

Scoping template for in-country partners

Guidelines:

Please fill in this document, intended to be a strategic overview of the activities that you will conduct throughout the JUSTPATH project.

The objective of this document is not to set in stone the details of your work for the entire duration of the project, but rather inform the overall direction of the activities carried out, based on national priorities and needs. It is a living document summarizing the reflections and the discussions that will take place throughout the scoping phase and beyond within your team, with IDDRI as project lead and with task leads.

This document is separated into several sections, based on the different analytical and engagement components of the project that need to be informed through the scoping phase:

- 1) Overall strategic vision
- 2) Modeling improvements
- 3) Scenario development
- 4) Analysis of socioeconomic impacts of the transition
- 5) Stakeholder engagement at the domestic level
- 6) Translation of First GST outcomes at the domestic level

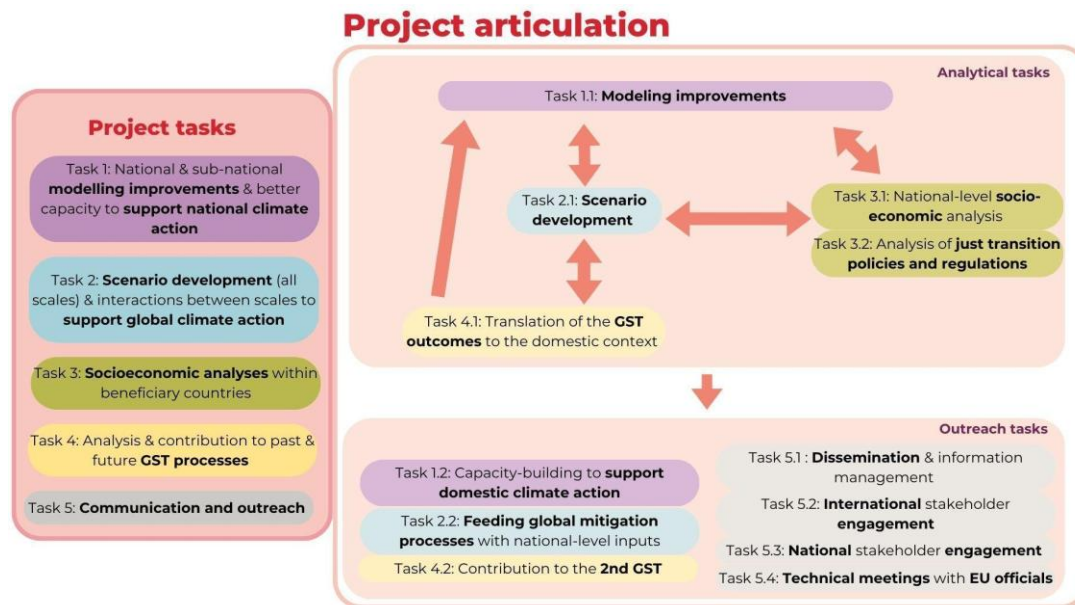
Overall, it is key to ensure consistency between the different tasks (both analytical and engagement) that you will carry out throughout the project. Indeed, they should all feed the same goal: to contribute provide robust and policy-relevant inputs to national and international processes based on national priorities and needs, in order to support national climate ambition and accelerate action.

As a reminder, the focus of this project will be the just energy transition. All activities should therefore have a link to this essential issue, be it close or distant.

Please also note that this scoping process should also help avoid duplication of efforts and ensure that this work is complementary to other projects or work carried out with other teams working at national level.

Reminder: Project structure & articulation

It is key that all project activities are coherent with one another and feed each other. You will find below an overview of project structure and articulation to clarify how we see the interaction between project tasks.



Overall, all the projects' analytical tasks (tasks 1.1, 2.1, 3.1, 3.2 and 4.1) will feed into dissemination and outreach-related tasks (tasks 1.2, 2.2, 4.2, 5.1, 5.2, 5.3, 5.4).

Modeling improvements (task 1.1), scenario development (task 2.1) as well as analyses of socio-economic impacts of mitigation action (tasks 3.1 and 3.2) and of the translation of the First GST outcomes to the national level (task 4.1) work together to enable in-country teams to develop robust scientific analyzes on domestic climate ambition and action in accordance with the 1.5°C temperature goal, while improving socio-economic conditions.

Modeling improvement (task 1.1) helps improve the capacity of scenario analyses (task 1.2) to provide policy-relevant insights and to feed the socio-economic analysis (task 3.1). Conversely, scenario analysis and exchanges with experts of socio-economic dimensions can inform and guide the modeling developments. In parallel, the analysis of the translation of the First GST outcomes at national level (task 4.1) serves as input to national and sub-national scenario development and the analysis of their socio-economic impacts, while conversely, detailed analytical work can help inform the analysis of the national contextualization of GST outcomes.

