occurs by signing the Term of Adhesion to A3P, which lasts for 5 years. During the five years of membership, MMA monitors the actions implemented by the partner agency, providing the necessary technical advice to achieve the objectives agreed in the work plan.

- SIDAC Platform – Construction Environmental Performance Information System – allows the calculation of environmental performance indicators from the cradle to the factory gate for construction products, based on verified Brazilian data. Sidac originates from the Strategic Partnerships for the Implementation of the Paris Agreement (SPIPA) program, coordinated by the Ministry of Mines and Energy (MME), financed by the European Union Partnership Instrument together with the Ministry of Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV, in German) and implemented by the German Agency for International Cooperation (GIZ). The MME signed a Technical Cooperation Agreement with the Brazilian Council for Sustainable Construction (CBCS), so that the CBCS could coordinate the development of Sidac, in view of the CBCS' track record in the Life Cycle Assessment applied to construction.

- CITinova I and CITinova II - multilateral projects led by MCTI to promote sustainability in Brazilian cities and metropolitan regions through innovative technologies and integrated urban planning. Financed by the GEF (GEF-6 and GEF-7), UNEP implements the projects. CITinova I is carried out in partnership with the Recife Agency for Innovation and Strategy (ARIES) and Porto Digital, Center for Management and Strategic Studies (CGEE), Sustainable Cities Program (PCS) and Secretariat for the Environment (SEMA / GDF). CITinova II is executed in partnership with UNEP Brazil and the Brazilian Fund for Biodiversity (FUNBIO), and it is part of the Sustainable Cities Impact Program, the global program funded by GEF-7 that advances the integrated approach of urban planning and implementation under its brand name UrbanShift. These projects are relevant to this project in that they highlight successful coordination

mechanisms and vertical alignment between federal, state and local governments in Brazil which can be drawn upon to promote low-emission buildings, a key element of sustainable cities.

## Key stakeholders

Given the multisectoral nature of net-zero buildings, policies, programs, and projects, a multitude of actors are involved in promoting the decarbonization of this sector. Key stakeholders include:

- Federal government: the Ministry of Science, Technology and Innovation, the Ministry of Integration and Regional Development, the Ministry of Mines and Energy and the Ministry of Environment.
- Financiers, such as Caixa Econômica Federal, BNDES, FNDE and FINEP;
- National agencies and public companies: National Electric Energy Agency (Aneel), Energy Research Company (*EPE*), Studies and Projects Financing Agency (FINEP), Eletrobras.
- International funds, partnerships and initiatives: GEF, GIZ, SPIPA.
- NGOs and international organizations: GIZ, ICS, WRI, ICLEI.
- Academia, such as the Federal University of Santa Catarina (UFSC) and the Federal University of Rio de Janeiro (UFRJ).
- Other associations and organizations: Brazilian Council for Sustainable Construction (CBCS), Brazilian Technical Standards Agency, National Industrial Learning Service (Senai), and Federal Council of Engineering and Agronomy (CONFEA), including theirs gender equity commissions.

A more complete list of stakeholders to be involved in the next stages of the project is available in the stakeholder assessment uploaded to the GEF portal as part of this PIF.

### Relevant financial instruments for the housing sector

The following table provides an indicative overview of relevant financial instruments for the housing sector.

| Bank | Name of product | Product description | Financial structuring |
|---|---|---|---|
| BNDES | FINEM Energy Efficiency line | Any corporate client that needs financing for buildings, with a focus on air conditioning, lighting, envelopes and distributed generation; including cogeneration, for new or existing units (retrofit), production processes, with a focus on cogeneration, use of process gases as an energy source and other interventions prioritized by the BNDES; and smart electrical grids | Amount: at least R$ 5 million Fee: long-term national interest rate (TJLP) + 1.5% pa + credit risk (Direct Operation) Fee: TJLP + 1.5% pa + financial intermediation + credit risk (Direct Operation) |
| BNDES | PSI - Innovation and Efficient Machinery and Equipment | Manufacturing investments for the introduction of innovations in the market, provided they are part of a development project in the context of the innovation business plan. Buildings, provided that the investments are directly related to R&D activities and are not carried out in isolation. Current company R&D expenses related to the innovation business plan. technology parks | Term: 6.5% per year for micro small and medium-sized companies (MSME); and 7% p.a. for larger companies. Limit: Minimum BRL 1 million |

| | | | |
|---|---|---|---|
| Caixa | BCD Eco-efficiency PJ | Line of credit for financing investments with eco-efficient attributes for the following functionalities: • Solar water heating system • Control or filtering of gases or particles • Treatment of solid waste • Treatment and liquid effluents • Recycling of waste • Treatment and reuse of wastewater • Reduction of waste of inputs and/or natural resources • Energy efficiency • Control of water pollution • Remediation of contaminated area | Minimum term: 3 months Maximum term: 60 months Grace period: up to 6 months Maximum financing amount: up to 100% of the value of the asset included in the Invoice Minimum gross annual tax revenue: R$ 3.6 million Minimum amount: R$ 100 thousand Rates: TJLP +: • Revenues up to R$60 thousand: 2.15% pa • R$60 to R$360 thousand: 2.05% pa • R$360 thousand to R$3.6 million: 1.95% pa • R$3.6 million to R$15 million: 1.90% pa |
| Santander | Sustainable CDC | Any corporate client who needs financing for Machinery and Equipment that promotes Energy Efficiency, Rational Water Use, Sustainable Construction and Accessibility, Waste Treatment and Corporate Governance | Term: up to 60 months Limit: varies from client to client Fee: varies from client to client Warranty: Real or surety. |
| Develop SP | Green Economy Line | It finances buildings with sustainable civil construction parameters – water reuse, energy efficiency, retrofit of existing buildings. | Fee: 0.53% am Term: up to 120 months Grace period: up to 24 months |
| Northeast Bank | FNE Sol | Any customer who needs financing for all the components of the photovoltaic, wind or biomass micro and mini generation systems, as well as their installation | Term: up to 12 years Grace period: from 6 months to 1 year Rate: interest rate below the market average |
| BNDES | Energy Efficiency | Any corporate client that needs financing for buildings, with a focus on air conditioning, lighting, envelopes and distributed generation; including cogeneration, for new or existing units (retrofit), production processes, with a focus on cogeneration, use of process gases as an energy source and other interventions prioritized by the BNDES; and smart electrical grids | Amount: at least R$ 5 million Rate: TJLP + 1.5% pa + credit risk (direct transaction) Rate: TJLP + 1.5% pa + financial intermediation + credit risk (direct transaction) |
| Caixa | Construcard | Any customer that needs financing for solar water heating systems and micro energy generation system — solar and wind | Term: The current contract terms consider the sum of the purchase and payment phases and are up to 240 months Limit: minimum of R$ 1,000 and the maximum will depend on the term, relationship and payment capacity of the borrower approved in the evaluation of credit risk |
| Caixa | Producard | Any client who needs financing of micro power generation systems - solar and wind | Term: is the sum of the terms of use and amortization. Up to 36 months. Limit: More than one loan can be granted to the same customer, provided that the previous ones are not being used and the sum of the outstanding balances does not exceed the credit limit defined after credit assessment |
| FNDE (National Education Development Fund | PAR | Through PAR (Articulated Action Plans), the FNDE transfers resources to municipalities and state governments to implement their plans, which may include the construction or renovation of schools and other educational infrastructure and equipment. Within this program, the FNDE provides the architectural design of different types of schools to be built by states and municipalities. | In 2021, through PAR, more than USD 150 million were released in direct transfers to 1157 municipalities and 22 states for investments in schools. |

## Key barriers to addressing the global environmental problem

As presented above, the buildings sector is responsible for growing energy consumption and a corresponding increase in greenhouse gas emissions in Brazil. This trend is expected to continue increasing unless actions are taken. Currently, the emissions challenge of the buildings sector is summarized by four main factors:

1. A traditional construction industry produces and uses materials, construction and demolition processes with high consumption of energy and water, large amounts of waste and high greenhouse gas emissions. The existing building stock is high in carbon and energy inefficient;

2. Buildings are designed with low energy efficiency, without consideration of bioclimatic conditions and energy efficient solutions and materials;

3. Buildings and their related appliances are operated inefficiently, leading to increased energy and water consumption and greater waste;

4. The national electricity supply cannot keep up with the growth in building demand and is incorporating more fossil fuel sources. Large hydroelectric plants are negatively impacted by weather events, especially droughts.

Although there do exist some efforts for promoting energy efficiency in Brazilian buildings, these are still incipient, fragmented and are experiencing challenges in being executed. **Incipient** because the initiatives impact a small portion of the total number of buildings built annually in the country. For example, despite the country being ranked fourth in the world on the annual list of Top 10 Countries and Regions for LEED - Leadership in Energy and Environmental Design (a rank that considers the absolute number of square meters certified) in 2022, there were only 108 certified projects. It is an important number, but incipient considering the total number of projects and square meters under construction in the country. Also, existing initiatives consider only part of the life cycle of buildings, with a particular absence of focus on embodied carbon. They furthermore do not incorporate aspects of just transition and gender equity in the construction sector. **Fragmented** in the sense that initiatives are poorly coordinated, there is duplication of efforts, gaps are not filled, and there is discontinuity of initiatives. Furthermore, while some cities are setting sustainable performance requirements, most are voluntary and focus on promoting the use of renewable energy. In addition, there is no reliable system for measuring, reporting, and verifying the interventions adopted. Isolated initiatives without proper coordination are not generating the necessary impact to reach net zero emissions in the construction sector.

After analysing the problem and the projects and initiatives related to the topic in the country, four main barriers were identified that need to be overcome so that Brazil can address the causes and move towards carbon neutrality, reducing energy costs for the building users and global GHG emissions. Those barriers are presented here forth.

### B1. Absence of integrated and coherent public policy and government actions towards net-zero in the building sector

Despite the existence of governmental initiatives related especially to energy efficiency, Brazil has not yet established specific targets or an action plan for decarbonizing the buildings sector through a holistic approach, considering the emissions from the building's entire life-cycle. Despite the lack of a vision and short, medium and long-term goals, there are energy efficiency and sustainable construction initiatives in the country, including research projects, public policy proposals, development of standards and awareness programs (see baseline section above) However, the absence of an integrated public policy and strategic planning integrating the initiatives generates inefficiency and lack of clarity about the real needs and impacts of action in this area. It is essential that the different spheres of action have better coordination between them, in order to advance the agenda for reducing greenhouse gas emissions in the built environment sector in Brazil.

There is also a lack of government actions aimed at regulating and creating incentives for the civil construction industry to invest in more efficient and sustainable projects and constructions. In the Brazilian context, one of the greatest areas of potential for action in the building sector is with municipal governments, responsible for defining and implementing local urban policy in accordance with the Federal Constitution. Municipalities thus have significant authority to encourage low-carbon construction, especially with regards to building code. Despite some advances in some Brazilian municipalities, the vast majority do not have the technical knowledge or institutional capacity to effectively act on energy consumption and emissions from buildings. Many also do not have specific guidelines and solutions suitable for the different bioclimatic regions of the country.

