Inputs for Climate Change and Sustainability Annex

*This document has been completed based on the information available in the project documents. It is intended for informational and illustrative purposes only, demonstrating how Ecofilia can assist in completing sustainability screenings and reports, supporting organizations in aligning with climate and environmental criteria.*

*The information provided does not constitute official financial, regulatory, or compliance advice, nor does it replace formal sustainability reporting obligations. Organizations should validate all data and classifications with relevant sustainability standards, regulatory bodies, and institutional policies.*

**Title and number of the operation**

Florianópolis Urban Development Program: Floripa for All

**Project summary**

Florianópolis Urban Development Program (Floripa for All) is a strategic initiative financed by the Inter-American Development Bank (IDB) in partnership with the Municipality of Florianópolis. The project seeks to address urban development challenges in Florianópolis, focusing on sustainability, resilience, and inclusivity. It is structured under a Multiple Works Modality and has a total budget of USD 150 million, with USD 120 million from the IDB and USD 30 million in local counterpart funding.

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# **1. Introduction to climate change and sustainability aspects in the context of the operation**

#### **1.1. Climate Change Context in Brazil: Mitigation and Adaptation Framework**

Brazil faces significant climate challenges that necessitate urgent action in both mitigation and adaptation. Its Nationally Determined Contribution ([NDC Brazil, 2024](https://unfccc.int/sites/default/files/2024-11/Brazil_Second%20Nationally%20Determined%20Contribution%20%28NDC%29_November2024.pdf)), updated in November 2024, strengthens the country's commitment to reducing greenhouse gas (GHG) emissions by 50% by 2030 (compared to 2005 levels) and achieving carbon neutrality by 2050. These commitments align with the Paris Agreement and reinforce Brazil’s ambition to transition toward a low-carbon and climate-resilient economy.

Brazil has not yet officially submitted a Long-Term Strategy (LTS) to the UNFCCC [Long Term Strategies Portal](https://unfccc.int/process/the-paris-agreement/long-term-strategies)​. However, Brazil’s updated NDC includes long-term climate goals, such as achieving climate neutrality by 2050 and reducing greenhouse gas emissions by 50% below 2005 levels by 2030​.

On adaptation, Brazil has developed a National Adaptation Plan ([NAP Brazil, 2016](https://unfccc.int/sites/default/files/resource/NAP_Brazil_2016_EN.pdf)), which outlines sectoral strategies to reduce climate vulnerability in urban areas, infrastructure, biodiversity conservation, and water resources management.

Despite these commitments, Brazil remains highly vulnerable to climate change, with rising temperatures, extreme precipitation, and sea-level rise threatening urban centers, particularly coastal cities like Florianópolis. The transport and land-use sectors are among the largest contributors to GHG emissions, and unplanned urbanization has exacerbated climate-related risks in many municipalities. Therefore, effective urban development interventions must align with national and international climate policies, leveraging mitigation and adaptation measures to foster sustainable urban growth.

#### **1.2. Climate Change Challenges in Florianópolis: Mitigation and Adaptation Needs**

Florianópolis, a coastal city and capital of the Santa Catarina state, is uniquely positioned at the intersection of climate vulnerability and urban sustainability challenges. The city’s rapid urbanization, coupled with its reliance on road-based transport, has contributed to GHG emissions growth, congestion, and environmental degradation. Meanwhile, as a low-lying coastal area, Florianópolis is highly susceptible to flooding, sea-level rise, and extreme weather events.

**Mitigation Challenges**

* High reliance on private vehicles: The city’s urban transport sector accounts for a significant portion of GHG emissions, as the public transport network is underutilized and lacks infrastructure to support low-carbon alternatives.
* Limited sustainable mobility infrastructure: Pedestrian and cycling networks are underdeveloped, and public transport services require enhancements to increase efficiency and ridership.
* Energy inefficiency in urban infrastructure: Public buildings, housing developments, and urban lighting systems lack energy efficiency measures, contributing to unnecessary energy consumption and emissions.
* Deforestation and ecosystem degradation: Uncontrolled urban sprawl has led to biodiversity loss and the destruction of natural carbon sinks, exacerbating environmental vulnerabilities.