The coordination between tasks 1.1, 2.1 and 3.1 will also reinforce the relevance of the knowledge developed on the interactions between the global Paris Agreement temperature goal and national climate action and inputs on how to support this global commitment. Not only will this allow in-country modeling teams to provide meaningful inputs and comments on the global scenarios to global modeling teams, the latter will also be able to provide feedback to the national scenarios developed. Global scenarios will be reinforced through bottom-up national perspectives, and national and subnational scenarios will draw of global-level insights.

The impact of the analytical work at domestic level will be ensured and reinforced through the capacity-building activities carried out as part of task 1.2 and the national and sub-national engagement activities of task 5.3. Policymakers and other stakeholders as well as external experts will be invited to provide inputs and feedback at key points in the modeling and scenario development processes, complementary to the socio-economic analyses. The analyses should feed national processes, such as NDCs or LT-LEDS, by providing insights to support national commitments but also more generally provide inputs to key discussions in the domestic debate.

Both country-level and global learnings will be disseminated at international level. Insights from national-level work will be disseminated to the international community through task 2.2, where in-country teams will draft country-level contributions to global mitigation processes. Outreach on cross-country and global analyses will be carried out as part of international engagement activities (task 5.2) and during the organization of events during COPs or SBs, also as part of task 5.2. Finally, this project will provide inputs to the technical assessment phase of the Second Global Stocktake (task 4.2) based on the knowledge developed through these tasks.

The linking of domestic mitigation pathways with socio-economic impacts (task 3.1) will feed and be fed by the analysis of just transition policies and regulations (task 3.2). The analysis of socio-economic impacts of domestic mitigation pathways and consultations with external experts will provide a useful framework for the consideration of just transition policies and regulations at domestic level and the identification of “Hot Spots” and vice versa. Also, the learnings of this task 3 will feed project inputs to the Second GST’s Technical Assessment Phase.

Lastly, tasks contributing inputs to international processes (tasks 2.2, 4.2, 5.2) and outreach to a broad target audience (5.1) will also interact to ensure that project learnings are disseminated to the correct international targets (whether it be the Second GST or other processes such as the Mitigation Work Program or Just Transition Work Program) to maximize their impact and that efforts are not duplicated between tasks and are rather complementary.

Section 1: Overall strategic vision

This introductory section is designed to help identify your priorities for this project, according to your country's political context, national priorities for decarbonization and current policy debates. Indeed, ensuring that the analysis and engagement activities carried out as part of this project are aligned with national needs and context is key to make sure that your work has maximum impact.

Please provide an overview of the **national political context**, namely as regards to climate change and the just energy transition.

The current Brazilian Federal Government (Lula's presidency four-year term from 2023 to 2026) has prioritized the Climate Change Agenda, with a radical departure from the preceding administration. On the international context, Brazil has pushed the due consideration of this agenda in the G-20 Summit held in Rio and COP29 held in Baku in 2024. Brazil is continuing to do so in 2025, when it will host the BRICS+ Summit and COP30 in the city of Belém, in the Amazon region.

On the national front, the Ministry of Environment has played a crucial role leading Brazil's Climate Change Agenda through the Mitigation Climate Plan. This initiative has been instrumental in conducting comprehensive modeling and facilitating political discussions and negotiations that ultimately shaped the second NDC targets. Brazil was one of the first few countries to present a second NDC updated in due time and presented at COP29: it has confirmed the economy-wide GHG emissions target of 1.32 Gt CO₂e by 2025 and 1.2 Gt CO₂e by 2030, has established a new target of 0.85-1.05 Gt CO₂e by 2035 and confirmed the commitment to reach net-zero GHG emissions by 2050. The pertinent Ministries are preparing for presentation at COP30 a Climate Plan encompassing eight Sectoral Mitigation Plans and fourteen Adaptation Plans. The Ministry of Finance ("Fazenda") has presented at COP29 the Ecological Transformation Plan (ETP) of the Brazilian economy. The Ministry of Industry has launched the New Industry Plan and the Ministry of Mines and Energy has launched the Energy Transition Policy, the Low-Carbon Hydrogen Law and the Future Fuel Law, also in 2024. A new Federal Law approved at the end of 2024 has established a domestic cap-and-trade system for GHG emissions that should become fully operational around 2030 as well as Energy Transition Acceleration Program enacted by Federal Government in the beginning of 2025 to support financing the energy transition and the net-zero ambitions.

Currently, the Ministry of Environment is focused on developing detailed Sectorial Climate Plans, which are expected to outline specific contributions to achieve the new economy-wide emission targets set for 2035.