**B2. Lack of evidence in the country of the economic, social and environmental viability of net-zero buildings**

Considering the total number of buildings built annually in the country, few are certified with sustainability labelling. With regards to net-zero buildings, the cases are practically non-existent. Added to this, there are a lack of energy efficiency baselines since due to difficulty in accessing reliable and transparent data on energy and water consumption in buildings. This situation means that there is an absence of evidence nationally on the economic, social and environmental viability of net-zero buildings in different Brazilian bioclimatic regions. Demonstrating the benefits of net-zero buildings for the real estate industry and for potential owners, occupants and operators (who pay the bills), including benefits desaggregated by gender, is critical for promoting the uptake of net-zero buildings. When it comes to retrofit actions, the lack of data and results of feasibility analyses of these types of intervention are even more scarce in the country.

The barrier of lack of evidence of the feasibility of net-zero buildings is also associated with the limited supply of tested and validated technological solutions. Although there are alternatives available, development, deployment and commercialization actions need to be strengthened so that new solutions can enter the market. Government leadership by example is an opportunity to implement new technologies and solutions, monitor and evaluate their impacts, and disseminate their results to the construction and real estate industry, funding agencies, as well as building owners and users.

**B3. Insufficient financial incentives and catalysing financial instruments for net-zero buildings**

Despite the considerable potential for the development of markets for sustainable new construction, retrofits, and photovoltaic solar panels for small and medium-sized companies and individuals in Brazil, the volume of business is small, as is the volume of financing carried out by the banking sector. Surveys carried out in 2015 found that financing for renewable energy sources and energy efficiency, components of net-zero building projects, represented less than 2.3% of total financing to corporate clients. Furthermore, while CAIXA and BNDES do have financing lines related to promoting energy efficiency in buildings (see previous section), these financial entities do not have financing lines promoting the reduction of embodied carbon in buildings, i.e. promotion of concrete with recycled fly-ash, and greater use of sustainable timber and green steel. With Brazil having a relatively clean energy matrix, addressing embodied carbon emissions is the key challenge for decarbonizing the building and construction sector. Furthermore, CAIXA and BNDES currently do not directly incentivize or prioritize the financing of buildings which focus on reducing energy usage through passive and climate friendly design. This is especially pertinent for social housing, in which reductions in energy usage through passive design can lead to significant financial savings for government (at multiple levels and which often subsidize or cover such costs) and low-income households. In this context, it is necessary to analyse the business models currently in practice as well as the financial products available to support the enhancing and creation of new products and financial and guarantee mechanisms, so that the projects gain greater viability for all key stakeholders. It is also necessary to establish new channels between the demand and supply of credit for the adoption of technologies aimed at net-zero. i.e. while the absence of dedicated credit lines for promoting net-zero buildings is key, there is also a need to create greater awareness amongst possible ‘clients’ through focused and tailored communication which highlights the social, economic and environmental benefits of net-zero buildings, even if such may have slightly higher upfront costs.

According to a survey by the Getúlio Vargas Foundation, the development of new business models with effective financing structures will contribute to the expansion of the role of the national financial system in the agenda of net-zero buildings. However, the foundation notes that for this the following aspects need to be addressed: (i) reduce the

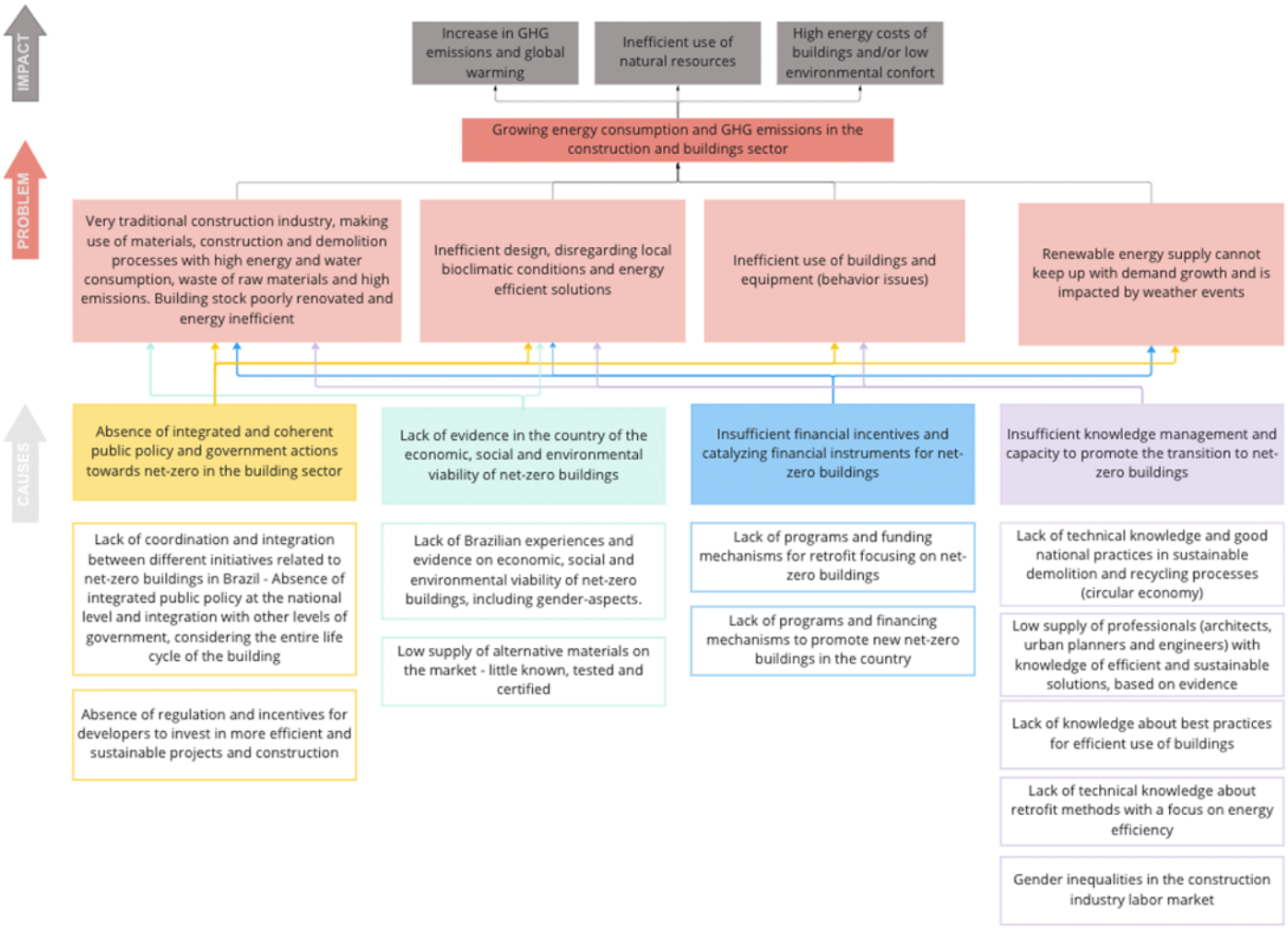
asymmetry of information existing in the markets; (ii) institutionalize the standardization of projects; (iii) increase the safety level of projects; (iv) develop processes and mechanisms for the accreditation of developing and implementing companies; (v) reduce performance and credit risks; and (vi) ensuring reliability for the end customer.

[1] https://eaesp.fgv.br/producao-intelectual/edificacoes-sustentaveis-e-eficiencia-energetica
[2] https://eaesp.fgv.br/producao-intelectual/edificacoes-sustentaveis-e-eficiencia-energetica

**B4. Insufficient knowledge management and capacity to promote the transition to net-zero buildings**

One of the biggest barriers identified is related to the lack of technical knowledge on net-zero buildings of actors in all stages of the value chain of the built environment, from the elaboration of the projects, to the professionals involved in the construction stage, to users, to the companies responsible for building demolition. There is a need to promote greater exchanges between academia, training institutions and the private sector, so that scientific and technological advances can be incorporated more quickly in the construction industry. Greater exchanges are also necessary between academia, training institutions and local governments, so that principles and guidelines for net-zero buildings are incorporated into public policies. There is a lack of technical knowledge and good national practices especially on circular economy in the construction industry and on retrofit methods and alternatives with a focus on energy efficiency and low emissions. Finally, it is urgent to train professionals involved in the design stages of net-zero buildings (architects, urban planners and engineers), and in the construction, maintenance and renovation stages, through the support of organizations that promote learning within the construction industry.

# Problem tree



## Socio-economic benefits

In addition to the importance of decarbonizing the Brazilian buildings and construction sector to achieve the goals of the Paris Agreement, such efforts also present significant socio-economic opportunities for the country, especially in the context of the post-pandemic economic crisis. Recent studies have identified that increasing the energy efficiency of social housing in Brazil has the potential to generate economic, social and environmental benefits for the country. For example, simple measures (such as the colour of paint and building orientation) with little or no additional cost could reduce energy usage by up to 18.9%.[15][13] Further measures and technologies could reduce energy usage, and consequently family electricity bills, at a much larger scale. Considering that most low-income households are headed by women, savings on the electricity bill could have a significant gender benefit.

Improving energy performance of public buildings is also a great opportunity to reduce operational expenses. Campinas and Porto Alegre, for example, spend more than USD $800,000 annually on energy services to maintain their public schools.[16][14] [17][15] Energy services for schools represents a significant proportion of Brazilian municipal government expenditure.[18][16] In the context of schools, a recent study on low-carbon buildings in Brazil identified that the school typology has the greatest potential to achieve net-zero in Brazil.[19][17] Thus, promoting energy efficiency in buildings brings direct economic benefits to families, companies and governments.

A modelling commissioned by the Coalition for Urban Transitions[20][18] shows that urban actions can reduce GHGs, generate cost savings and create jobs. The implementation of a package of low carbon measures in the construction, transport and waste management sectors could allow Brazil to reduce its urban GHG emissions from these sectors by 75 Mt CO2e (35%) by 2030, and 238 Mt CO2e (88 %) by 2050 compared to the baseline scenario. A significant increase in investments would be required – US$1.7 trillion by 2050 – but these investments would pay for themselves with energy and material savings alone, generating cumulative returns with a net present value of US$369.7 billion by 2050. They could also promote the creation of more than 4.5 million new jobs by 2030. In a sector dominated by men, the creation of new jobs, combined with technological innovations, is an opportunity for training and inclusion of female work force in the sector, promoting greater gender equity in the construction industry and promoting a just transition to a low-carbon economy.

