



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 23-May-2022 | Report No: PIDC33453



BASIC INFORMATION

A. Basic Project Data

Country Brazil	Project ID P178557	Parent Project ID (if any)	Project Name Integrated Sustainable Mobility Project in the Foz do Rio Itajaí Metropolitan Region (P178557)
Region LATIN AMERICA AND CARIBBEAN	Estimated Appraisal Date Nov 14, 2022	Estimated Board Date Mar 30, 2023	Practice Area (Lead) Transport
Financing Instrument Investment Project Financing	Borrower(s) CIM - AMFRI (Foz do Rio Itajaí Region Consortium of Municipalities)	Implementing Agency Consortio Intermunicipal Multifinalitário - AMFRI	

Proposed Development Objective(s)

The Project Development Objective (PDO) is to improve urban accessibility and mobility in select areas of the Foz do Rio Itajaí Region in an inclusive, sustainable, resilient, and safe manner.

PROJECT FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	200.00
Total Financing	200.00
of which IBRD/IDA	90.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	90.00
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Non-World Bank Group Financing

Counterpart Funding	30.00
Borrower/Recipient	30.00



Commercial Financing	80.00
Unguaranteed Commercial Financing	80.00

Environmental and Social Risk Classification

Substantial

Concept Review Decision

Track II-The review did authorize the preparation to continue

A. Country and Sectoral Context

- Economic conditions in Brazil, exacerbated in 2021 by median inflation of 10 percent, combined with the Global Pandemic, have disproportionately affected the poor and most vulnerable.** Low-income groups and those living in urban areas were most affected. The compounding political and health crisis, slow economic recovery, high unemployment rates, and high rates of informality have severely limited the capacity for a large portion of the socially vulnerable population to rebound from this series of continuous and contiguous events. In this backdrop, economic and social progress gained over the last two decades has been partially eroded. Many are expected to be pushed back to poverty, especially if they lose their jobs.
- Brazil’s investment in infrastructure has lagged comparable nations for many years, ranking 78th in the world according to the World Economic Forum’s Global Competitiveness Index of 2019.** Since peaking at 2.3 percent of GDP in 2014, public investment in infrastructure has declined steadily, reaching a minimum of 1.7 percent of GDP in 2019. Such levels of investment are barely enough to fully cover the annual depreciation of existing infrastructure assets, estimated at R\$91 billion¹. It is estimated that Brazil needs to invest around 4 percent of GDP in infrastructure over the next decade to achieve the SDGs by 2030, with half of that in transportation. In recent years, the Brazilian Government’s strategy has been to promote private investments in transportation infrastructure through authorizations, concessions, and Public-Private Partnerships (PPPs) for critical projects that support economic growth, competitiveness, and productivity.
- Brazil is the largest net GHG emitter in Latin America and the sixth largest globally, accounting for approximately 2.3 percent of global emissions.** However, Brazil’s emissions per capita are low relative to other large economies (1.9 tCO₂e, compared to USA 15.0, China 6.8, and EU 6.1). Brazil’s main sources of emissions are agriculture and livestock (33 percent), energy (29 percent, including fossil fuel use in transportation), land-use change and forestry (27 percent), industrial processes (6 percent), and residues (4 percent). Between 1990 and 2019, emissions in the energy sector increased by 114 percent, representing 10 percent of all emissions in the early 1990s to 19 percent in 2019. In the energy sector, transportation activity represented 38 percent (196.5 Mt of CO₂e) of GHG emissions for the sector due to its high dependence on fossil fuels². Road-based modes are mainly responsible for emissions, especially trucks, followed by private cars. Cargo is currently accountable for 102 Mt (52 percent) of emissions from the transportation

¹ World Bank (2017) “Back to Planning: How to Close Brazil’s Infrastructure Gap in Times of Austerity.”

² Analysis of Brazilian Greenhouse Gas Emissions and Their Implications For Goals of Climate of Brazil 1970-2019. Greenhouse Gas Emission and Removal Estimation System - SEEG 8: Climate Observatory, 2020.



activity, while passengers correspond to 95 Mt (48 percent). Analyzing by mode of transportation, trucks contribute 79 Mt (40 percent), cars account for 61 Mt (31 percent), and buses 19Mt (10 percent).