Since the Brazilian NDC has been economy-wide from its inception a decade ago, there has been a notable lack of clarity within individual sectors regarding their specific contributions to national mitigation goals, leading to minimal action from these sectors over the past ten years. The current government is addressing this by developing sectorial plans aimed to be ready both technically and politically before COP30 in Belém, ensuring that each sector understands and commits to its mitigation responsibilities. Additionally, discussions on the means of implementation cover financial, technological, and capacity-building aspects essential for achieving these targets. Integral to this process are just transition discussions, and macroeconomic and social assessments using the IMACLIM-BR model, which analyse the broader impacts of climate policies to balance environmental objectives with economic and social well-being, highlighting pathways for sustainable development. Brazil has to deliver its LT-LEDS to the UNFCCC yet, and the federal government has the intention to launch this process in 2026, providing an opportunity to use the inputs from our research.

Please list out and detail the **key long-term transformations changes** required in your country to reach carbon neutrality.

The key long-term transformations required in Brazil to reach carbon neutrality are:

- reach net-zero illegal deforestation annual rates;
- strongly increase carbon uptake by afforestation and vegetation cover restauration programs;
- control and reduce methane emissions from bovine cattle while ensuring the sustainability of Brazilian beef production and exports, through innovative practices along its supply chain;
- reduce energy-related GHG emissions to near-zero by 2050: pursue the decarbonization of power generation and transport sectors, accelerate the decarbonization of industry and compensate for the residual emissions in a few hard-to-abate industrial sectors, through a mix of command-and control and economic policies, and notably the full implementation of the regulated domestic carbon market.

Please list the **key players/constituencies/interest groups** critical to implement the transformations listed above, by industry/sector.

The key players, constituencies and interest groups critical to implement the transformations listed above are:

- the pertinent Federal Ministries (Environment, Agriculture, Energy, Industry, Transport, Finance)
- Governors of key states (mainly of the Amazon region)
- Mayors of large cities (mainly the state capital cities)
- Congress (both the Senate and the Chamber of Deputies)
- Sectoral Associations (agribusiness, industry, transport, energy, waste and sanitation sectors)
- Financial institutions

Centro Clima has been developing since 2014 a stakeholders engagement process including many virtual and in-person consultations. We have mapped a roaster of around three hundred stakeholders (25 from financial institutions and between 40 and 65 from each of the five main sectors: AFOLU, Transport, Energy, Industry and Waste).

Please detail the **current stakeholder-specific barriers, priorities and other conditions to implement these changes, as well as the position or changes you need them to adopt.**

Capital costs in Brazil are very high and long-term investment suffers from insufficiency of funding. Mitigation actions face many barriers to attracting investments in a developing country like Brazil. The most fundamental barriers are inherited from the historical process leading to the insertion of Brazil in the global economy as a peripheral country. They are usually known as the “political risks” of the country (political instability; macroeconomic conditions; currency risk (exchange rate fluctuations); inflation risk; public debt; external debt; fluctuation of interest rates; legal insecurity, among others). Technological, microeconomic and financial barriers, as the too high costs of capital deriving from the perception by investors of all these risks, have been identified by Centro Clima through expert judgment, using the above-referred stakeholders engagement process.

A good summary of the barriers and the policy instruments to address them can be found in the final report of the DECARBOOST project: “A Decarbonization Strategy for a 2050 Net-zero carbon Brazilian Economy: Enablers and Sectoral Mitigation Plans”, Centro Clima / COPPE/UFRJ, February 2023.

Going one step further and based on your answers to the previous question, please provide a short **overview of the policy-research questions** that you would want to inform through your work in this project.

The main policy-research questions to be informed by this research work in Brazil are:

- Identification of the economic and social impacts of the transition towards a net-zero economy in Brazil;
- Discussion of potential policy tools to minimize the negative impacts and maximize the positive impacts of the transition;
- Development of updated scenarios of economic and emissions pathways appropriate to allow for a just transition, including milestones for 2030, 2040 and 2050;
- Design in consultation with key stakeholders the storyline of a LT-LEDS for Brazil.
- How to better represent financial flows and smart financial mechanisms in modelling long-term decarbonization scenarios

Section 2: Modeling improvements (Task 1.1)

The objective of this section is to define the model improvements that you will seek to implement during this project, as well as the support needed to carry out these improvements.

The focus of the modeling improvements carried out through this project should increase your ability to provide robust scientific inputs to the critical policy questions as identified in the previous sections, notably on socio-economic dimensions of the energy transformations as critical dimensions of just transitions. The identification of these policy-relevant model developments can involve engagement with policymakers, stakeholders, or other modeling experts.

A modeling improvement can consist in the improvement of databases supporting calculation made by the model, in a refinement of the mathematical representation of a specific aspect already present in the model (e.g., further disaggregation of a specific component) or in the addition of a new feature allowing the model to assess dimensions that were previously absent. This can involve building soft or hard linkage with other models or simply the development of ad-hoc reduced forms of more complex models, facilitating the articulation with the existing model structure. These modeling improvements can either focus on a specific sector, explore various sectors, or even focus on a more national-generic level. At least 2 improvements will be carried out by each team under this project.