Construction GDP grew 2.1% in relation to the last quarter of last year, being one of the sectors with the highest increase. Brazil's GDP grew by 1.2% in the period. It is clear that the civil construction GDP has a strong relationship with Brazil's economic performance and indicates that the sector will be essential for the recovery and sustained growth of the Brazilian economy. So that economic growth is not linked to the increase in GHG emissions, it is essential to promote actions towards neutrality of emissions in the building sector.

## Project objective

This project aims to promote the decarbonization of the Brazilian building and construction sector through the adoption of innovative technologies and public policies. With support from the GEF and UNEP, Brazil seeks to address key barriers to the adoption of solutions for zero-emission, efficient, and resilient buildings, considering the entire building life cycle. The project aims to mitigate greenhouse gas emissions from the buildings sector through

enhancement of policy and institutional frameworks, technology demonstrations and deployment, innovations in the construction sector and the financial system, and capacity building and dissemination of good practices. Although Brazil has made steps towards building energy efficiency, the project focuses on the additional support necessary to increase the rate of adoption and support the decarbonization of the building sector throughout its entire life cycle, beyond the existing baseline. In this sense, the project will seek to build upon the fragmented baseline initiatives, which primarily focus on building efficiency, to support Brazil in embracing a more holistic decarbonization of the sector in a coordinated way. Promoting technological advances and decarbonization considering the entire life cycle of buildings is also an opportunity to (i) reduce household, business and government spending on energy costs, (ii) optimize the use of natural resources and (ii) promote training the workforce involved in the construction industry, contributing to the promotion of gender equality and a just transition to a low carbon economy in Brazil.

The project will also seek to promote for zero-emission buildings which are more resilient to the impacts of climate change. In a national context of increasingly frequent extreme events, with people living in low-lying areas near the coast, risks of landslides, floodings, and heat island effects, among others, the project will promote, in addition to reducing greenhouse gas emissions, increased adaptability of buildings to climate change, promoting greater comfort and safety for users.

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[14] https://eaesp.fgv.br/producao-intelectual/edificacoes-sustentaveis-e-eficiencia-energetica

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## B. PROJECT DESCRIPTION

### Project description

This section asks for a theory of change as part of a joined-up description of the project as a whole. The project description is expected to cover the key elements of good project design in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the PIF guidance document. (Approximately 3-5 pages) see guidance here

Introduction

To achieve the project's objective described in the previous section, four project components will address each one of the key barriers aforementioned. **Component 1** will create an enabling environment for achieving the transition to net-zero buildings. Through **Component 2**, key national, state and local decision-makers, including governments, public and private financiers, and civil society, will obtain evidence and data as to the social, economic and environmental feasibility of net-zero school buildings in each of Brazil's eight bioclimatic regions. In **Component 3**, the project will support leading national financiers, CAIXA, BNDES and FINEP, to incentive investment and innovation to decarbonize the building and construction section, ensuring a sustainable and long-term term transition to net-zero buildings. Finally, **Component 4** will ensure effective knowledge management of national and international experiences, good practices and lessons learned from efforts to transition to net-zero buildings, as well as build the capacity, in collaborations with key partners, of construction sector actors, local governments and building operators.

The following table summarizes the current context and the transformation that the project aims to achieve to support Brazil to implement an ambitious net-zero buildings program that meets the requirements of NDC and the Paris Agreement. The table also links the desired transformation to the corresponding outputs that will contribute to this change. The outputs are presented in the following sub-sections.

In addressing the key barriers described previously, the project aims to achieve four outcomes:

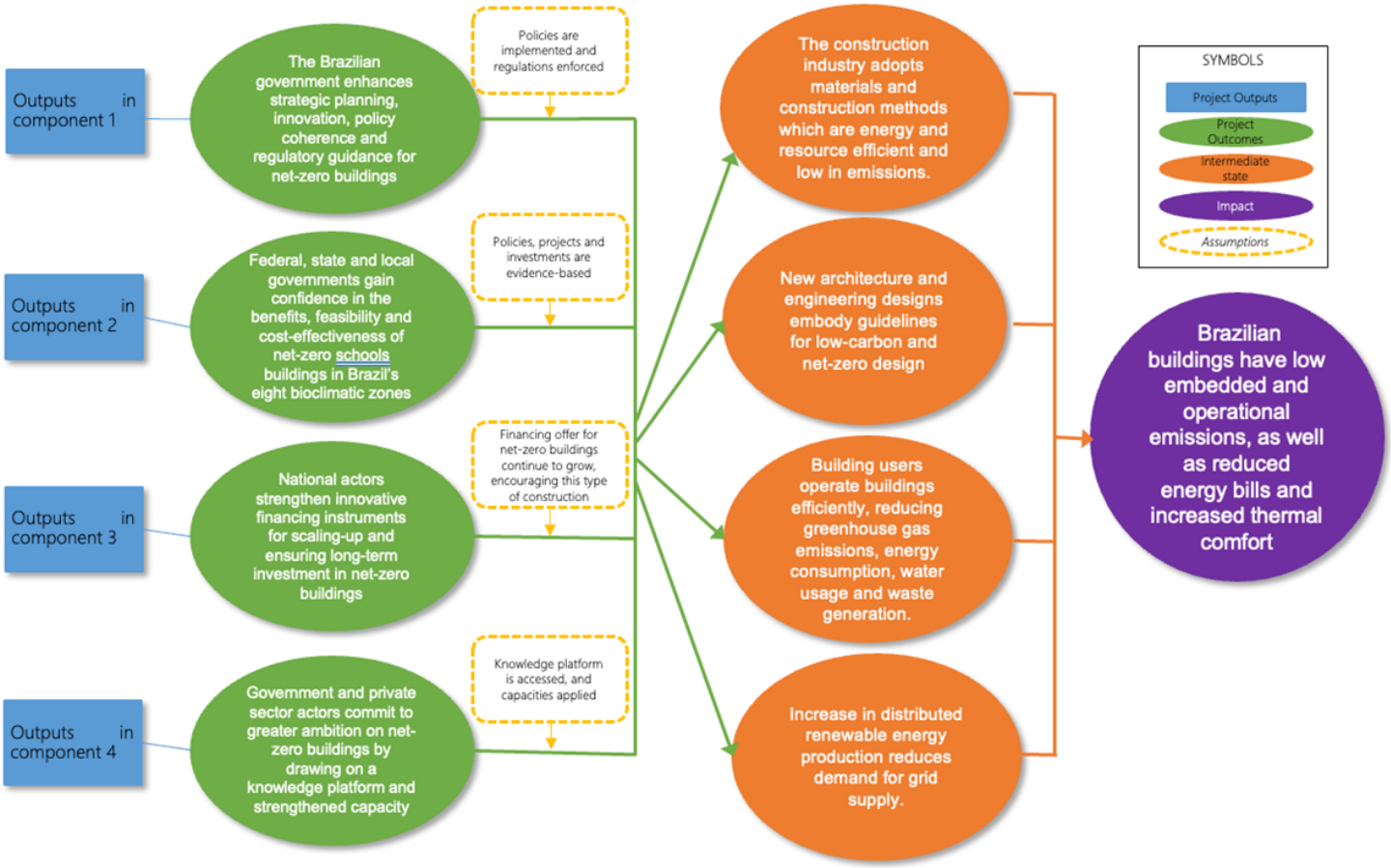
1. The Brazilian government enhances strategic planning, innovation, policy coherence and regulatory guidance for net-zero buildings
2. Federal, state and local governments gain confidence in the benefits, feasibility and cost-effectiveness of net-zero schools buildings in Brazil's eight bioclimatic zones
3. National actors strengthen innovative financing instruments for scaling-up and ensuring long-term investment in net-zero buildings
4. The government and private sector actors commit to greater ambition on net-zero buildings by drawing on a knowledge platform and strengthened capacity

Table: Aspired project transformation

| Current and future baseline context | Aspired change through project |
|---|---|
| A traditional construction industry produces and uses materials, construction and demolition processes with high consumption of energy and water, large amounts of waste and high greenhouse gas emissions. The existing building stock is high in carbon and energy inefficient | The construction industry adopts materials and construction methods which are energy and resource efficient and low in emissions. Change driven by:<br><br>(i) Public policies, regulation and incentives at the federal, state and local government level (Component 1)<br><br>(ii) Information, data and evidence about the economic, social and environmental benefits of net-zero buildings (Components 2 and 4)<br><br>(iii) Financial incentives for net-zero construction and operation and disincentives for high-carbon solutions (Component 3)<br><br>(iv) Construction industry has capacity to adopt innovative low-carbon solutions and materials (Components 1 and 4)<br><br>(v) Enhanced innovation of materials and methods (component 1) |
| Buildings are designed with low energy efficiency, without consideration of bioclimatic conditions and energy efficient solutions and materials; | New architecture and engineering designs embody guidelines for low-carbon and net-zero design. Change driven by :<br><br>(i) Larger consumer demand (developers and final users), based on user greater understanding of cost-benefits, regulations and financial incentives (Component 1)<br><br>(ii) Enhanced incentives funds for low - cost projects carbon ( Component 3)<br><br>(iii) Increased capacity of architects and engineers for such designs (Components 2 and 4)<br><br>(iv) Enhanced innovation of such designs (component 1) |
| Buildings and their related appliances are operated inefficiently, leading to increased energy and water consumption and greater waste; | Building users operate buildings efficiently, reducing greenhouse gas emissions, energy consumption, water usage and waste generation. Change driven by:<br><br>(i) Behavioural change stimulated through education and capacity building (Components 1 and 4)<br><br>(ii) Clear guidance on good practices for building operations (Component 2)<br><br>(iii) Greater understanding as to the economic, social and environmental benefits (Components 1, 2 and 4)<br><br>(iv) Stimulation of installation of more high resource efficient solutions (Components 1, 2, 3) |

| | |
|---|---|
| | (v) Boosted monitoring and benchmarking system in national and local policies (Components 1 and 2) |
| The national electricity supply cannot keep up with the growth in building demand and is incorporating more fossil fuel sources. Large hydroelectric plants are negatively impacted by weather events, especially droughts. | Increase in distributed renewable energy production reduces demand for grid supply. Change drive by:<br><br>(i) Public policies, regulation and incentives at the federal, state and local government level (Component 1)<br><br>(ii) Financial incentives for installation of distributed renewable energy on buildings (Component 3) |

## Theory of Change



# Component 1: Enabling environment for the net-zero building transition

This component aims to support Brazil in establishing an enabling environment for facilitating the transformation to a decarbonized building and construction sector.

Outcome 1: Federal, state and local governments adopt roadmaps and regulations, increase policy coherence, and strengthen innovation ecosystems for accelerating the scale-up of net-zero buildings.