4. **Extreme rainfall events that triggered flash floods and landslides were responsible for 74 percent of the deaths related to natural disasters in the 1991–2010 period in Brazil.** Nearly every highly populated municipality in Brazil was affected by floods between 2009 and 2014, and about 50,000 low-income homes were destroyed.³ Increased flooding will disrupt infrastructure networks, and sea-level rise could significantly increase the number of people exposed to coastal floods. There are also indirect costs to transportation disruptions. Every year, Brazilian firms lose USD 22 billion (1.27 percent of GDP) due to infrastructure disruptions, most of which are due to transportation and power disruptions (from Lifelines' report) and limited planning for maintenance due to extreme weather.

B. Sectoral and Institutional Context

5. **Mobility and the quality of urban transportation are longstanding obstacles to improving productivity and sustaining economic growth in Brazilian cities⁴.** Due to years of low investments, Brazil remains below countries of similar income in the development and quality of the transportation infrastructure and services. This is particularly the case in large cities, and growing metropolitan areas, such as the Foz do Rio Itajaí Region, one of the fastest population growth areas in the country. The need for effective and coordinated inter-municipal governance, including integrated transportation and urban planning, makes the management of metropolitan areas even more complex. Recent studies have found that the external cost of motor vehicle congestion and other negative externalities from urban transportation in Brazil, such as traffic-related deaths and injuries, air pollution, and global emissions, can reach 8 percent of a metropolitan area's GDP and increase the cost of public transportation operations up to 16 percent⁵.
6. **The lack of high-quality public transportation contributes to negative externalities and decreased productivity in Brazilian cities.** Most Brazilians (85 percent) live in urban areas where transportation contributes significantly to GHG emissions, local air quality, and water pollution, impacting health and well-being. The lack of mass transit infrastructure and high-quality public transportation services spurs the use of cars and motorcycles, resulting in greater congestion, higher emissions of local and global pollutants, and a higher number of traffic injuries and fatalities. This leads to worse health outcomes and quality of life for urban residents and decreased productivity for the main economic centers of Brazil. Those who earn a living outside the home, including the working poor and essential workers, are sometimes forced to spend more than two hours daily and more than 15% of their income on their Home-Work-Home commute.
7. **Brazil's Nationally Determined Contributions (NDC), submitted to the UNFCCC in December 2020, includes public transportation in urban areas as part of the Country's climate action strategy⁶.** Investment in low-carbon and climate-resilient mass transit systems, such as Bus Rapid Transit (BRT) systems, can provide high-quality services at an affordable cost while encouraging active mobility and reducing the dependence on private motorized

³ Debortoil, N. et al., (2017). An index of Brazil's vulnerability to expected increases in natural flash flooding and landslide disasters in the context of climate change. *Natural Hazards*. 86, p. 557 – 582.

⁴ IPEA (2016) Discussion Paper on "Desafios da Mobilidade Urbana no Brasil."

⁵ Estado de Sao Paulo (2021), "Summit Mobilidade": Studies of Congestion in Brazil showing estimated costs of R\$267 billion annually in the main 9 metropolitan areas: <https://summitmobilidade.estadao.com.br/sustentabilidade/modelo-centrado-no-carro-individual-custa-carro-para-o-estado/>

⁶ Brazil confirms its commitment to reduce its greenhouse gas emissions in 2025 by 37%, compared with 2005. Additionally, Brazil commits to reduce its emissions in 2030 by 50%, compared with 2005.



transportation. BRTs have become an attractive urban transit alternative in many developing cities due to their cost-effective and flexible implementation. Such a system provides transportation services similar to subways or light rail but costs a fraction to implement and operate. BRT provides dedicated right-of-way lanes and pre-paid stations to pick up and drop off passengers more efficiently, offering high-capacity transportation with higher average speeds. Because of these characteristics, the BRT has been adopted by 181 cities worldwide, including in dozens of low- and middle-income countries. It generally offers a faster, safer, and more attractive alternative to commuters than regular bus services. Transportation electrification is also considered a promising solution for climate change mitigation in Brazil. The Brazilian electricity matrix is mostly clean, with 84.8 percent of the country's electricity generated through renewable energy.