In order to define the support activities carried out as part of this task to enable in-country partners to carry out the chosen modeling improvements, a cross-country assessment will be conducted by task leads to define specifically the capacity-building activities organized in the context of the project, including a mapping of capacities available in the consortium and missing capacities that should involve external subcontractors.

Please present here a concise stocktake of your **existing modeling capacities** and main gaps, related to the policy-research questions identified in Section 1.

We use an integrated modeling approach that links a set of six sectoral models to IMACLIM-BR, a CGE model for Brazil: four energy demand models (transport, industry, buildings, and agriculture energy demand), an AFOLU model and an energy supply model (MATRIZ). Finally, a waste model completes the estimates.

The main gaps related to the policy-research questions are:

- refinement of the impacts of the transition on the level of employment of skilled and non-skilled manpower, and its links to household income classes;
- proper consideration of the financial intermediation and how smart financial instruments can contribute to decrease capital costs of the mitigation actions;
- proper representation of new economic activities and sectors (e.g. bioeconomy) to be created and/or substantially increased in the transition (structural shifts of the ecological transformation).

In the previous IMAGINE project, the KLEM model was adapted to the Brazilian context, calibrated with national data, and coupled with a set of bottom-up sectoral models to simulate long-term macroeconomic and energy trajectories. A major innovation was the integration of the stock-flow consistent (SFC) methodology, enabling a more realistic representation of financial dynamics within the macroeconomic framework. Although the enhanced SFC-KLEM-BR model presented consistent macroeconomic results, it revealed an unsustainable trade balance deficit. Adjusting the model to correct this imbalance is a necessary next step and will open the room for the introduction of innovative financial mechanisms aimed at attracting international capital for low-carbon investments.

Please provide detailed **description of the modeling tasks to be envisaged** to improve the capacity to contribute to the national debates identified in Section 1.

The KLEM-BR SFC model will undergo refinements to better represent financial flows, balance national and foreign investments, and integrate Innovative Financial Mechanisms (IFMs). These improvements aim to enhance the model's capacity to project low-carbon investments (LCIs) and their macroeconomic and energy implications. A key step in this process is the introduction of IFMs as a new variable in the model structure, followed by endogenous simulations. In this procedure, key financial variables —such as prices, interest rates, and asset quantities (e.g., bonds, loans, deposits)—must be identified and isolated in order to test how adjustments in perceived risk and capital costs influence macroeconomic outcomes. This approach will help determine the set of financial conditions that can foster a more favorable environment for green investments. The strategy includes increasing returns on green assets to enhance household portfolio attractiveness without penalizing productive sectors or overburdening the government, particularly if supported by international subsidies channelled through innovative mechanisms.

The **IMACLIM-BR** model will similarly incorporate IFMs and apply the Stock-Flow Consistent (SFC) methodology to enrich low-carbon scenarios. IMACLIM-BR vastly expands the scope of KLEM-BR to encompass a wider array of sectoral details, income classes, and institutional sectors. By incorporating Innovative Financial Mechanisms (IFMs) and applying the Stock-Flow Consistent (SFC) methodology, the model will offer refined and enriched low-carbon scenarios. These enhancements are designed to deepen the analysis of financial flows and their implications on Brazil's transition to a low-carbon economy, addressing key research gaps in the path to achieving net-zero emissions. The integration of IFMs will enable the model to simulate the economic effects of green bonds, guarantees, and other innovative financial mechanisms more accurately. These financial instruments are critical for reducing the capital costs associated with green investments and for attracting international and domestic investments in low-carbon infrastructure. By enhancing the representation of these mechanisms, the IMACLIM-BR model will be able to provide policymakers with clearer insights into the potential economic and environmental benefits of various low-carbon transition strategies.

Please describe the **support needed** to carry out these modeling improvements.

In regard to IMACLIM platform, the cooperation with CIRED (e.g. to run KLEM simulations) will be discussed in order to define priorities and establish a timeline to implement the work program. To effectively integrate Innovative Financial Mechanisms (IFMs) and apply the Stock-Flow Consistent (SFC) methodology within the IMACLIM-BR model, this task will require collaboration with CIRED to develop new coding for the IMACLIM-Country Platform, where IMACLIM-BR is hosted. This enhancement, crucial for simulating the economic effects of green bonds, guarantees, and other financial instruments accurately, will be supervised by Frédéric Gherzi. The resulting improvements will not only benefit Brazil's transition to a low-carbon economy but also enhance the model's applicability and utility for several other countries currently utilizing the IMACLIM-Country Platform.

Please provide a short **proposition of a work program** taking into account the timeframe and resources of the project. Describe the improvements that you want to carry out. If you are unsure

whether the list of planned improvements is getting too long, put the most important ones first and we will add our estimate on where to stop.