Barrier addressed: B1. An absence of integrated and coherent public policies and government actions towards net-zero in the building sector

| Output | Title |
|---|---|
| 1.1 | A national roadmap for net-zero buildings in 2050, which takes into account, inter alia, embodied carbon, energy efficiency, behavioural change and distributed renewable energy, and incorporating just transition and gender equality principles, is submitted for adoption by the Federal government |
| 1.2 | A multisectoral and inter-federal governance structure is created for promoting policy coherence on net-zero buildings at the federal level, including with regards to the national roadmap |
| 1.3 | Entrepreneurs and other innovation stakeholders have access to a national network of innovation on net-zero building materials, designs, technologies and construction systems |
| 1.4 | The National Fund for Educational Development (FNDE), Caixa Econômica Federal (CAIXA) and Brazilian Development Bank (BNDES), local governments and the construction sector have access to a guide of cost-effective technical recommendations and design guidelines for developing and operating low-emission and net-zero buildings in Brazil's eight bioclimatic zones |
| 1.5 | Policies and regulations packages for low-emission and net-zero buildings (including technical standards and procurement specifications) are made available by federal, state and local governments for adoption by a minimum of three municipalities |
| 1.6 | Ambition, regulatory certainty and action on net-zero buildings is promoted with local governments, including through the creation of an alliance of municipalities for net-zero schools |

Through output 1.1, Brazil will establish a gender-sensitive national roadmap, aligned with its NDC and 2050 economy-wide net-zero target, for achieving net-zero climate resilient buildings by 2050. The document will be developed through a multi-ministerial, multi-stakeholder and multi-scale consultative process to provide policy coherence for stakeholders to achieve net-zero buildings. The roadmap will include concrete actions and timelines for achieving the project aim, including prioritization of actions and an investment plan. The roadmap will also support the development of national and subnational strategies and policies. Elements of the strategy will include:

- Goal and vision for 2050
- Promotion of smart buildings
- Technological action plan and investments to decarbonize the construction sector
- Promotion of circular economy principles and sustainable waste management
- Promotion of behaviour change

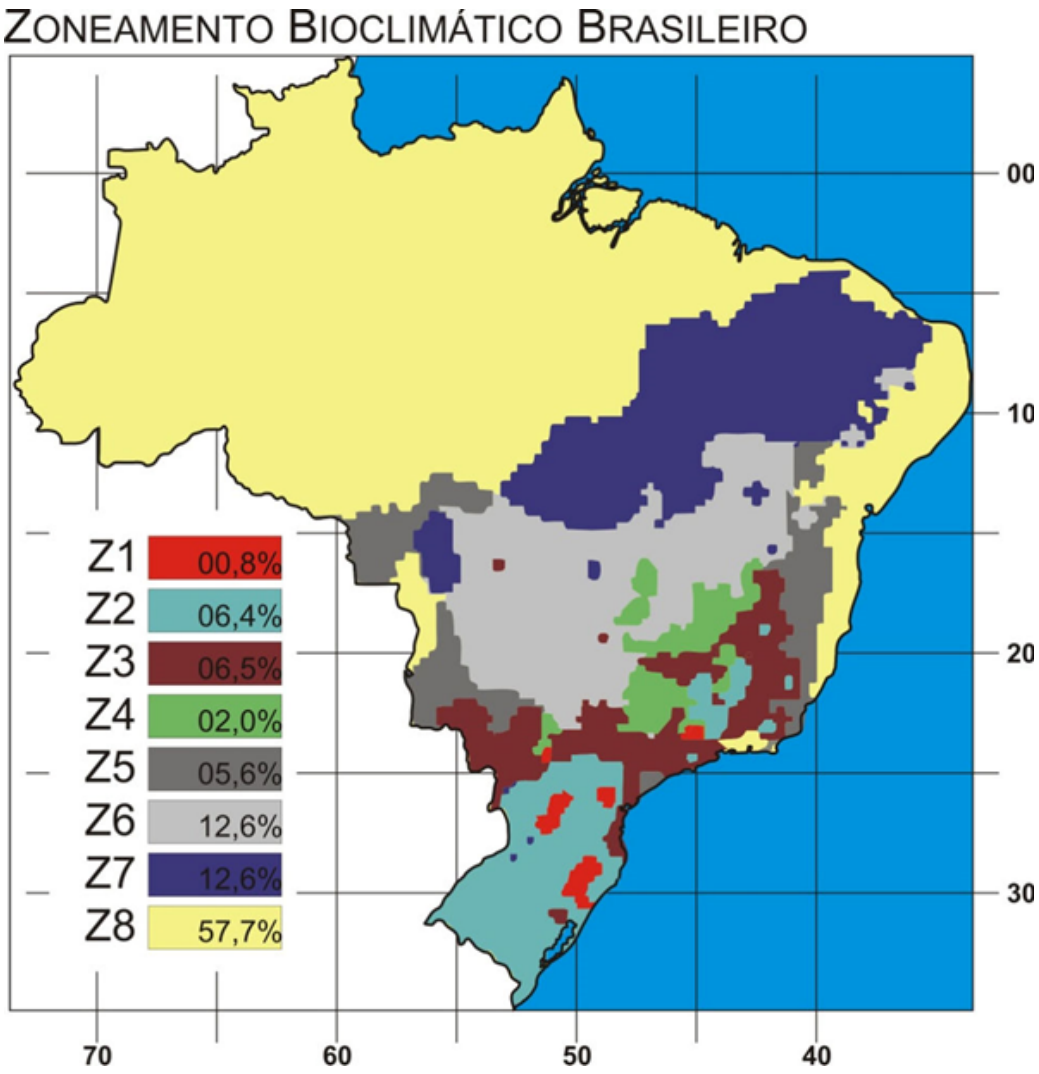
In output 1.2, a multisectoral and inter-federal governance structure will be developed to execute the national strategy and monitor its implementation and also promote policy coherence on the transition to net-zero buildings. The governance structure will take into account the different perspectives of government entities, financiers (including Caixa Economica Federal, BNDES and

private sector entities), private sector technology providers, civil society and academia. The development of this group will build upon existing efforts in this space, in particular the multi-ministerial technical working group GT-edificações.

Output 1.3 will complement the strategic policy work by catalysing innovation in building materials, as well as passive building designs, construction systems and energy efficient building operation technologies, through a national innovative network support by the Ministry of Science, Technology and Innovation. This may include building upon and strengthening its existing initiatives in this area, including the COPPE-UFRJ Intelligent Construction Laboratory (LCI) and the Living Lab C, which promotes innovation and sustainability in civil construction.

The Brazilian Association of Technical Standards (ABNT) has divided Brazilian building technical standards into eight bioclimatic zones, leading to buildings with different energy usage profiles and adaptation and resilience requirements (see figure below). The studies that supported the definition of the 8 regions were elaborated by LabEEE, a laboratory of the Federal University of Santa Catarina, and are under review. The zones are revised periodically to ensure that the Brazilian building technical standards may draw on the latest global civil engineering practices and theories and also adjust to any potential climatic changes. The results are expected to be published by early 2024 and will be considered within this GEF project. To cater for these differences, output 1.4 will support Brazil in elaborating a manual of cost-effective net-zero climate resilient building designs and recommended technologies, including nature-based solutions, for use by the National Fund for Educational Development, financiers such as CAIXA and BNDES, local, state and federal governments, financiers and the private sector in costing, designing, constructing, operating and retrofitting net-zero buildings in these bioclimatic zones. With regards to the manual's focus at the federal level, this will include a focus on social buildings as well as schools (Brazil has approximately 178,400 primary and secondary schools).[1] A dedicated section on schools will be revised and updated once results from the project's pilots (component 2) are obtained.

[1] https://agenciabrasil.ebc.com.br/educacao/noticia/2022-01/censo-escolar-mais-de-650-mil-criancas-sairam-da-escola-em-tres-anos#:~:text=O%20pa%C3%ADs%20tem%2C%20ao%20todo,anos%20finais%20do%20ensino%20fundamental.




Building on the roadmap (output 1.1) and the manual (output 1.4), output 1.5 will develop policies and regulation packages that local, state and federal governments can implement for promoting the uptake of net-zero and resilient buildings. Due to their distinct legal responsibilities under the Brazilian constitution, each of the Federal, State and Municipal governments have a key role to play in regulating building construction. These packages will be developed under the guidance of the multisectoral and inter-federal governance structure (output 1.2) and with participation of representatives of municipal entities and state governments (e.g. National Mayors Front, the National Confederation of Municipalities, and the Forum of Governors) and federal government ministries.

The packages will include technical norms and standards, building codes, lead-by-example programs, municipal zoning and permitting, and procurement specifications, among others.

The packages will be tested and promoted for adoption by a minimum of three states and/or municipalities, to be defined in the design phase (PPG). These early adopters will demonstrate to other municipalities and states with similar bioclimatic conditions the social, economic and environmental viability of such packages. These states/municipalities will be selected based on a multicriteria process taking into consideration, inter alia, political interest at the state and local level and co-financing (potential for post-project sustainability and scale-up).

Furthermore, the packages will be delivered to other states and municipalities through outputs 1.6 (alliance of municipalities for net-zero schools), 4.1 (knowledge platform), 4.2 (training) and 4.3 (communication). During the full project development phase it will also be explored as to how the strengthened CAIXA and BNDES financing lines can incentivize accelerated adoption at the state and local level of such packages.

At the federal level, the policy and regulation packages will be related to the design and retrofitting of Brazilian schools and social housing, buildings which are stipulated at the federal level, in addition to the roadmap developed under output 1.1.

Finally, through output 1.6, greater ambition, regulatory coherence and action will be promoted amongst local governments on promoting resilience and decarbonizing schools in their jurisdiction, and hence reducing their energy bills related to these, including through a political alliance of municipalities for net-zero schools. Existing building networks in Brazil may also be used to promote such efforts, such as the Brazilian Chamber of the Construction Industry (CBIC) and the Brazilian Council for Sustainable Construction (CBSC).

## Component 2: Demonstration of the feasibility of net-zero buildings

Through this component, Brazilian stakeholders will develop awareness of and confidence in innovative technologies and solutions, adapted to the Brazilian context, for designing, constructing and operating net-zero climate resilient buildings in different Brazilian regions.

Outcome 2: Federal, state and local governments take steps to replicate the pilot net-zero school buildings.