**Adaptation Challenges**

* High exposure to climate risks: Florianópolis experiences frequent coastal and urban flooding, landslides in risk-prone areas, and urban heat island effects, which affect livelihoods, infrastructure, and essential services.
* Vulnerable low-income populations: Many informal settlements are located in high-risk zones, with inadequate housing structures and poor drainage systems, increasing exposure to extreme weather events.
* Lack of resilient urban planning: The expansion of urban areas into ecologically sensitive regions has increased risks, while current land-use planning mechanisms lack climate-adaptive strategies.
* Deficiencies in disaster preparedness and response capacity: The city needs improved early warning systems, emergency response strategies, and climate risk assessments to enhance resilience.

In recent years, several diagnostic studies have been conducted in Florianópolis to identify key climate risks and mitigation opportunities. The Florianópolis Emissions and Mitigation Study (IDOM) highlights the urgent need to decarbonize urban transport and promote energy-efficient urban infrastructure. Meanwhile, vulnerability assessments indicate that strengthening coastal resilience, flood management, and disaster preparedness are crucial for safeguarding urban infrastructure and communities.

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#### **1.3. Proposed Approach: Integrating Climate and Sustainability into the Operation’s Design**

To align the Florianópolis Urban Development Program (Floripa for All) with national and global climate priorities, the project should incorporate comprehensive climate mitigation and adaptation strategies across its components. The following recommendations outline a pathway to maximize climate resilience, low-carbon development, and sustainability outcomes:

**Component 1: Climate-Resilient Housing and Urban Infrastructure**

* Integrate flood and disaster risk reduction measures into urban upgrading projects, prioritizing climate-resilient housing developments for low-income communities.
* Implement green building standards (e.g., EDGE certification) for new housing units and public buildings, ensuring higher energy efficiency, water conservation, and lower emissions.
* Enhance urban drainage systems and integrate nature-based solutions (NBS), such as wetlands restoration and permeable pavements, to mitigate flooding risks.
* Promote compact, climate-smart urban planning to prevent future settlements in high-risk coastal and landslide-prone areas.

**Component 2: Sustainable Mobility and Transport Decarbonization**

* Prioritize public transport improvements, including dedicated lanes, bus prioritization, and multimodal integration, to reduce reliance on private vehicles.
* Expand bicycle lanes, pedestrian corridors, and non-motorized infrastructure, ensuring safe and accessible low-carbon transport options.
* Conduct feasibility studies for Bus Rapid Transit (BRT) implementation, exploring electrification of public transport as a long-term decarbonization strategy.
* Develop a municipal low-carbon mobility strategy, aligning with Florianópolis’ sustainability goals and Brazil’s NDC transport decarbonization targets.

**Component 3: Environmental Restoration and Nature-Based Solutions**

* Implement reforestation and ecosystem conservation programs to enhance carbon sequestration and biodiversity protection.
* Integrate coastal resilience measures, such as dune preservation, mangrove restoration, and shoreline protection, to mitigate the impacts of sea-level rise and erosion.
* Promote urban greening initiatives (e.g., tree planting, green roofs, parks) to reduce urban heat island effects and enhance air quality and climate resilience.
* Establish a climate-adaptive land-use policy framework, ensuring sustainable urban growth without compromising ecological integrity.

**Component 4: Institutional Strengthening and Climate Governance**

* Develop a city-wide Climate Resilience and Decarbonization Plan, integrating long-term mitigation and adaptation actions into municipal policies.
* Strengthen institutional capacity by training local government agencies on climate-smart urban planning, risk management, and sustainable infrastructure development.
* Implement early warning systems and disaster preparedness programs, leveraging climate data and AI-driven monitoring for proactive risk reduction.
* Foster public-private partnerships and community engagement to promote inclusive climate governance and local climate resilience initiatives.

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**Conclusion**

By integrating climate-smart urban development strategies, the Florianópolis Urban Development Program can serve as a model for sustainable and resilient coastal cities in Latin America. Aligning with Brazil’s NDC and NAP, the project should prioritize low-carbon transport, climate-resilient housing, nature-based solutions, and institutional strengthening to mitigate GHG emissions and adapt to climate risks. These interventions will ensure that Florianópolis remains a livable, sustainable, and climate-resilient city while reinforcing Brazil’s commitments to the Paris Agreement and long-term climate goals.