To fully incorporate and execute the range of improvements planned for the various models involved in Brazil's low-carbon transition strategy, the following expanded work program proposition is outlined, considering the specific tasks and objectives for each model:

1. Refinement of the KLEM-BR SFC Model:

- **Literature Review: Smart Financial Mechanisms:** This stage involves an extensive review of financial mechanisms designed to mitigate global warming by leveraging low-carbon investments. The focus will be on strategies that reduce investment risks, lower capital costs, and create incentives such as mechanisms capable of anticipating future revenues. A smart financial mechanism (SFM) operating at early investment stages could effectively address these constraints, particularly if it is supported by climate remediation assets that materialize the avoided externalities over the investment lifecycle. The literature review will also explore how innovative green financing architectures can attract private capital for low-carbon infrastructure investments, particularly in emerging and developing countries. This review will go further and deeper than that conducted in the IMAGINE project, broadening the scope of instruments considered and strengthening the analytical foundation for their integration into macroeconomic models
- **Development of modelling plan:** The modelling plan will consist of: (i) plan intervention on KLEM BR SFC regarding a better and more detailed representation of the finance sector; (ii) preliminary simulations in excel to estimate the potential of different smart finance options, either separately or in combination, and help understand to what extent the use of smart financial mechanisms can reduce the risks and cost of capital, thus, attracting investments and improving the macroeconomic conditions in carbon-neutral scenarios for Brazil; (iii) plan introduction of interventions in the KLEM-BR SFC model in order to have an integrated simulation. This stage should be carried out in close cooperation with CIRED.
- **Refinement of the KLEM-BR SFC Model:** This phase will focus on incorporating intelligent financial mechanisms (IFMs) into the KLEM-BR SFC modeling framework. Coding and development efforts will integrate IFMs, such as green bonds and guarantees, into the model to simulate their economic effects, particularly in balancing national and foreign investments and reducing capital costs. The modeling plan will ensure that the structure aligns with Brazil's decarbonization and financial strategies.
- **Model Calibration:** At this stage, the **KLEM-BR SFC IFM** model will be refined and calibrated to accurately represent the most promising financial mechanisms identified in previous steps. The model calibration process will be conducted in close collaboration with CIRED to ensure consistency and robustness. This step is crucial to validating the reliability of the simulations before scenario analysis begins.
- **Cooperation:** These three stages (development, refinement, and calibration) should be carried out in close cooperation with CIRED and could benefit from synergies with the modelling work being developed by Angélique Sarre and Yannick Glémarec. Their results, expected by the end of 2025, and Angélique's availability in Rio between July and September 2025, offer a valuable opportunity for technical exchange and joint exploration of smart financial instruments to be incorporated into the KLEM-BR framework
- **Results and Analysis:** This phase will simulate the impact of SFMs on the cost of capital for selected mitigation options in Brazil. Scenarios will prioritize GHG

neutrality by 2050, comparing cases with and without smart financial instruments to evaluate cost and economic impacts.

Key areas of analysis will include:

- **Economic and Investment Cost Analysis:** Refining methodologies to estimate incremental and baseline investment costs, ensuring clearer comparisons and identifying potential savings.
- **Decarbonization Investment Synergies:** Simulating a pricing system and large-scale investments in low-carbon technologies as a result of SFM incentives.
- **Economic Impact Assessment:** Evaluating how the introduction of SFMs fosters synergies between mitigation plans and economic growth, reducing GHG emissions while enhancing Brazil's production structure.

These simulations will provide detailed investment scenarios in infrastructure and mitigation technologies, offering critical insights for Brazil's long-term economic and environmental strategy. The cost savings generated by SFMs and their broader economic impacts will be explored using the KLEM-BR model results.

○ **Documentation and Dissemination**

All methodologies, modifications, and key findings will be documented systematically. The results will be disseminated through various channels, including academic publications, policy briefs, and stakeholder engagement initiatives, to ensure broad visibility within economic and environmental policy communities.

○ **Final Report and Presentation**

A comprehensive report will be produced, detailing the impact of SFMs on key economic and environmental indicators, including GDP, price index, trade balance, capital costs, employment generation, GHG emissions and poverty and inequality specifically in the case of IMACLIM-BR. The findings will be presented to policymakers, investors, and stakeholders to support informed decision-making and encourage the integration of smart financial mechanisms into Brazil's climate and economic strategies.