Barrier addressed: B2. A lack of evidence in the country of the economic, social and environmental viability of net-zero buildings.

| Output | Title |
|---|---|
| 2.1 | The feasibility of net-zero school buildings is demonstrated to key stakeholders in Brazil's eight bioclimatic zones |
| 2.2 | Municipal managers, school directors and other school building stakeholders are trained to operate the demonstration net-zero school buildings |
| 2.3 | A monitoring and evaluation system is established for measuring the impact (emission reduction, energy and cost savings, cost-benefit, environmental comfort) of the demonstration net-zero school buildings vis-à-vis baseline school buildings and data made available through SIS+ |
| 2.4 | A gender-responsive multi-stakeholder engagement and ambition-raising strategy engages local stakeholders and communities in the demonstration and promotion of the net-zero school buildings |

A recent study on low-carbon buildings in Brazil identified that the school typology has the greatest potential to achieve net-zero in Brazil.[2][19] In this context, in component 2 a minimum of one school in each of Brazil's eight bioclimatic regions will be retrofitted to demonstrate the viability of net-zero buildings in Brazil. The retrofitting and promotion of net-zero buildings in the schools will include as related to the building's construction (building materials and insulation), energy demand (distributed renewable energy, energy efficient devices for operation, intelligent systems, operation modes, behavioural change training and education, maintenance) and the building's output (e.g. circular economy principles to reduce waste and energy leakage). The local governments and the school directors will play central roles in the implementation of the pilots. In addition, key roles in the design and retrofitting will be played by the National Fund for Educational Development (FNDE), as the primary federal entity financing school construction, the Brazilian Council of Architecture and Urbanism (CAU/BR), the Federal Council of Engineering and Agronomy (CONFEA), private sector small, medium and large enterprises, as they providers of technology solutions, and academia, as the providers of research and development for such solutions. For each school, the pilot project will be developed through a

gender-sensitive co-creation process involving all actors aforementioned. In output 2.1, proposals for the retrofitting of each school will be developed through a co-creation process and the retrofitting work will be executed. Environmental and social assessments for each of the 8 pilot projects will be carried out before the works start.

Through output 2.2, municipal managers, school directors and other key community stakeholders will be trained on the operation and maintenance of the buildings, to ensure that the buildings achieve full impact in demonstrating the viability of net-zero schools. Such training will be key in ensuring the sustainability of buildings post-project.

To ensure that the viability of net-zero schools is demonstrated by real data, output 2.3 will consist of a monitoring system that monitors energy consumption in each of the schools and compares this data with that of other schools in that bioclimatic zone that have not been retrofitted. Thus in each of the bioclimatic zones, a minimum of two schools (one retrofitted and one not) will participate in pilot. Each school will be equipped with energy and emission monitoring devices to facilitate a comparison between the retrofitted school and the baseline. The two schools will be chosen based on similarity of characteristics, including as related to building size (metres squared), school population size (number of students, teachers and other), school usage (hours per day, days per week), and climate conditions (average temperature, average sunlight, wind, rain, etc.). Data collection will be performed by school managers and local government officials following training and with the support of academia and the private sector. The data will be open-source and connected to the dedicated SIS+ module (see output 4.1) in real time, and quarterly and yearly performance reports will be prepared and shared with key policy-makers at the local, state and federal levels. The results will be used to inform the building and retrofitting of schools and social housing through the manuals and regulations developed under outputs 1.4 and 1.5.

Finally, output 2.4 will focus on promoting the effective participation in the retrofitting of the net-zero schools buildings in each bioclimatic region by project beneficiaries, building occupants and operators, building constructors, material producers, technology developers, etc. This output will consist of gender-responsive social engagement activities, communication activities, for ensuring effective ownership of the transition by project beneficiaries.

## Component 3: Finance for a sustainable transformation to net-zero buildings

Complementary to efforts to strengthen the enabling environment (component 1) and generate evidence and data (component 2), component 3 will focus on working with the finance sector to catalyse finance for ensuring a sustainable transition to net-zero buildings post-project.

Outcome 3: National actors strengthen innovative financing instruments for scaling-up and ensuring long-term investment in low-emission and net-zero buildings.

Barrier addressed: B3. Insufficient financial incentives and catalysing financial instruments for net-zero buildings.

| Output | Title |
|---|---|
| 3.1 | CAIXA and BNDES credit lines are strengthened through targeted technical assistance to incentivize the scale-up of low-emission and net-zero social housing, private buildings, schools and other public buildings |
| 3.2 | FNDE funding lines are strengthened through targeted technical assistance to promote the construction of low-emission and net-zero school buildings and net-zero retrofitting of existing ones |

| | |
|---|---|
| 3.3 | Funding Authority for Studies and Projects (FINEP) credit lines are strengthened through targeted technical assistance to promote innovation in and certification of net-zero building materials, designs, technologies and construction systems |
| 3.4 | Energy-as-a-Service (EaaS) business models are made available to private enterprises for retrofitting Brazilian schools to be low-emission or net-zero |

Caixa Economica Federal (CAIXA), is a state-owned enterprise, the fourth largest bank in Latin America,[3][20] and the primary financier of social and private housing in Brazil. The Brazilian Development Bank (BNDES) is the largest development bank in Latin America[4][21] and the principal financier of public and public-private sustainable development in Brazil. An organization of the Ministry of Science, Technology and Innovation, the Funding Authority for Studies and Projects (FINEP) plays a central role in financing innovation, technology development and deployment, and entrepreneurship.

In output 3.1, the project will support CAIXA and BNDES to enhance the effectiveness of financial instruments (see baseline) for ensuring a sustainable and long-term decarbonation of the building and construction sector (i.e. strengthening the 'supply side'). Through this, the private sector (through CAIXA) and Brazilian municipal and state governments (BNDES) will have increased access to finance for investing in low-emission and net-zero building initiatives. For CAIXA, this will focus on enhancing its existing credit lines for social housing, low-income mortgages and middle-class mortgages[5][22] to provide incentives and monitoring and evaluation structures for promoting greater investment in low-emission and net-zero housing. This will include working with CAIXA to de-risk such investments through supporting the financial institution to develop a deeper understanding of the nature of such materials, technologies and soft solutions. For BNDES, similar technical assistance will be provided to support it to enhance BNDES FINEM credit lines available to the private sector and local and state governments on energy efficiency and integrated municipal development, so that such lines can more effectively promote low-emission and net-zero building development.

Output 3.2 will directly focus on supporting the scaling up of the component 2 pilots through technical assistance to the National Fund for Education Development (FNDE). Through this output, FNDE will be strengthen existing funding lines to make funding available for developers and constructors to build low-emission and net-zero schools across Brazil.

> In addition to addressing supply side barriers through outputs 3.1 and 3.2, the project will also seek to address barriers related to the demand side. In particular, the project will seek to address the weak demand for such financing lines through component 2, which will raise awareness as to the social, economic and environmental viability of low-emission buildings, and more directly through component 4. In particular, outputs 4.2 and 4.3 will focus on building the capacity of 'clients' of such financing lines as well as create awareness as to the opportunities and viability of such financing lines. See component 4 for more information.

In output 3.3, focus will shift to promoting innovation, by supporting FINEP in enhancing access to finance by micro-, small-, and medium-sized enterprises (MSMEs) (i.e. primarily private finance) for the development and commercialization of innovative solutions for net-zero housing. The project will support FINEP in analysing the effectiveness of existing public financing calls, such as Technology 4.0, Innovative Women, and Investment in Innovative Start-ups, and identify opportunities to strengthen such and develop new calls to support commercialization of innovative materials, construction techniques and smart buildings for achieving net-zero buildings.[6][23] Financing for the ongoing development and commercialization of such solutions will play a key role in ensuring a sustainable decarbonization of the building and construction sector post-project.

Finally, output 3.4 will focus on private sector enterprises that can catalyse the decarbonization of Brazilian schools and other educational facilities through the development of tailored Energy-as-a-Service (EaaS) business models. As such entities will be involved in the pilot designs and construction (see component 2), this output will build upon experiences in component 2 to develop economically viable business plans and models for transforming Brazil's more than 170,000 schools.

## Component 4: Knowledge management and capacity-building

This component aims to facilitate effective knowledge management with regards to experiences, good practices and lessons learned from national and international experiences from transitions to net-zero buildings. Furthermore, the component will also build capacity of key actors and facilitate the development of sustainable capacity-building instruments for promoting a long-term capacitation of stakeholders.

Outcome 4: Government and private sector actors commit to greater ambition on net-zero buildings by drawing on a knowledge platform and strengthened capacity.

Barrier address: B4. Insufficient knowledge management and capacity to promote the transition to net-zero buildings.

| Output | Title |
|---|---|
| 4.1 | An open-source module on net-zero and resilient construction and buildings, including a catalogue of certified innovative low-emission building materials, is made available on the Ministry of Science, Technology and Innovation online platform (SIS+) for use by federal entities, state and local governments, and building designers and constructors |
| 4.2 | Building designers and constructors, municipal managers, real estate and potential building owners, occupants, and operators are trained on technical and financial aspects of net-zero buildings through a gender-responsive capacity-building program executed by national partners |
| 4.3 | A gender-responsive strategic communication plan is developed and implemented for outreach, awareness raising and dissemination on zero-emission buildings |

Knowledge management is a core element of this GEF project and critical to achieving the transition to net-zero buildings. Through output 4.1, the project will create a new knowledge module of an existing platform of the Brazilian Ministry of Science, Technology and Innovation, SIS+,[7][24] to facilitate the management of experiences, good practices and lessons learned garnered nationally and internationally in the promotion of net-zero buildings. In this context, the module will house all information products developed by the project. It will also contain a database of solutions for such buildings, including with regards to materials, construction techniques, architectural designs, and smart building operations. Such solutions will be compiled from national sources, including those developed by entrepreneurs financed through FINEP funding (see output 3.3), and international sources, including through the UNEP Global Alliance for Buildings and Construction. It will also build upon the ProjetEEE platform, which provides guidance on bioclimatic strategies, construction components and appliances for building energy efficiency. Where possible, this module will be linked to work undertaken by existing networks promoting sustainable buildings and construction, such as the Brazilian Chamber of the Construction Industry (CBIC) and the Brazilian Council for Sustainable Construction (CBSC) (during the PPG phase it will be explored how such entities can promote scale-up and adoption, including through the use of this platform). Output 4.1 will also focus on reducing embedded building emissions by providing a list of certified low-emission and cost competitive building materials that architects, engineers and constructors can draw upon in building design and construction. This will build upon the ProjetEEE platform, which provides guidance on bioclimatic strategies, construction components and appliances for building energy efficiency. It will also explore how to strengthen labelling for net-zero buildings, building upon existing labelling efforts.

Complementing the SIS+ module, output 4.2 will create and execute capacity-building programs for different key stakeholders most in need of capacity development in partnership with leading federal entities. These programs will be institutionalized within the partner's institutional structure to ensure a sustainable and long-term approach to capacity-building and retaining of capacity is achieved. For architects and engineers, a training program will be developed in partnership with the Brazilian Council of Architecture and Urbanism (CAU/BR), the Federal Council of Engineering and Agronomy (CONFEA) and the Federal University of Santa Catarina (UFSC). For town-planners and other municipal managers, a program will be developed by UFSC under the guidance of the Ministry of Integration and Regional Development. For construction companies, training will be provided by the National Service for Industrial Training (SENAI) together with the Federal University of Rio de Janeiro (COPPE-UFRJ) and the Living Lab C. Training will also be given to real estate industry and for potential building owners, occupants, and operators, as well as with financiers, such as CAIXA and BNDES, to stimulate demand for financing instruments promoting low-emission buildings.