8. **The Foz do Rio Itajaí Metropolitan Region (“Region”) in the Brazilian State of Santa Catarina, comprises 11 municipalities (namely *Balneário Camboriú, Balneário Piçarras, Bombinhas, Camboriú, Ilhota, Itajaí, Itapema, Luiz Alves, Navegantes, Penha and Porto Belo*).** The 11 municipalities are members of the Association of Municipalities of the Foz do Rio Itajaí Region (AMFRI) founded in 1973. A multi-purpose inter-municipal Consortium (also known as CIM-AMFRI) was created in 2019 to act as a public authority for AMFRI to implement strategic projects that require strong regional coordination and policies that promote sustainable development in the Region. CIM-AMFRI includes a council of 11 mayors, the main decision-making body, and an Executive Director.
9. **The Region has a year-round population of 742,000 people distributed along 1,004 km², with an impressive population growth of 3.6 percent per year during the last five years.** This population growth rate is three times the average for the State of Santa Catarina (SC). According to the AMFRI's projected demographic estimations, by 2030, the year-round population is expected to reach 1.1 million inhabitants. The Region is one of the main touristic and fastest growing areas in Brazil, increasing due to the massive influx of migrants. Its total population (including floating) doubles during the peak holiday season, reaching more than 1.4 million due to seasonal touristic inflow.
10. **While the Region has one of the highest average GDP per capita and HDI in the country⁷, there are still high levels of inequality and significant barriers for the low-income population to access job opportunities, markets, and services.⁸** More than one-third of the population in the Region is considered poor, with an average salary of only 2.6 minimum wages (with extremes of 2.1 in Camboriú and 3 in Itajaí). The largest sectors of the economy and jobs in the Region are in real estate, port logistics, food processing, retail, and tourism. A large share of the population lives in areas where jobs are not available and need to commute every day to the large job centers, namely the retail and port areas of Itajaí city or the tourism-related jobs in the Balneário Camboriú Beach. Pockets of unemployment, underemployment, and a lack of efficient integration between municipalities also contribute to social inequalities. Higher poverty areas scattered throughout the Region are not connected to major employment centers with affordable transportation options. Based on the travel demand in the Region, there are metropolitan trip patterns between the municipalities for jobs, services, and leisure, with an average of 1.9 million total trips per day in 2016 and projected to grow to 3.7 million by 2030. The average commuting time in the Region was estimated at around 103 minutes for Home-Work-Home trips and continues to increase⁹. The job-housing imbalance and a lack of metropolitan public transportation services exacerbate mobility and affordability problems for vulnerable populations.

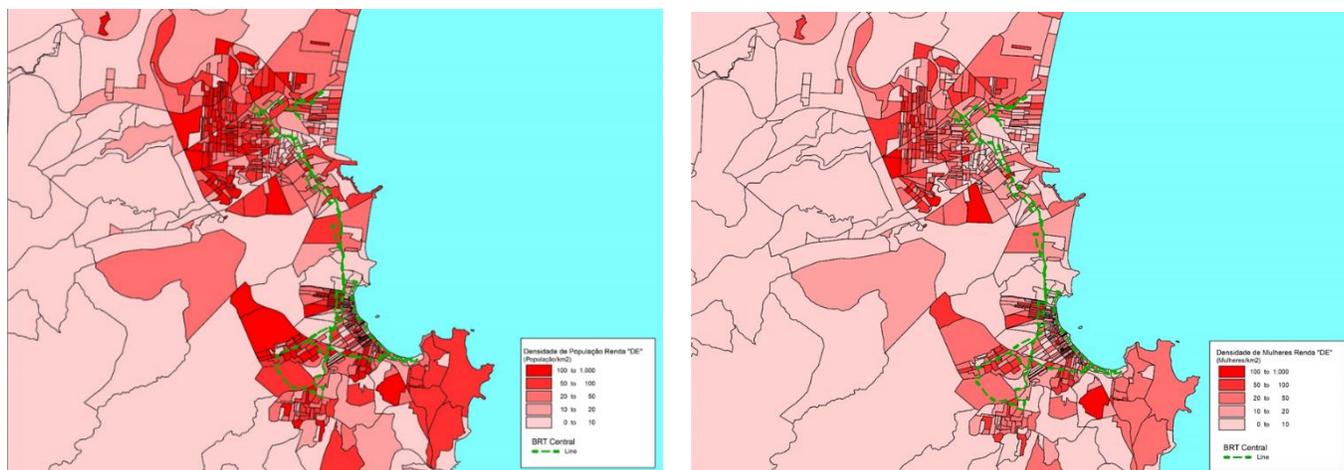
⁷ 42500 R\$ GPD per capita in the Region; HDI from 0,845 to 0,726 in the Region – showing the high differences among the Municipalities.