# **2. Climate change adaptation**

#### **2.1 Compatibility with the adaptation priorities of the NDC and the National Adaptation Plan**

The Florianópolis Urban Development Program: Floripa for All is aligned with Brazil’s Second NDC ([NDC Brazil, 2024](https://unfccc.int/sites/default/files/2024-11/Brazil_Second%20Nationally%20Determined%20Contribution%20%28NDC%29_November2024.pdf)), and the National Adaptation Plan ([NAP Brazil, 2016](https://unfccc.int/sites/default/files/resource/NAP_Brazil_2016_EN.pdf)) by incorporating climate resilience measures into urban infrastructure, housing, mobility, and environmental restoration. Given Florianópolis' high vulnerability to climate hazards, the project integrates adaptation strategies that enhance disaster preparedness, promote nature-based solutions, and strengthen urban governance to support long-term climate resilience.

Alignment with National Adaptation Priorities

✔ **Disaster Risk Reduction and Resilient Infrastructure:** The program mitigates climate risks, particularly urban flooding, sea-level rise, and coastal erosion, which are among the key adaptation priorities in Brazil’s NAP and Second NDC. The operation includes:

* Climate-resilient housing and infrastructure, incorporating flood-resistant construction techniques and early warning systems.
* Reinforcement of coastal protection measures, including dune stabilization and erosion control structures.
* Improvements to urban drainage systems, integrating flood control measures to reduce exposure to extreme weather events.

✔ **Nature-Based Solutions (NBS):** The project prioritizes ecosystem-based adaptation to enhance climate resilience and biodiversity conservation, in line with Brazil’s NAP strategies for urban ecosystems. Key initiatives include:

* Restoration of degraded areas and flood-prone zones through wetland conservation and reforestation.
* Expansion of urban green spaces, such as parks, green corridors, and permeable surfaces, to mitigate heat stress and enhance water absorption.
* Sustainable land-use planning that prevents urban expansion into climate-sensitive areas.

✔ **Sustainable Urban Mobility and Climate Adaptation:** The project strengthens low-carbon and climate-adaptive transport infrastructure, aligning with the NAP’s goals for urban resilience. Measures include:

* Expansion of pedestrian-friendly spaces and cycling infrastructure to reduce reliance on motorized transport.
* Public transport prioritization, ensuring greater resilience to extreme weather events through dedicated bus lanes and elevated transit corridors.
* Studies for Bus Rapid Transit (BRT) and electric public transport, integrating adaptation and mitigation strategies in urban mobility.

*To be completed by the IDB Team. Based on the above in the previous section, how can you justify that the operation is not inconsistent with those national priorities?*

| [C3 Is the operation inconsistent with relevant policies/strategies and with private sector or community-driven priorities for climate adaptation and resilience?](#kix.dti3simqtoar) | |
| --- | --- |
| **☐**[**YES**](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.49x2ik5) | ☐NO  ☐ |
| Rationale:  *Based on the above in the previous section, how can you justify that the* ***operation*** *is not inconsistent with those national priorities?*  [Insert text] | |

#### **2.2 Vulnerability Context (3-step evaluation only if applicable)**

The Vulnerability and Natural Risks Study for Florianópolis has identified significant climate risks affecting the metropolitan region. The city’s geographical location as a coastal urban center, combined with unregulated urban expansion and climate change-driven extreme weather events, makes adaptation measures essential.

**1. Climate Hazards**

* Coastal and Riverine Flooding: Rising sea levels and increased precipitation exacerbate urban flooding, threatening low-lying neighborhoods, road infrastructure, and critical services.
* Landslides: Unstable slopes, particularly in informal settlements, pose a high risk of displacement during extreme rainfall.
* Extreme Weather Events: Increased frequency and intensity of storms, heatwaves, and strong winds impact infrastructure, public safety, and economic activity.