A strategic communication plan (output 4.3) will be elaborated and implemented throughout the project execution in order to promote outreach, awareness raising, and dissemination of experiences, good practices and lessons learnt in promoting net-zero buildings in Brazil with key stakeholders. For instance, one key focus of the communication plan will be in stimulating demand for the use of CAIXA and BNDES financial instruments for accelerating investment in low-emission buildings. The plan will indicate the strategies, tools, schedule, and means of communication, considering suitability for different audiences. It will also include a monitoring and evaluation strategy for communication activities.
For the project's knowledge management (output 4.1), capacity-building (output 4.2) and communication strategy (output 4.3), a gender-responsive approach will be adopted, following principles such as:

- Taking into account the different needs of women, men and transgender people in the development of project information and engagement schedules;
- Drawing upon the participation of female and male practitioners in the development and review of project products;
- Using gender-responsive language and gender-balanced images;
- Disaggregating data by gender where possible.

## Component 5: Project monitoring and evaluation

In this component, project monitoring and evaluation will be undertaken in accordance with GEF and UNEP policies.

| Output | Title |
|---|---|
| 5.1 | Monitoring and evaluation products are delivered |

## Global environment benefits

The project is projected to achieve greenhouse gas emission reductions during the project lifetime, as global environmental benefits which would not have accrued without project interventions, as follows, in accordance with *Guidelines on the Implementation of the GEF-8 Results Measurement Framework* (GEF/C.62/Inf.12/Rev.01), page 17:[8][25]

- Lifetime direct emission reductions, supervised implementation period of four years. GHG emission reductions obtained through the retrofitting of a minimum of 8 Brazilian schools and their subsequent operation, as per component 2;

- Lifetime direct emission reductions, post supervised implementation period of 20 years:

    - Regulatory interventions: development and execution of national strategy (outputs 1.1 and 1.2), and the development and adoption of regulatory packages by local, state and federal governments (output 1.5).

    - Financial facilities: creation and enhancement of CAIXA, BNDES, FNDE and FINEP credit instruments (outputs 3.1, 3.2 and 3.3) and the development and execution of EaaS business models (output 3.4).

- Lifetime indirect emission reductions, post supervised implementation period of 20 years:

    - Capacity building under outputs 2.3 and 4.2;

    - Innovation under output 1.3 (and output 3.3, but not included here to avoid double-counting).

The quantity of GHG emission reductions expected to be achieved is indicated below in the core indicators section.

## Innovativeness

The EDinova project aims to promote the decarbonization of the Brazilian building and construction sector through the adoption of innovative technologies and public policies. Considering the Brazilian context, the following innovative aspects of this project are noteworthy:

- Development and adoption of innovative public policies which consider:
    - The complete life cycle of a building, from obtaining the raw material to the disposal of waste at the end of the building's life.
    - Promotion of gender equality and just transition in the decarbonization process of the construction sector.
    - A long-term vision aimed at a net-zero building and construction sector.
- Innovative multi-stakeholder co-creation processes, engaging distinct levels of government, private sector (builders, designers, etc.), academia (universities) and civil society in the co-development, implementation, monitoring and evaluation of projects and solutions for net-zero buildings, including nature-based solutions. In addition to the impact of the solutions themselves, this participatory process allows for the building of awareness in the school community, influencing students, parents and teachers.
- Innovative financial instruments and business models that allow for a greater supply of financing for net-zero buildings, while also stimulating demand.
- Promotion of innovative building designs and materials tailored to the specific climatic, economic, social and technological conditions of different Brazilian regions.

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[1] https://agenciabrasil.ebc.com.br/educacao/noticia/2022-01/censo-escolar-mais-de-650-mil-criancas-sairam-da-escola-em-tres-anos#:~:text=O%20pa%C3%ADs%20tem%2C%20ao%20todo,anos%20finais%20do%20ensino%20fundamental.

[2] Mitsid, 2017. Edifícios de Baixo Carbono no Brasil. Aspectos e Subsídios para Programas Nacionais. Instituto Clima e Sociedade, São Paulo.

[3] https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/latam-s-50-largest-banks-by-assets-2022-69927370.

[4] https://www.swfinstitute.org/fund-rankings/development-bank.

[5] https://www.caixa.gov.br/voce/habitacao/Paginas/default.aspx.

[6] Work with BNDES and FINEP in outputs 3.1 and 3.2 will be complementary to efforts under GEF project 10465 “Promoting integrated metropolitan planning and innovative urban technology investments in Brazil”, which will partner with these institutions in enhancing financing for sustainable urban development. Synergies will be explored in the project preparation grant phase to ensure complementarity and the avoidance of duplication.

[7] Developed in the GEF project 10465.

[8] https://thegef.org/sites/default/files/documents/2022-06/EN_GEF_C.62.Inf_.12.Rev_.01_GEF-8%20Results%20Measurement%20Framework%20Guidelines%20%28003%29.pdf

## Coordination and Cooperation with Ongoing Initiatives and Project.

Does the GEF Agency expect to play an execution role on this project?

If so, please describe that role here. Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing

UNEP, will be the implementing agency. The Ministry of Science, Technology and Innovation (MCTI) will be the project's executing agency and governmental project lead. As an integral member of the federal Technical Group for Energy Efficiency in Buildings in the Country (GT-edificações) and the ministry mandated to promote innovation and the collection and verification of data to facilitate evidence-based policy making, MCTI will play the leading role in facilitating cooperation with ongoing initiatives and projects (described in the baseline). In particular, through the GT-edificações, MCTI will ensure that this GEF project complements and builds synergies with other ongoing initiatives related to decarbonization of buildings. In the PPG phase, through the GT-edificações MCTI will explore with other group members the possibility of component 2 pilot locations in Brazil's eight bioclimatic zones that can build upon other initiatives in schools in those zones. Within MCTI, the project will be housed within its Department of Innovation Programs (DEPIN), responsible for, inter alia, the management of public policy for innovation in energy, advanced materials and industry 4.0. As such, the project will draw upon significant co-financing of technical staffing and in-house expertise related to this GEF project. At the international level, this project will coordinate with the Global Alliance for Buildings and Construction. Launched at COP-21 in Paris, the GlobalABC is a voluntary partnership of national and local governments, inter-governmental organisations, businesses, associations, networks and think thanks committed to a common vision: A zero-emission, efficient and resilient buildings and construction sector. UNEP, as the alliance's secretary and this GEF project's proposed implementing agency, will ensure that this national project draws upon experiences, good practices and lessons learned during the project preparation grant phase and project execution.

This project is part of UNEP's Decarbonization Programme Coordination Project, which is a logical link between the higher-level structuring of the mitigation parts of UNEP's 2022-2025 Medium-Term Strategy and Programme of Work and UNEP's individual projects (such as this one). In particular, will directly support UNEP in implementing its Programme of Work outcomes 1.4, 1.6, 1.7, 1.8 and indicators i, ii and v.

## Core Indicators

### Indicator 6 Greenhouse Gas Emissions Mitigated

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|---|---|---|---|---|
| **Expected metric tons of $CO_2e$ (direct)** | 1918 | 0 | 0 | 0 |
| **Expected metric tons of $CO_2e$ (indirect)** | 980000 | 0 | 0 | 0 |

### Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|---|---|---|---|---|
| **Expected metric tons of $CO_2e$ (direct)** | | | | |
| **Expected metric tons of $CO_2e$ (indirect)** | | | | |
| **Anticipated start year of accounting** | | | | |
| **Duration of accounting** | | | | |

### Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|---|---|---|---|---|
| **Expected metric tons of $CO_2e$ (direct)** | 1,918 | | | |
| **Expected metric tons of $CO_2e$ (indirect)** | 980,000 | | | |
| **Anticipated start year of accounting** | 2028 | | | |
| **Duration of accounting** | 20 | | | |

**Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)**

| Total Target Benefit | Energy (MJ) (At PIF) | Energy (MJ) (At CEO Endorsement) | Energy (MJ) (Achieved at MTR) | Energy (MJ) (Achieved at TE) |
|---|---|---|---|---|
| **Target Energy Saved (MJ)** | | | | |

**Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)**

| Technology | Capacity (MW) (Expected at PIF) | Capacity (MW) (Expected at CEO Endorsement) | Capacity (MW) (Achieved at MTR) | Capacity (MW) (Achieved at TE) |
|---|---|---|---|---|

**Indicator 11 People benefiting from GEF-financed investments**

| | Number (Expected at PIF) | Number (Expected at CEO Endorsement) | Number (Achieved at MTR) | Number (Achieved at TE) |
|---|---|---|---|---|
| **Female** | 750 | | | |
| **Male** | 730 | | | |
| **Total** | **1480** | **0** | 0 | **0** |

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

GHG emission reductions

Emission reductions are estimated as per follows:

• Lifetime direct emission reductions from the project pilots. Based on trends (see the section on project rationale), it is assumed that in a baseline scenario Brazil's electricity grid will become more fossil fuel intensive over time. However, to be conservative it is assumed that the fossil fuel intensity will not change from that of 2022. GHG emission reductions are then calculated for net-zero retrofitting of a minimum of 8 schools based on their estimated GHG emissions for 2022 and summed over a lifetime of 20 years.

• Lifetime direct emission reductions from regulatory and financial facilities, specifically the execution of the national roadmap (outputs 1.1 and 1.2), the adoption of regulatory packages by local, state and federal governments (output 1.5), the creation and enhancement of CAIXA, BNDES, FNDE and FINEP financial instruments (outputs 3.1, 3.2 and 3.3) and the execution of EaaS business models (output 3.4). A business-as-usual emissions baseline was created based on trends described in the project rationale section related to increases in emissions from the building and construction sector, projected population growth rate, projected building growth rate (including as related to addressing the housing deficit), increased usage due to climate change effects and decreased costs for energy efficient and renewable energy technologies. Emission reductions were then calculated based the difference between this baseline and a trajectory in which the building and construction sector is net-zero by 2050, in accordance with the roadmap to be developed under output 1.1, and consistent with the Brazilian government's indicative long-term objective of reaching climate neutrality in 2050 (as communicated in October 2021). Emission reductions were calculated for a lifetime of 20 years, for energy-related operational carbon and embedded carbon related to the use of cement.

• Lifetime indirect emission reductions from capacity building (2.2 and 4.2) and innovation (output 1.3). It is assumed that lifetime indirect emission reductions will be obtained through the contributions of project capacity-building and innovation to achieving a net-zero building and construction sector in comparison to the business-as-usual emission baseline for this sector (as described in the previous bullet point. Emission reductions were calculated for a lifetime of 20 years, for energy-related operational carbon and embedded carbon related to the use of cement. Considering other initiatives underway to support the GEF project in achieving its goal for the building and construction sector, as described in the baseline, an overall causality factor of 0.15% is assumed.