⁸ <https://fnembrasil.org/regiao-metropolitana-da-foz-do-rio-itajai-sc/>

⁹ FIRJAN (2015), “Cost of Congestion in several Brazilian Metropolitan Areas.”



Figure 1: Density of total population (left) and female population (right) belonging to Bottom 40 percent in the Region (Classes D & E of median income in Brazil)



- 11. The Region currently lacks an integrated public transportation system connecting the population across the 11 municipalities.** The lack of integration between bus routes and fares in the Region¹⁰ contributes to the low patronage of public transportation and a very high private motor vehicle mode share. And as congestion has surged, public transportation services become less frequent and more unreliable, their operating cost goes up, and the ridership decreases, creating a vicious circle of worsening quality and lower demand. Despite recent investments in bikeways and sidewalks, the Region still suffers from a car-centric design of roads and public spaces and a lack of integration between bus services and non-motorized transportation (also known as active mobility). Existing bikeways are not connected to the main bus routes and between the municipalities in the Region, not allowing for the safe use of bicycles for inter-municipal trips. Another issue that affects mobility between the Southern and the Northern part of the Region, divided by the Itajaí-Açu River, is the lack of a permanent and dry river crossing. The Region relies on existing ferryboats to cross from Navegantes (mostly residential area) to Itajaí (commercial and logistics area), which can add 30 minutes for the crossing or even longer detours on the BR-101 bridge. For that reason, working towards a permanent fixed link between the two sides of the river is a pressing issue in the Foz do Rio Itajaí Region, and an immersed river tunnel has been proposed to be studied (described in Annex B).
- 12. The high dependence on private motor vehicles and poor road safety outcomes are major concerns in the Region.** The current modal share of private cars (65 percent) and motorcycles (15 percent) are expected to continue increasing at the expense of public transportation (10 percent) and non-motorized transportation if current trends continue. The growth of the private motor vehicle fleet in the region has averaged 7.7 percent per year in the last five years, which is double the population growth. The high reliance on private motor vehicles generates high traffic congestion levels, deteriorates air quality, increases CO₂ emissions, and contributes to excessive traffic crashes. Therefore, the lack of good quality public transportation results in the low-income population needing to rely on private vehicles, typically cheaper, poor-quality cars or motorcycles that emit more pollutants and are less safe. SC

¹⁰ The longest intermunicipal bus trips in the Region currently take over between 5 and 7 hours to travel 70 kms between Bombinhas in the South and Balneário Piçarras in the North and costs the user up to R\$25, which is unaffordable for poor families that need to travel for work or essential services. Compared to the car trip that takes between 1 h 30 min and 2 h depending on the congestion. Source: AMFRI



has a higher road traffic fatality rate than other states in southern Brazil¹¹, which is also higher than the average in Brazil. The excessive use of motorcycles, high levels of tourism, lack of enforcement against risky driving behaviors, and lack of adequate public transportation services and active mobility infrastructure (sidewalks, bike paths, and safe crossings) are some of the reasons behind the high level of traffic injuries and fatalities.