2. IMACLIM-BR Model Enhancements:

- **Development of IFM and SFC Integration:** Initiate the project by developing and coding the integration of Innovative Financial Mechanisms (IFMs) and the Stock-Flow Consistent (SFC) methodology into the IMACLIM-BR model, benefiting from the previous advances on this topic in KLEM-BR. This will involve collaboration with CIRED to ensure that the new coding aligns with both the specific needs of the Brazilian model and the broader requirements of the IMACLIM-Country Platform. The priority is to ensure that the model can accurately simulate the economic impacts of various financial instruments aimed at promoting low-carbon investments.
- **Pilot Testing and Refinement:** Following the integration and training phases, conduct pilot testing of the updated model to identify any potential issues or areas for improvement. This step will involve running several scenarios to assess the impact of IFMs on Brazil's low-carbon transition strategies and making necessary adjustments based on the outcomes.
- **Capacity Building and Training:** Conduct a series of training sessions for the local modeling team to familiarize them with the new features and functionalities introduced in the IMACLIM-BR model. This will include hands-on workshops led by experts from CIRED, led by Frédéric Gherzi, to ensure comprehensive understanding and capability in utilizing the updated model.

Section 3: National & subnational scenario development (Task 2.1)

The focus of national and subnational scenario work should be to inform national and international processes with robust inputs to improve the understanding of interactions between global emissions and national climate action. It should seek to contribute to inform policy-research questions to be addressed in a given country context, as identified in Section 1.

In addition to national & subnational scenario work, the project will also develop global scenarios, based on national-level needs. Activities to ensure consistency between the different levels of analyzes through a proactive process of conversations between scenario developers will be carried out throughout the entire scenario development process.

Please provide a detailed description of the possible focuses for scenario development for this project, including a reflection on they would contribute to the critical policy questions identified in Section 1. Please also consider the **feasibility** of this work within the timeframe and resources of the project.

Building on the previous scenario exercises conducted under the Decarboost project (supported by the German Ministry for Economic Affairs and Climate Action and the International Climate Initiative - IKI) and the Imagine project (with IDDRI), we plan to develop three scenarios up to 2050 to support decision-making. These scenarios will be based on an expanded and robust modelling base for domestic mitigation actions, contributing to the country's next NDC and LT-LEDS, and responding to the call of the GST to align with limiting global warming to 1.5 °C. Our goal is to enhance the quality of our national-level mitigation modelling and improve the link between mitigation actions and socioeconomic impacts, under the perspective of a just transition framework.

With both IMACLIM-BR and KLEM-BR SFC, the modelling approach will focus on developing and analysing different scenarios, particularly the current policy scenario (CPS) and the deep decarbonization scenario (DDS). Innovative Financial Mechanisms (IFMs) will be tested as a facilitator to achieve a deeper decarbonization (long-term net-zero goal in DDS), aiming to provide a higher capacity to attract low-carbon investments.

By conducting internal tests of IFMs, the model will focus on key variables such as prices, interest rates, and asset quantities (including bonds, advances, and loans) to illustrate lower risk, diminished capital costs, and enhanced attractiveness of the assets. The idea is to assess how the model will respond to the reduction in the cost of capital through IFMs and, consequently, impact investment capacity and GDP. Upon completion of the modelling improvement process, three distinct scenarios will be developed: the Current Policy Scenario (CPS), the Deep Decarbonization Scenario (DDS) and the Deep Decarbonization Scenario with Innovative Financial Mechanisms (DDS IFM). Each scenario has been carefully selected to illustrate a range of potential outcomes under different levels of policy intervention and financial innovation.

CPS: This baseline scenario will reflect the continuation of existing policies without the introduction of new measures. It provides a control framework against which the effects of more robust policies or innovative financial mechanisms can be assessed. This scenario is essential to understand the natural progression of emissions and economic growth under current legislation and commitments.

DDS: This scenario targets achieving net-zero emissions by 2050, aligning with Brazil's Nationally Determined Contributions (NDC) goals. It simulates the effects of stringent climate policies and more extensive decarbonization efforts. The DDS is designed to explore the potential for Brazil to accelerate its transition to a low-carbon economy using aggressive policy measures and technologies, providing insights into the economic and social challenges and opportunities associated with ambitious environmental targets.

DDS IFM: By applying Innovative Financial Mechanisms within the context of the Deep Decarbonization Scenario, the DDS IFM explores how these financial tools can support the ambitious goal of net-zero emissions by 2050. IFM, in its various forms, can simulate lower risks and higher returns on capital, expanding the scope and effectiveness of climate policies. In addition to pricing, it offers the country the ability to attract a range of investments in low-carbon projects. Thus, this scenario assesses the potential for innovative financing to lower the cost of capital and increase investment in sustainable projects. It aims to demonstrate the added value of financial innovations in strengthening the economic viability of net-zero goals, potentially attracting more domestic and international investment. It will provide a deeper understanding of how financial innovations can facilitate this stringent transition, examining their impact on reducing capital costs, enhancing the attractiveness of green investments, and potentially transforming economic structures towards sustainable practices.