Project beneficiaries

Project beneficiaries were calculated to be students, teachers and building administrators of the minimum 8 schools to be net-zero retrofitted, one in each of Brazil's 8 bioclimatic regions. Brazil has approximately 26.5 million students in primary and secondary schools and 178,400 schools, which leads to an average of 150 students per school. Assuming that each school has 5 teachers and 5 administrators, it is assumed that there are 160 beneficiaries for each school, leading to a total of 1280 beneficiaries. This was then divided between male and female beneficiaries based on the country's gender balance as provided by the World Bank. Finally, it assumed that a further 100 men and 100 women will be trained through the project's capacity building activities in output 4.2.

## Risks to Project Preparation and Implementation

Summarize risks that might affect the project preparation and implementation phases and what are the mitigation strategies the project preparation process will undertake to address these (e.g. what alternatives may be considered during project preparation-such as in terms of consultations, role and choice of counterparts, delivery mechanisms, locations in country, flexible design elements, etc.). Identify any of the risks listed below that would call in question the viability of the project during its implementation. Please describe any possible mitigation measures needed. (The risks associated with project design and Theory of Change should be described in the "Project description" section above). The risk rating should reflect the overall risk to project outcomes considering the country setting and ambition of the project. The rating scale is: High, Substantial, Moderate, Low.

| Risk Categories | Rating | Comments |
|---|---|---|
| Climate | Low | Risk: Extreme climate events, particularly extreme wind and rain events, delays execution of the project pilots. PPG mitigation strategy: Develop project workplan so that pilot construction is undertaken in typically low extreme weather seasons of the year (i.e. the dry season for certain areas of the country). Incorporate buffers in the workplan to account for possible delays and budget buffers to account for minor damage to work materials. Project execution mitigation strategy: Adjust workplan as needed to avoid construction during heavy weather events. If needed, postpone |

| | | |
|---|---|---|
| | | construction or change pilot locations if extreme weather events impede progress. |
| Environment and Social | Moderate | Risk: Social priorities to address the national housing deficit through energy inefficient high carbon low-cost housing affects project progress to achieve its objective. PPG mitigation strategy: Undertake deep and broad stakeholder consultations to understand challenges to achieving these twin objectives (addressing housing deficit and decarbonize building sector) and co-design with such stakeholders project deliverables to ensure buy-in and ownership of project activities. Project execution mitigation strategy: Develop project steering committee and multistakeholder consultation group that meet regularly to ensure that the twin objectives can be complementary and not in conflict. Adjust project deliverables as required based on such consultations and the evolving social landscape. |
| Political and Governance | Low | Risk: Municipal elections in 2024 result in changing local political priorities and less political support for project pilots. PPG mitigation strategy: Undertake deep consultations with the local government as well as the state government (which will change only in 2026) and federal entities (such as FNDE) to ensure ownership at political levels which will be unaffected by changes in 2024. Develop the workplan to ensure buffers for a possible change in local government in 2024. Project execution mitigation strategy: Develop pilot steering committees for each of Brazil's bioclimatic zones, with representation, inter alia, |

| | | |
|---|---|---|
| | | of Federal, state and local entities, ensuring ownership and continuity over election periods. |
| Macro-economic | Moderate | Risk: A financial crisis triggers action to address the national housing deficit through energy inefficient high carbon low-cost housing which affects project progress to achieve its objective. PPG mitigation strategy: Co-design the project activities with the federal government to safeguard its political commitment to reducing emissions in the building sector as an effort to achieve its NDC and decarbonization target. Also co-design the project activities with key financiers, CAIXA, FINEP, FNDE and FINEP. Structure the workplan so that activities focusing on reducing costs of net-zero buildings are undertaken in the project's first two years. Project execution mitigation strategy: Hold monthly meetings to track project progress vis-à-vis macroeconomic challenges and adjust workplan as needed to ensure cost-effective incentives are in-place early in the project execution phase. |
| Strategies and Policies | Low | Risk: The federal government is hesitant in adopting the net-zero building roadmap, leading to policy uncertainty and a lack of project progress and impact. PPG mitigation strategy: Undertake deep and broad consultations with all key ministries involved to understand their concerns and challenges related to adopting a roadmap in this area. Co-design with them a process for roadmap adoption that will take into account their concerns (such as developing supporting studies and feasibility analyses for ministry consideration to facilitate adoption). Project execution |

| | | |
|---|---|---|
| | | mitigation strategy: Hold quarterly meetings of the project steering committee involving representatives of multiple ministries to ensure continued project ownership and addressing of concerns. |
| Technical design of project or program | | No risk perceived. Extended external consultations have already been undertaken with MCTI, CAIXA, FINEP and the Federal Universities of Santa Catarina and Rio de Janeiro with regards to the project's technical soundness. Furthermore, UNEP has also undertaken significant internal consultations on the project, including with its team which acts as the secretary to the Global ABC alliance. |
| Institutional capacity for implementation and sustainability | | No risk perceived. MCTI has demonstrated high institutional capacity for managing the execution of GEF projects. Furthermore, addressing the housing deficit in Brazil, including through buildings that can reduce energy costs, has been and continues to be a key priority of all Brazilian federal governments. |
| Fiduciary: Financial Management and Procurement | Low | Risk: The fund management agency, supporting MCTI in project execution, is inadequate in financial management, leading to delayed procurement and poor financial reporting. PPG mitigation strategy: Undertake a detailed capacity assessment of potential fund management agencies, selecting the agency that has proven experience in handling international projects of similar size. Project execution mitigation strategy: Provide capacity building to the fund management agency at the beginning of the project and on a yearly basis to build its capacity on financial reporting |

| | | |
|---|---|---|
| | | and procurement in accordance with GEF and UNEP policies. |
| Stakeholder Engagement | Low | Risk: Insufficient stakeholder engagement leads to a lack of buy-in, reducing project effectiveness. PPG mitigation strategy: Undertake deep and broad stakeholder consultations to ensure a co-design of project deliverables for achieving ownership of project activities. Project execution mitigation strategy: Develop a project steering committee and a multistakeholder consultation group that meet regularly to ensure ongoing ownership of project activities. In addition, develop pilot steering committees for each of Brazil's bioclimatic zones. |
| Other | | NA |
| Financial Risks for NGI projects | | NA |
| Overall Risk Rating | Low | |

## C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Describe how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how. (max. 500 words, approximately 1 page)

GEF-8 alignment

This project is aligned with the GEF-8 programming directions climate change focal area strategy, Pilar I: *promote innovation, technology development and transfer, and enabling policies for mitigation options with systemic impacts*; Objective 1.1: *Accelerate the efficient use of energy and materials*. In particular, the project is aligned with paragraphs 474, 475, 477 and 479 of Objective 1.1.[1][26]

Country alignment

This project is also aligned with country priorities related to the United Nations Framework Convention on Climate Change (UNFCCC). In September 2016,[2][27] Brazil deposited the instrument of ratification of the Paris Agreement in which the country pledged to adopt measures to reduce GHG emissions through its nationally determined contribution (NDC), which was updated on 8 December 2020.[3][28] All policies, measures and actions to implement Brazil's NDC derive from the National Policy on Climate Change (Law No. 12,187/2009), the Forest Code (Law No. 12,651/2012), the National System of Conservation Units Law (Law No. 9,985/2000) in addition to related regulation, programs and planning instruments.

Brazil's updated NDC in 2020 confirms its commitment originally presented in its intended nationally determined contribution to reduce national greenhouse gas emissions in 2025 by 37% compared with those of 2005. Additionally, Brazil commits to reduce its emissions in 2030 by 43% compared with 2005. Brazil also notes that its NDC is compatible with an indicative long-term objective of reaching climate neutrality in 2050 (as communicated in October 2021),[4][29] although it affirms that the final determination of any long-term strategy for the country, in particular the year in which climate neutrality may be achieved, will depend on the proper functioning of the market mechanisms provided for in the Paris Agreement. The NDC presents economy-wide targets, consistent with the sectors present in the National Inventory of Greenhouse Gas Emissions for 2025 and 2030, always compared with 2005 levels. It is stated that the targets therein communicated will be translated into policies and measures to be detailed and implemented by the Brazilian Federal Government. Brazil has not submitted a long-term strategy to the UNFCCC. No country policies that contradict with the intended outcomes of the project have been identified. The project will work to enhance policy coherence, particularly through output 1.1 (development of a 2050 strategy for net-zero buildings) and output 1.2 (multisectoral governance structure).

The GEF project is also aligned with the five pillars of the United Nations Framework Agreement for Sustainable Development (UNSDPF) with Brazil: People, Planet, Prosperity, Peace and Partnerships (five Ps).[5][30] Its objectives include generating a positive impact to guarantee diversity and an inclusive society, adequate resource management, quality of life and multiple partnerships. UNEP-BR will facilitate coordination with the UN Country Team and Resident Coordinator, ensuring they are informed of the project's progress and that it aligns with the Brazilian UNDAF.

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[1] https://www.thegef.org/sites/default/files/documents/2022-04/GEF_R.08_29_Rev.01_GEF8_Programming_Directions.pdf

[2] MRE, 2016.

[3] Available at: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Brazil%20First/Brazil%20First%20NDC%20(Updated%20submission).pdf

[4] Official communication to the UNFCCC available at: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Brazil%20First/2021%20-%20Carta%20MRE.pdf

[5] https://brasil.un.org/pt-br/node/52529.

## D. POLICY REQUIREMENTS

### Gender Equality and Women's Empowerment:

We confirm that gender dimensions relevant to the project have been addressed as per GEF Policy and are clearly articulated in the Project Description (Section B).

Yes

### Stakeholder Engagement

We confirm that key stakeholders were consulted during PIF development as required per GEF policy, their relevant roles to project outcomes and plan to develop a Stakeholder Engagement Plan before CEO endorsement has been clearly articulated in the Project Description (Section B).

Yes

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**Were the following stakeholders consulted during project identification phase:**

Indigenous Peoples and Local Communities:

Civil Society Organizations: Yes

Private Sector: Yes

**Provide a brief summary and list of names and dates of consultations**

This document has been prepared through extensive consultation with representatives of the Brazilian Federal Ministry of Science, Technology, and Innovation (MCTI). The project team also held consultations with the private sector, academia, and financial institutions, according to the list below:

| Institutions | Description | Names of contact | Consultations |
|---|---|---|---|
| Federal University of Rio de Janeiro - Coppe | Graduate and research institute in engineering, with extensive experience in energy, transport and climate change projects. | Prof. Romildo Toledo<br><br>Prof. Rejane Rocha | 8/24/2022<br><br>(and on-going since then) |
| Federal University of Santa Catarina - LabEEE | The Laboratory of Energy Efficiency in Buildings is linked to the Center for Research in Construction of the Civil Engineering Department of the Federal University of Santa Catarina. It works to reduce specific energy consumption in new and existing buildings, through the implementation of new lighting, air conditioning and thermal insulation technologies, without, however, reducing comfort levels. | Prof. Roberto Lamberts | 10/18/2022 (and on-going since then) |
| Brazilian Chamber of Construction Industry (CBIC) | CBIC institutionally represents the construction sector and promotes the integration of the production chain at the national level. It has more than 90 associated entities, including builders, developers, suppliers, among others. | Mariana Silveira Nascimento<br><br>Mariana Martins | 09/23/2022 |
| Caixa Federal Econômica | Financial institution in the form of a public company with its own assets and administrative autonomy. It is one of the main financers of urban projects in the country, including social housing. | Mariana Carvalho | 10/19/2022<br><br>(and on-going since then) |
| Funding Authority for Studies and Projects (FINEP) | The FINEP is an important financer of studies and projects focused on innovation. Besides providing direct financial support, it launches calls for project proposals. Brazilian public company promoting science, technology and innovation in companies, universities, technological institutes, and other public or private institutions. | Mauricio Alves Syrio | 08/26/2022 |

A broader list of stakeholders and general guidelines for a stakeholder engagement plan to be developed in the project preparation phase, including information on grievance redress mechanism, are available in Attachment 3.