13. **Women and minorities in Brazil and the Region, especially Afro descendants, have the lowest access to job opportunities and have a disproportionately higher incidence of poverty rates.** Those groups tend to have lower wages and longer commuting times. While there is a lack of gender-disaggregated mobility data for Foz do Rio Itajaí¹², women's and men's different mobility patterns are expected to be similar to other Brazilian cities, which coincide with several urbanized settings in Latin America. According to a baseline Bank study in Sao Paulo, women rely more on public transportation and walking than men, while men have more access to private vehicles. Moreover, when it comes to public transportation, women use more buses than rail services, which tend to have much lower speeds and greatly reduce their access to economic opportunities. Women tend to make more time-consuming chained trips and multi-purpose journeys, such as jobs, childcare, and shopping.
14. **Regarding minorities, one group of attention is the refugees.** The State of SC is the sixth State in Brazil with the most refugees in Brazil (30,000), with a predominance of African nationalities. The region had a significant increase in the migratory flow due to higher employment rates than in other States, which caused the entry of immigrants of Haitian, Senegalese, and Venezuelan origin. Although the State of SC is home to migrations with a significant plural identity constitution, there is a continuous marginalization and disqualification of non-European, non-white ethnicities. The cases of racial slurs and racism, when added to xenophobia, make them fall into a condition of hypervulnerability, barriers to the integration of these peoples into the labor market and services. Therefore, the accessibility of schools, childcare, and other services for women and minorities to public transportation is critical. Also, jobs of low skill levels in the transportation sector are disproportionately occupied by men and women who lack opportunities due to gender norms and stereotypes, among other factors.
15. **Public transportation safety and security are other mobility barriers that disproportionately affect women.** According to a survey from 2019 by the Locomotiva and Patrícia Galvão Institutes in all the Brazilian regions, 97 percent of interviewed Brazilian women said they had experienced sexual harassment on public transportation or in taxis or ride-hailing vehicles. In addition, the lack of integrated security response protocols on public transportation in the Region is a barrier to effectively responding to sexual harassment and providing adequate care to survivors. Besides sexual harassment constituting a barrier to gender equality, it also directly impacts women's access to economic opportunities. According to data from ILO, a lack of safe transportation reduces the probability of women accessing economic opportunities by 16.5 percent.
16. **The Region is one of the most vulnerable areas in Brazil concerning potential climate change impacts and extreme weather events.** Itajaí suffered heavy rains in 2008 that left around 75 percent of the urban areas under water and suffered one of the few hurricanes that had ever hit Brazil in 2004. Those extreme weather events are becoming more frequent in Brazil.¹³ The Region improved its Disaster Risk Management and Readiness after the 2008 events,

¹¹ 18.7 fatalities per 100,000 inhabitants in 2020 (DATASUS). Higher than the national rate (15.5). Data source: DATASUS.

¹² The World Bank team is analyzing travel demand differentiated by income and sex in the Region and the data will be available for the PAD.

¹³ Heavy rains in January and February 2022 in several Brazilian states in Brazil left almost hundred fatalities and thousands of people without housing in Rio de Janeiro, Bahia, São Paulo, Paraná, Minas Gerais, Tocantins, Pará and other States. In the two years since 2020, Brazil has already had 7 named tropical storms, whereas there were 15 in from 2010-2019.



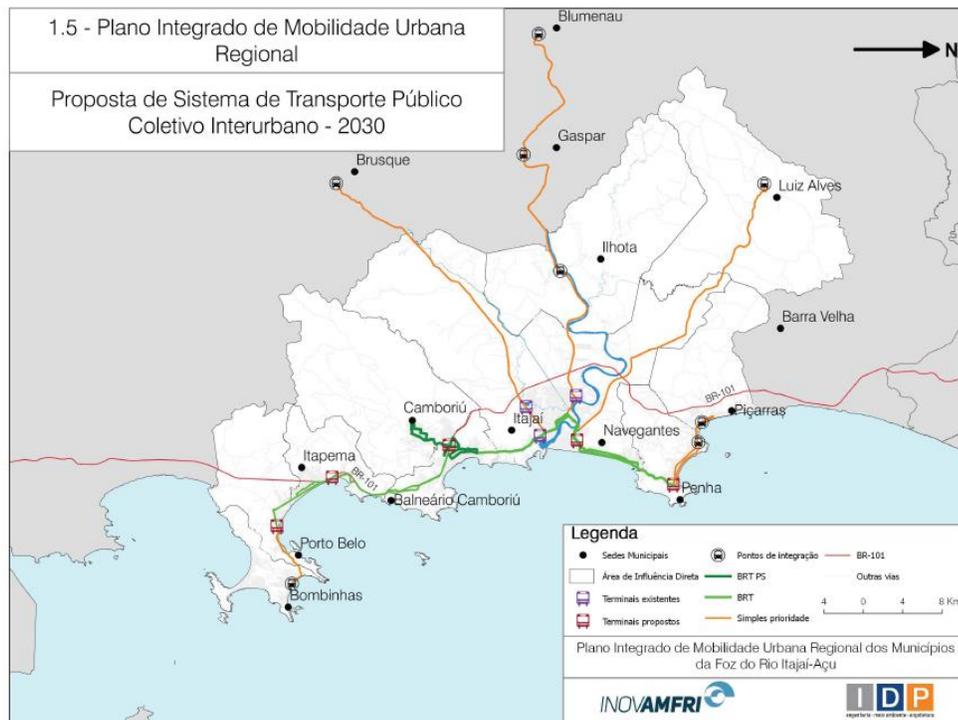
with several flooding control measures upstream of the Itajaí-Açu river. Lately, in early May 2022, the Region was affected by high precipitation levels, which created economic disruption. Moreover, the sea level rise can still be a problem, especially if the Southern Atlantic Ocean warming leads to more hurricanes in the future. The number of impervious areas in the Region, which keep growing with the urbanization of additional areas, and including roads and drainage systems not adequately designed, exacerbates the effects of heavy rains, increasing the vulnerability of the transportation system and the tourism sector, which provides jobs and livelihoods to a large portion of the low-income population.