The comparative analysis of these scenarios will allow us to assess the effectiveness of Innovative Financial Mechanisms in increasing the capacity to attract international capital and stimulate macroeconomic transformations. By reducing risks and capital costs, IFMs play a crucial role in addressing the economic and employment concerns associated with the transition. This analysis will allow policymakers to discern the practical implications of financial and policy interventions on Brazil's economic landscape, examining shifts in GDP, employment, sectoral adaptations, and the overall feasibility of achieving environmental objectives within projected economic frameworks. This strategic approach will inform the development of nuanced policies that align economic growth with sustainable development goals.

Please detail any ideas for **(1) focuses of global scenarios or (2) topics to address during interactions with global scenario developers which could inform your national or subnational-level scenarios**. While this will be defined more specifically through workshops and discussions, any preliminary ideas would be useful at this stage.

Follows a list of preliminary suggestions of focuses for global scenarios and topics for discussion:

- Similarly to the approach followed by the Emissions Gap Report, draft a CPS and two families of DDS scenarios up to 2070 (commitment of net-zero in India), with average global temperature stabilization at 1.5° C and 2° C;
- Spell out CO₂ and non-CO₂ gases (particularly CH₄) concentrations, annual emissions milestones and emission budgets up to 2070;
- Establish for each scenario a range of pertinent values for key variables that influence the design of national scenarios, e.g.: coal, oil and gas volumes and prices in the global market, capital flows from North to South, learning curves of decarbonization technologies (EVs, batteries, CCS in thermopower generation, O&G, steel and cement sectors, BECCS, offshore wind, etc.).

Section 4: Socioeconomic aspects of the transition (Task 3.1)

Linked to the modeling improvements and scenario development, this task will consist in analyzing the socioeconomic impacts of the transition, as represented in the pathways developed.

The objective of this section is to (1) define the focus of this analysis, also based on the policy-research questions identified; (2) identify potential external expertise which could help ensure that socioeconomic dimensions are considered more adequately in the modeling improvements and national scenarios.

The analysis carried out can be qualitative or quantitative, depending on the identified priorities. They can build from all the relevant components of the project, including modeling results reported in the updated reporting template, insights emerging from the consultations with socioeconomic experts and collaborations between project teams where relevant.

This external expertise needed should be identified by you, based on the analysis that you'll carry out and the external help that you believe could be beneficial. This expertise could for example be on employment and labor, inequalities, education, etc., depending on your priorities. At this stage of the process, we ask you to provide ideas on the types of expertise, and perhaps names of potential experts that you already have in mind. The selection of these experts will be finalized at the beginning of this task.

Consultations with these external experts will be carried out throughout the other analytical tasks (modeling improvements and scenario development) to feed these processes and enrich the analyses. At the beginning of the process, they will provide structural comments on the framing, missing elements, etc. Regular check-ins will be organized to ensure that their comments are considered adequately. Towards the end of the process, the external partners will provide general feedback and possibly complement the analyses.

Please highlight here the **focus of the analysis of socioeconomic impacts of the national transition** that you plan to carry out, and how they are connected to your strategic direction (Section 1). Please also list out potential activities that you have in mind.

The analysis of the economic and social impacts of the national transition will focus on key indicators connected to our strategic vision (see Section 1): GDP, employment, inflation, households purchasing power, household income levels and distribution, mitigation costs, investment and funding requirements for the transition, GHG sectoral emission targets with milestones up to 2050, forest offset levels and carbon prices.

We will focus on examining various scenarios, specifically the current policy scenario (CPS) and the deep decarbonization scenario (DDS), with an emphasis on understanding the socioeconomic impacts of domestic mitigation pathways with and without the IFM (see Section 3). In the CPS, where traditional financial instruments predominate, the model explores high capital costs and risks to determine if IFMs can be effective, particularly when green investments are minimal compared to conventional ones. Conversely, in the DDS, with a higher ratio of green to conventional investments, IFMs are expected to have more substantial impacts, reducing risks, decreasing capital costs, and enhancing the attractiveness of financing low-carbon infrastructure projects. In this case, the IFM will operate on a larger asset base, and it is therefore expected that the model will have a more profound influence on the total amount of investment on the macroeconomic level, increasing GDP and reducing unemployment for instance.

Expanding on these scenarios, both models will simulate the macroeconomic and social effects of increasing green investments through IFMs, examining impacts on GDP growth, employment, inequalities and sectoral transitions, particularly within the energy sector. This analysis will extend to the mobilization

of international capital through IFMs, scrutinizing how external funding can complement domestic investments to drive broader environmental and infrastructural improvements.

An example includes raising the interest rates of green assets to encourage household investment without detrimentally impacting productive sector returns nor government spendings. To do so, we will force the model to finance the difference between the bonds and the green bonds through international flow of capital subsidized by international climate funding. Introducing IFMs as green asset with attractive returns for households and lower costs for the productive sector will allow for a comparison of macroeconomic outcomes with and without IFMs. This analysis aims to provide multiple insights into areas such as investment patterns, trade balance, employment effects, and GDP growth, illustrating how IFMs can assist Brazil in meeting its commitments to the Paris Agreement and improving development indicators.