**2. Exposure**

* More than 150,000 residents are currently exposed to flooding risks, with a high concentration of vulnerable populations in informal settlements.
* Critical infrastructure, including transportation corridors, hospitals, and public buildings, is located in high-risk zones.
* Economic activities highly dependent on tourism and coastal resources are at risk from coastal erosion and environmental degradation.

**3. Vulnerability**

* High social vulnerability: Low-income populations lack access to climate-resilient housing and services, increasing displacement risks.
* Deficiencies in climate-adaptive urban planning: Drainage infrastructure and coastal defense systems are inadequate for extreme climate scenarios.
* Uncontrolled urban expansion into flood-prone and ecologically sensitive areas worsens long-term exposure and limits adaptation capacity.

**Proposed Response Strategies:** To reduce the climate vulnerability of Florianópolis, the project will implement the following adaptation strategies:

✔ Flood and Coastal Protection Measures

* Improvement of drainage infrastructure and stormwater management to reduce urban flooding.
* Wetland restoration and green retention basins to enhance natural water absorption and prevent overflow.
* Coastal resilience programs, including dune stabilization and mangrove conservation, to protect against sea-level rise and erosion.

✔ Climate-Resilient Infrastructure and Housing

* Development of resilient social housing projects, incorporating elevated structures, water-resistant materials, and climate-smart urban design.
* Relocation of at-risk populations from high-exposure areas to safer, climate-resilient housing.
* Implementation of cooling strategies in public spaces (e.g., tree-lined streets, green roofs, and permeable pavements) to mitigate extreme heat effects.

✔ Urban Mobility Adaptation

* Prioritization of climate-resilient public transport infrastructure, including elevated BRT corridors and storm-resistant stations.
* Expansion of pedestrian and cycling infrastructure, reducing exposure to extreme heat and flooding.
* Strengthening transport infrastructure maintenance programs to improve resilience to extreme weather events.

✔ Institutional Capacity and Governance for Adaptation

* Integration of climate risk assessments into municipal planning to guide future urban development.
* Implementation of early warning systems and disaster preparedness programs to improve response capacity.
* Community engagement programs to enhance climate awareness and local adaptation efforts.

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#### **2.3 Summary of the application of Standard 4 of the ESPF**

The Florianópolis Urban Development Program: Floripa for All incorporates environmental and social considerations aligned with Standard 4 of the Environmental and Social Policy Framework (ESPF). The program integrates climate resilience and disaster risk management into urban planning and infrastructure development.

The key measures aligned with Standard 4 include:

* Climate Risk Management: The project area is highly vulnerable to sea level rise and extreme weather events. A quantitative risk assessment for floods, landslides, and dune movements has been incorporated into the project design. This assessment will define mitigation measures and inform the Disaster Risk Management and Climate Change Plan.
* Adaptation Strategies: The operation prioritizes integrating climate adaptation into urban planning, including the development of housing solutions resilient to climate impacts. The Social Interest Housing Plan will incorporate risk and climate change studies to ensure long-term adaptation measures.
* Environmental Recovery and Biodiversity Protection: Given the project's direct and indirect interventions in environmentally sensitive areas, it includes environmental recovery initiatives to protect biodiversity and enhance climate adaptation.
* Institutional Strengthening: The executing agency lacks prior experience with ESPF-aligned projects, necessitating technical and institutional strengthening measures to enhance long-term climate resilience.
* Infrastructure Resilience: The project includes enhancements to urban and transport infrastructure, incorporating sustainable mobility solutions such as pedestrian and cycling infrastructure, public transport prioritization, and the development of a decarbonization plan for the municipality.

#### **2.4 Conclusion of alignment with the adaptation goal of the PA**

*(to be completed by IDB Team)*

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# **3. Climate change mitigation**

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#### **3.1 Compatibility with mitigation goal of the NDC and Long-Term Strategy**

The Florianópolis Urban Development Program: Floripa for All aligns with Brazil’s Nationally Determined Contribution (NDC) by integrating climate mitigation measures in its urban development initiatives. According to Brazil’s NDC ([NDC Brazil, 2024](https://unfccc.int/sites/default/files/2024-11/Brazil_Second%20Nationally%20Determined%20Contribution%20%28NDC%29_November2024.pdf)), the country aims to reduce greenhouse gas (GHG) emissions by 50% by 2030 compared to 2005 levels and reach climate neutrality by 2050. Florianópolis' urban development interventions contribute to these goals by prioritizing low-carbon solutions, sustainable urban mobility, and infrastructure resilience.