17. **Demographic pressure is menacing the Region’s biodiversity, which is also one of its most important assets for tourism.** Commonly known as “Costa Verde & Mar,” the Region benefits from having some of the largest remaining pockets of the critically endangered habitat of the Atlantic Rainforest in the Southern part of Brazil. Avoiding degradation and deforestation can also benefit the climate resilience of the Region by absorbing carbon emissions and reducing flooding risks. Demographic growth and real estate development increase new land plots that reduce the available area for the native flora and fauna. Protecting these natural resources and their potential for tourism is key to sustainable development in the Region.

18. **The AMFRI prepared and approved a 2030 Mobility Plan which led to the creation of conceptual studies for the Foz do Rio Itajaí Metropolitan Region Integrated Sustainable Mobility Project (PROMOBIS).** This proposed project seeks to implement a regional mobility system, including the first Bus Rapid Transit (BRT) in the Region. These studies included conceptual design, demand estimates, operational and technological studies to implement an electric vehicle fleet, environmental and social impacts diagnostic, financial and economic analysis, business models, legal assessment, and risk analysis to demonstrate the best alternatives to implement a regional mobility system, including a BRT. The initial study recommended the regional mobility system be implemented through public-private partnerships (PPP) with private financing and public funding. The World Bank conducted a subsequent pre-feasibility analysis in 2020 and 2021 through an Advisory Services and Analytics (ASA) study (Foz Do Rio Itajai BRT Project - P170886) with Global Infrastructure Fund (GIF) support. The pre-feasibility study provided the technical and economic information necessary to prepare the request for an External Financing guarantee from the Federal Republic of Brazil, which was granted in December 2021.

Figure 2: AMFRI 2030 Mobility Plan identifying a Future BRT Network Plan for the Foz do Rio Itajaí Region¹⁴

¹⁴ The first phase is the dark green line shown as BRT PS in the legend) – the other corridors will be mix-traffic in the first phase and potentially becoming BRTs later on. The Operator will be in charge of all four corridors and the Circular line.



Source: AMFRI Mobility Plan (2016)

19. **The proposed Integrated Sustainable Mobility Project in the Foz do Rio Itajaí Metropolitan Region (PROMOBIS) covers the first phase of the Mobility Plan for the Region (Figure 2).** The overall aim is to improve access to jobs and services by implementing inclusive, sustainable, resilient, and safe mobility interventions, including a new, more integrated public transportation system. The improvement of public transportation and the improvement of mobility activity from low-income areas to the central and beach areas (where jobs are concentrated) responds to a long-standing demand from citizens widely discussed in public consultations and reflected in urban planning instruments for the Region. Therefore, the project supports a regional vision developed in a participatory manner with stakeholders, including residents, passengers, businesses, and bus operators.
20. **The proposed project aligns with the World Bank Group’s Country Partnership Framework for Brazil (FY18-FY23) (Report #113259-BR).** It will support three of the CPF’s main objectives. The main objectives to be supported are (i) Objective 2.3: Mobilize greater investment in infrastructure to improve services under Pillar 2: Private sector investment and productivity growth, including through PPPs or concessions in the transportation sector; (ii) Objective 3.1: Support the achievement of Brazil’s NDC, with a particular focus on land use under Pillar 3: Inclusive and sustainable development, by supporting sustainable mobility solutions, including a BRT, Transit-Oriented Development (TOD) and land value capture policies in the Region; and (iii) Objective 3.2: Provide more inclusive and sustainable urban services under Pillar 3, with the project providing improved connectivity and access to jobs and services, particularly for the poorer population in the Region.
21. **The project will also support sustainable mobility infrastructure consistent with the Bank’s Green, Resilient, Inclusive Development approach (GRID)¹⁵ and enable private sector participation and investment.** Upgrading the