By capturing the complex interplay between economic, social and environmental variables, the enhanced KLEM-BR and IMACLIM-BR models will serve as essential tools in developing informed and effective policy strategies. These strategies will not only aim to meet emission reduction targets but also enhance socioeconomic equity and resilience, ensuring that Brazil's transition to a low-carbon economy is both sustainable and inclusive. This comprehensive modeling effort will thus provide policymakers with a robust analytical foundation to design and implement mitigation strategies that effectively integrate economic growth with environmental and social priorities.

Please **identify key potential expertise outside of your team and of the project that could be relevant to contribute to the socio-economic aspect selected as a priority**. If you have already identified specific external experts that have the required expertise, please list them here.

Some research groups were identified that might contribute to a technical exchange about modelling of social and economic aspects of the transition, and preliminary contacts are ongoing with them:

- Unicamp (University of Campinas) – economic agent-based modelling (ABM) group headed by Prof. Marcelo Pereira;
- IPEA (Institute for Applied Economic Research, Ministry of Planning and Budget) – macroeconomic modelling group headed by Dr. Claudio Amitrano.

As agreed in preliminary exchanges on this subject, the follow-up of GMMI and C3A (among other initiatives as the assessment of the ETP impacts through the WB OMEGA model) can contribute to the dialogue to be promoted by the JUSTPATH project about the social and economic aspects of the ecological transition in Brazil.

Section 5: Stakeholder engagement at the national level (Task 5.3)

As part of this project, you will be asked to define an in-country engagement strategy, which should be coherent with the current policy context and debates identified in Section 1, as well as the analytical work detailed in Sections 2, 3 and 4. Without going into much detail, it is useful to think about key aspects of this engagement strategy, in order to make sure that the work executed as part of this project makes up a cohesive whole.

Furthermore, the project also offers the possibility to carry out engagement activities to contribute to the 2025 NDC process. If this is relevant to your national context and your existing work, these activities should be identified at this stage of the process.

Please list **current or future national policy processes** that you would like to contribute to through this project.

- The process of drafting, discussing and approving a national LT-LEDS, in 2026;
- The discussion of more ambitious decarbonization targets for the third NDC of Brazil, in 2028;
- The detailed regulations starting in 2025 for the launching of the Brazilian domestic cap-and-trade system (SBCE) and its full operation around 2030.

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Please detail **preliminary ideas for an engagement strategy**, based on the current policy context and debates identified in Section 1 and the analytical priorities identified in Sections 2, 3 and 4.

Our engagement strategy will include:

- joining stakeholders engagement processes launched by other initiatives (e.g. in other projects; in the ongoing Climate Plan currently developed by the Federal Government; etc.);
- active participation in the Brazilian Climate Change Forum (FBMC), and especially in the Technical Commission on Carbon Economics;
- engaging in the future national policy processes mentioned above.

Please list any **support needed to further develop your teams' ability to influence domestic climate action**. Examples can include organizations of sessions to share experiences on national engagement with teams working on similar topics, organization of training sessions with IDDRI on building an impactful engagement strategy.

- Not anticipated at this stage.

If this is relevant to your national context and to your existing work, please describe any **engagement activities** that you would like to do as part of the 2025 NDC process.

Brazil was an early mover and presented its 2025 NDC at COP29, and its implementation aspects are already being discussed with stakeholder engagement through a process led by the Federal Government, so we will join it and attend the scheduled consultations.

Section 6: Translation of GST outcomes at the national level (Task 4.2)

While you will be asked to carry out an analysis of the translation of GST outcomes at the national level, it is useful to understand at this stage what national-level perspectives already currently exist.

Please list out below any **national level documents** on how this analysis of GST outcomes at the national level should be conducted.

The main reference on how the analysis of GST outcomes at the Brazilian level will be conducted is the last section of the Technical Summary (ppt slides 35 to 44) of the Imagine project report on Brazil.

The general perception of the Brazilian government on the GST outcomes is that Brazil is already more advanced in the energy transition than other large economies in the world, thanks to the high share of renewables both in power generation (93% in 2023) and in the overall energy mix (49%).

However, many stakeholders from the civil society have expressed their concerns about the need for better alignment of Brazil with some key outcomes of the GST:

- accelerate the decommissioning of 3.2 GW of unabated coal power generation installed capacity (subsidies to coal-fired thermopower plants were extended up to 2040 by the Brazilian Congress);
- the need to transition away from oil and gas, while Brazil has recently joined OPEC+ as an observer and Petrobras is planning to expand its drilling activities to replenish Brazilian reserves in order to keep the expansion of oil production and exports;
- the need to curb down the increase and start to reduce Brazilian methane emissions, mainly caused by its cattle herd that allow for the largest beef exports worldwide;
- the need to phase out subsidies to fossil fuels.