Alignment with the NDC Mitigation Priorities

* The program includes measures such as energy efficiency improvements in housing and buildings, sustainable public transport, and green infrastructure, which are in line with Brazil's mitigation strategies outlined in the NDC.
* The transport interventions focus on non-motorized mobility (pedestrian and cycling infrastructure) and public transport improvements, supporting the decarbonization of urban mobility—one of the key priorities of Brazil’s NDC.
* Investments in afforestation, reforestation, and ecosystem restoration contribute to carbon sequestration and align with Brazil’s AFOLU (Agriculture, Forestry, and Other Land Use) sector strategies.

Mitigation Contributions in the Florianópolis Context

* GHG Emissions Context: Florianópolis' transport sector is the highest emitter of GHGs, accounting for 1.8 million tCO2e/year, as reported in the Florianópolis Emissions and Mitigation Study (IDOM)​. The project seeks to mitigate this impact by improving public transportation, reducing car dependency, and implementing smart growth strategies.
* Projected Mitigation Impact: The Smart Growth Scenario outlined in the emissions study demonstrates that, with proper mitigation actions, Florianópolis can reduce emissions from 2.0 million tCO2e (2013) to 1.9 million tCO2e by 2050, preventing a projected increase to 3.5 million tCO2e under a Business-As-Usual (BAU) scenario​.

Key Project Contributions to Mitigation Goals

* Integration of a Long-Term Climate Strategy: The project supports the city's efforts to reduce emissions from transport, urban infrastructure, and energy use while promoting low-carbon urban planning.
* Public Transport Prioritization: The project includes dedicated public transport lanes, studies for a Bus Rapid Transit (BRT) system, and transit-oriented urban planning, all of which align with Brazil’s long-term mobility decarbonization strategy.
* Climate-Resilient Urban Infrastructure: The initiative incorporates energy-efficient public infrastructure and green building certifications, directly supporting Brazil’s low-carbon urban development targets.

In summary, the Florianópolis Urban Development Program is aligned with Brazil's NDC mitigation commitments by promoting low-carbon transport, energy-efficient buildings, green infrastructure, and urban sustainability measures, thereby contributing to Brazil's 2030 and 2050 climate goals.

#### **3.2 Classification of activities as per the lists**

*To be completed by the IDB Team. Based on the comparison between the activities financed by the operation and the list of activities considered universally aligned and universally not aligned to the mitigation goals of the Paris Agreement as per the Appendix of the IDB Group PAIA (*[*GN-3142-1*](https://idbg.sharepoint.com/teams/ez-SEC/Registered%20Documents/RI-Reg-GN/RIRegGNEnglish/IDB%20Group%20Paris%20Alignment%20Implementation%20Approach%20-%20Principles,%20Methodology,%20and%20Technical%20Guidance.pdf)*):*

| [U1. Are all activities in the project included in the 'universally aligned list' with activities that have a positive or negligible impact on the climate?](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.2p2csry)      [*(This includes verifying that any activity considered universally aligned does not directly depend on fossil fuels, subsidies on fossil fuels, or exploitation of fossil fuels for its economic viability, nor cause promote the expansion into high carbon stocks areas.*](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.147n2zr)*)* | |
| --- | --- |
| ☐YES | ☐NO |
| Justification (list under which categories):  Break down the activities funded under each component and relate them to the applicable categories. In case you have selected universally aligned activities that require a justification (\*) please place them here.   * [Text]   The Operation includes the following investment typologies that are on the list of universally aligned activities according to the joint MDB methodology:  These criteria are consistent with the criteria of the aforementioned list of activities aligned with the Paris Agreement of the IDB Group's sectoral technical guidance. | |

| U2. Is any activity in the project included in the 'universally non-aligned list' with activities that have a negative impact on the climate? (coal or peat) | |
| --- | --- |
| **☐**[**YES**](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.3o7alnk) | ☐NO |
| Justification: No coal or peat is financed directly or indirectly. | |

| U3. Does this operation have an activity or activities that require(s) a specific assessment to validate its alignment with the mitigation objectives of the PA? | |
| --- | --- |
| **☐** YES | ☐NO |
| List activity(ies) that do not fit in the list of universally aligned activities and provide more detail on the specific activity. |