(Please upload to the portal documents tab any stakeholder engagement plan or assessments that have been done during the PIF development phase.)

### Private Sector

Will there be private sector engagement in the project?

Yes

And if so, has its role been described and justified in the section B project description?

Yes

### Environmental and Social Safeguard (ESS) Risks

We confirm that we have provided indicative information regarding Environmental and Social risks associated with the proposed project or program and any measures to address such risks and impacts (this information should be presented in Annex D).

Yes

Overall Project/Program Risk Classification

| PIF | CEO Endorsement/Approval | MTR | TE |
|---|---|---|---|
| Medium/Moderate | | | |
| Low | | | |

## E. OTHER REQUIREMENTS

### Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described in the Project Description (Section B)

Yes

## ANNEX A: FINANCING TABLES

### GEF Financing Table

**Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds**

| GEF Agency | Trust Fund | Country/ Regional/ Global | Focal Area | Programming of Funds | Grant / Non-Grant | GEF Project Grant($) | Agency Fee($) | Total GEF Financing ($) |
|---|---|---|---|---|---|---|---|---|
| UNEP | GET | Brazil | Climate Change | CC STAR Allocation: CCM-1-1 | Grant | 9,167,443.00 | 870,907.00 | 10,038,350.00 |
| **Total GEF Resources ($)** | | | | | | **9,167,443.00** | **870,907.00** | **10,038,350.00** |

## Project Preparation Grant (PPG)

Is Project Preparation Grant requested?

true

PPG Amount ($)

70000

PPG Agency Fee ($)

6650

| GEF Agency | Trust Fund | Country/ Regional/ Global | Focal Area | Programming of Funds | Grant / Non-Grant | PPG($) | Agency Fee($) | Total PPG Funding($) |
|---|---|---|---|---|---|---|---|---|
| UNEP | GET | Brazil | Climate Change | CC STAR Allocation: CCM-1-1 | Grant | 70,000.00 | 6,650.00 | 76,650.00 |
| **Total PPG Amount ($)** | | | | | | **70,000.00** | **6,650.00** | **76,650.00** |

Please provide justification

## Sources of Funds for Country Star Allocation

| GEF Agency | Trust Fund | Country/ Regional/ Global | Focal Area | Sources of Funds | Total($) |
|---|---|---|---|---|---|
| UNEP | GET | Brazil | Climate Change | CC STAR Allocation | 10,115,000.00 |
| **Total GEF Resources** | | | | | **10,115,000.00** |

## Indicative Focal Area Elements

| Programming Directions | Trust Fund | GEF Project Financing($) | Co-financing($) |
|---|---|---|---|
| CCM-1-1 | GET | 9,167,443.00 | 66657355 |
| **Total Project Cost** | | **9,167,443.00** | **66,657,355.00** |

## Indicative Co-financing

| Sources of Co-financing | Name of Co-financier | Type of Co-financing | Investment Mobilized | Amount($) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Recipient Country Government | Ministry of Science, Technology and Innovation | In-kind | Recurrent expenditures | 1057355 |
| Recipient Country Government | Ministry of Integration and Regional Development | In-kind | Recurrent expenditures | 500000 |
| Recipient Country Government | Ministry of Integration and Regional Development | Public Investment | Investment mobilized | 5000000 |
| Recipient Country Government | Ministry of Education (and its National Fund for the Development of Education) | Public Investment | Investment mobilized | 3400000 |
| Recipient Country Government | Ministry of Mines and Energy | In-kind | Recurrent expenditures | 100000 |
| Recipient Country Government | National Service for Industrial Training (SENAI) | Public Investment | Investment mobilized | 500000 |
| Recipient Country Government | Brazilian Development Bank (BNDES) | Loans | Investment mobilized | 8000000 |
| Recipient Country Government | Caixa Economica Federal | Loans | Investment mobilized | 25000000 |
| Recipient Country Government | Funding Authority for Studies and Projects (FINEP) | Loans | Investment mobilized | 20000000 |
| Recipient Country Government | Three Brazilian Municipalities | Public Investment | Investment mobilized | 2500000 |
| Others | Federal University of Santa Catarina | In-kind | Recurrent expenditures | 200000 |
| Others | Federal University of Rio de Janeiro | In-kind | Recurrent expenditures | 200000 |
| Private Sector | Brazilian Chamber of the Construction Industry (CBIC) | In-kind | Recurrent expenditures | 200000 |
| **Total Co-financing** | | | | **66,657,355.00** |

Describe how any "Investment Mobilized" was identified

Investment mobilized was identified through consultations with the Ministry of Science, Technology and Innovation and CAIXA, as well as a mapping of investments. Investment mobilized will be identified in greater detail during the PPG stage.

## ANNEX B: ENDORSEMENTS

### GEF Agency(ies) Certification

| GEF Agency Type | Name | Date | Project Contact Person | Phone | Email |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| GEF Agency Coordinator | Victoria Luque Panadero | | | | victoria.luque@un.org |
| Project Coordinator | Asher Lessels | | | | asher.lessels@un.org |

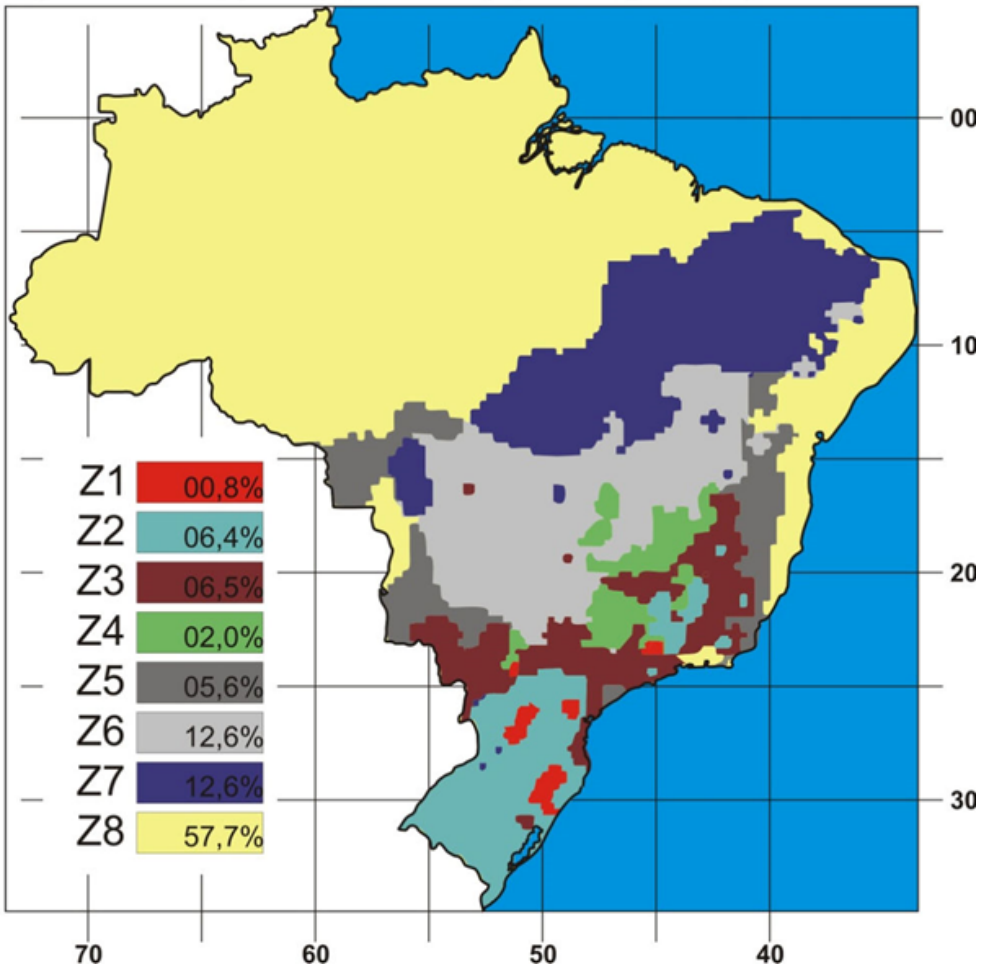
**Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):**

| Name | Position | Ministry | Date (MM/DD/YYYY) |
|---|---|---|---|
| André Luiz Campos De Andrade | General Coordinator for Green Finance | Ministry of Finance | 3/16/2023 |

## ANNEX C: PROJECT LOCATION

**Please provide geo-referenced information and map where the project interventions will take place**

Project interventions will take place throughout Brazil at a national scale. Furthermore, demonstrations will be undertaken in each of Brazil's eight bioclimatic zones. The exact location of the these will be determined during the project preparation grant phase.




| Element | Latitude | Longitude |
|---|---|---|
| Brazil | 14.2350° S | 51.9253° W |

## ANNEX D: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

**(PIF level) Attach agency safeguard screen form including rating of risk types and overall risk rating.**

| Title |
|---|
| Attachment 1. SRIF |

## ANNEX E: RIO MARKERS

| Climate Change Mitigation | Climate Change Adaptation | Biodiversity | Land Degradation |
|---|---|---|---|
| Principal Objective 2 | Significant Objective 1 | No Contribution 0 | No Contribution 0 |

## ANNEX F: TAXONOMY WORKSHEET

| Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|
| Influencing Models | Demonstrate innovative approaches | - | - |
| | Transform policy and regulatory environments | - | - |
| | Deploy innovative financial instruments | - | - |
| Stakeholders | Private sector | - | - |
| | Civil society | Academia | - |
| | Stakeholder engagement | - | - |
| Capacity, Knowledge and Research | Capacity Development | - | - |
| Gender Equality | Gender mainstreaming | Sex-disaggregated indicators | - |
| | Gender results areas | - | - |
| Focal Area / Theme | Climate change | Climate change mitigation | - |
| | | Climate finance (Rio markers) | Climate Change Mitigation 2 |
| | | | Climate Change Adaptation 1 |