#### **3.3 Specific assessment of alignment with the mitigation objective of the PA**

*(to be completed by IDB Team)*

| [SC1 Is the operation/economic activity inconsistent with the NDC of the country in which it takes place?](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.23ckvvd) | | |
| --- | --- | --- |
| **☐**[**YES**](#kix.j1fqb3dzbfb7) | ☐NO | ☐N/A |
| *Please use section 3.1 to review the national GHG mitigation commitments and objectives that are relevant to this sector. Based on that information, and considering the activities that cannot be considered universally aligned, please respond:*  Rationale:  The operation is not inconsistent with the NDC given that xx | | |
| SC2 Is the operation/economic activity, over its lifetime, inconsistent with the country’s LTS or other similar long-term national economy-wide, sectoral, or regional low-GHG strategies compatible with the mitigation goals of the Paris Agreement? | | |
| **☐**[**YES**](#kix.j1fqb3dzbfb7) | ☐NO | ☐N/A |
| *Please use section 3.1 to review the national GHG mitigation commitments and objectives that are relevant to this sector. Based on that information, and considering the activities that cannot be considered universally aligned, please respond:*  Rationale:  The operation is not inconsistent with the country’s LTS or other similar long-term national economy-wide, sectoral, or regional low-GHG strategies compatible with the mitigation goals of the PA given that xx | | |

| [SC3 Is the operation/economic activity inconsistent with global sector-specific decarbonization pathways in line with the Paris Agreement mitigation goals, considering countries’ common but differentiated responsibilities and respective capabilities](https://docs.google.com/document/d/1jqDFg7E_9Q27zeQS2Rb6Swjnryj_RPyp/edit#bookmark=id.ihv636)? | | |
| --- | --- | --- |
| **☐**[**YES**](#kix.j1fqb3dzbfb7) | ☐NO | ☐N/A |
| *Please use this section to review relevant milestones, actions and/or benchmarks in global sector-specific pathways that guide decarbonization efforts in this type of activity, and add information on any context-specific circumstance that appeals to the principle of common but differentiated responsibilities:*  Rationale: The operation is not inconsistent with global sector-specific decarbonization pathways in line with the Paris Agreement mitigation goals given that xx | | |

| [SC4 Does the operation/economic activity prevent opportunities to transition to Paris-aligned activities, OR primarily support or directly depend on non-aligned activities in a specific country/sectoral context?](#kix.g9hq9d4lg00e) | | |
| --- | --- | --- |
| **☐**[**YES**](#kix.j1fqb3dzbfb7) | ☐NO | ☐N/A |
| *The project team should use this section to reflect conclusions from the technical and economic feasibility analysis of alternatives for the operation, considering whether lower-GHG alternatives are available in the context, whether there are risks of stranded assets and how transition risks are managed.*  *Based on the operations’ economic and financial analysis, please determine:*  The operation does not prevent opportunities to transition to PA aligned activities or primarily supports or directly depends on non-aligned activities given that xx | | |

| [SC5 Is the operation/economic activity economically unviable, when taking into account the risks of stranded assets and transition risks in the national/sectoral context?](#kix.nmy3gk7jnspx) | | |
| --- | --- | --- |
| **☐**[**YES**](#kix.j1fqb3dzbfb7) | ☐NO | ☐N/A |
| *The project team should use this section to reflect conclusions from the technical and economic feasibility analysis of alternatives for the operation, considering whether lower-GHG alternatives are available in the context, whether there are risks of stranded assets and how transition risks are managed.*  *Based on the operations’ economic and financial analysis, please determine:*  The operation is not economically unviable when taking into account the risks of stranded assets and transition risks in the national sectoral context given that xx | | |

#### **3.4 Conclusion of alignment with the mitigation objective of the PA**

*(to be completed by IDB Team)*

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# **4. Climate finance approach**

To account for climate finance, the project should include investments that reduce greenhouse gas (GHG) emissions (mitigation) and increase resilience to climate impacts (adaptation). Potential measures for this operation are:

**Climate Mitigation Finance Measures**

✔ Low-Carbon Transport and Urban Mobility

* Bus Rapid Transit (BRT) system feasibility studies and implementation to reduce fossil fuel reliance and enhance public transport efficiency.
* Expansion of non-motorized transport infrastructure (bike lanes, pedestrian pathways) to reduce GHG emissions from private vehicles.
* Fleet electrification pilots for municipal services and public transport, positioning Florianópolis as a leader in low-emission urban mobility.

✔ Energy Efficiency and Decarbonization in Urban Infrastructure

* Energy-efficient building design with green certification requirements (e.g., EDGE, LEED) for new housing and public facilities.
* Deployment of smart street lighting systems with solar and LED technology to reduce urban energy consumption.
* Water efficiency measures, including rainwater harvesting systems and low-energy wastewater treatment, to optimize resource use in urban infrastructure.

✔ Carbon Sequestration and Nature-Based Solutions

* Reforestation initiatives to increase carbon sinks and mitigate urban heat islands.
* Coastal ecosystem restoration (mangroves, dunes, wetlands) to enhance carbon sequestration and biodiversity protection.
* Sustainable waste and circular economy initiatives, such as organic waste composting and biogas production, to reduce landfill emissions.

**Climate Adaptation Finance Measures**

✔ Disaster-Resilient Urban Planning and Infrastructure

* Relocation of at-risk communities to climate-resilient housing with stormproof design, elevated structures, and flood-resistant materials.
* Development of integrated flood management systems, including green infrastructure and stormwater retention basins.
* Implementation of a municipal Climate Resilience Strategy, incorporating early warning systems and emergency preparedness programs.

✔ Sustainable Water and Drainage Systems

* Expansion of permeable surfaces in public spaces to improve stormwater absorption and reduce runoff.
* Upgrading of urban drainage systems with climate-adaptive designs to prevent flooding in high-risk neighborhoods.
* Rehabilitation of degraded water bodies, restoring natural hydrological cycles to enhance urban water security.

✔ Institutional Capacity-Building for Climate Resilience

* Municipal training programs on climate risk management for local authorities and urban planners.
* Integration of climate risk data into city planning tools, ensuring long-term resilience in infrastructure investments.
* Public-private partnerships for climate innovation, fostering investment in resilient, low-carbon technologies.

# **5. Green finance approach**

To qualify for green finance, the operation should prioritize environmental sustainability investments beyond climate action, incorporating strategies for biodiversity conservation, pollution control, and ecosystem-based urban planning.

**Green Finance-Eligible Components**

✔ Urban Biodiversity and Ecosystem Restoration

* Greening of public spaces, creating urban forests, green roofs, and community gardens to enhance biodiversity.
* Integration of ecological corridors, ensuring habitat connectivity for urban wildlife and strengthening ecosystem resilience.
* Sustainable landscape management strategies, including tree planting and rewilding projects in urban expansion areas.

✔ Water Management and Pollution Control

* Wetland conservation and stormwater management to improve water quality and urban flood resilience.
* Decentralized wastewater treatment solutions, ensuring cleaner waterways and reduced contamination risks.
* Regenerative agriculture and agroforestry initiatives in peri-urban areas to prevent soil degradation and improve carbon capture.

✔ Circular Economy and Sustainable Waste Management

* Promotion of recycling and composting programs, supporting waste diversion from landfills.
* Implementation of sustainable construction materials, reducing the carbon footprint of new infrastructure projects.
* Expansion of renewable energy use in municipal facilities, contributing to green energy finance eligibility.

✔ Green Urban Infrastructure and Sustainable Building Design

* Low-impact urban infrastructure, incorporating climate-responsive architecture and passive cooling strategies.
* Integration of smart water and energy grids, improving urban efficiency and reducing environmental pressures.
* Development of carbon offset mechanisms, allowing Florianópolis to generate green finance through emissions reductions.