¹⁵ <https://openknowledge.worldbank.org/handle/10986/36322>



urban mobility system in the Region, including improving public transportation and non-motorized transportation, will support a greener, more inclusive, and climate-resilient recovery. International BRT experience and preliminary studies in the Region suggest that private financing can be mobilized for the provision and operations of the BRT bus fleet. The project will also support detailed studies and technical assistance on a proposed immersed tunnel with private participation¹⁶. The project is also expected to create employment in labor-intensive sectors (including construction and transportation sectors) and opportunities for socially inclusive and sustainable urban development in the Region.

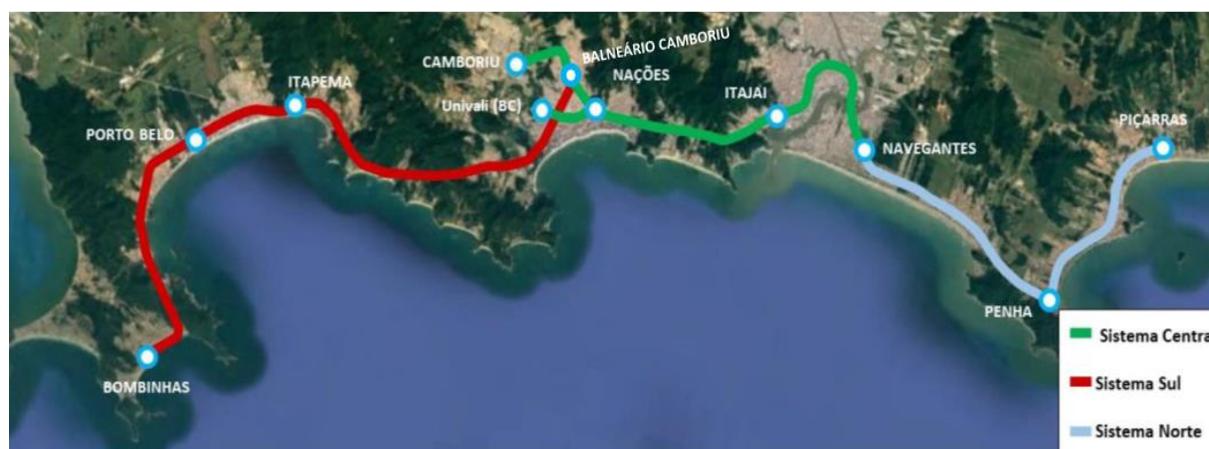
B. Concept Description

1. **The project will support four main components.** A detailed description of each component is in Annex B:
2. **Component 1 - Bus Rapid Transit and enhanced Regional Public Transportation System (BRT - AMFRI):** The first component consists of the implementation of: (i) a new integrated BRT and feeder bus system along the 20.5 km Central System (Figure 2, green line) connecting four municipalities (*Balneário Camboriú, Camboriú, Itajaí and Navegantes*) and including all necessary road infrastructure, exclusive bus lanes, terminals, stations and depots, complementary facilities, fare collection and other necessary systems, as well as consultancies to ensure proper design with climate resilience features, works supervision and BRT operations; (ii) mixed-traffic e-bus corridors connecting additional municipalities in the Region (including the North and South Corridors) that may include bus stops and bays, bus priority measures, and other road improvements; and (iii) an approximate 70 km network of bikeways, bike paths and pedestrian facilities to complement the BRT system and connect the municipalities in the Region. This component will finance studies to attract private participation for BRT operations for activities, including (i) the provision of around 60 electric buses in the first phase of the BRT Network Plan with modern features (including universal accessibility and bicycle storage) and infrastructure for bus charging for the BRT corridors (following successful models from other cities such as Santiago and Bogotá); the (ii) the operation of the BRT Central Corridor and the rest of the integrated public transportation system in Region; and (iii) an Itajaí-Açú River crossing system by fast barges for pedestrians and cyclists until the completion of a future tunnel. The estimated cost for this component is US\$121.1 million, of which approximately US\$59.5 million is IBRD financing, and the remainder is covered by counterpart financing and private financing, subject to confirmation through ongoing studies and project preparation.
3. For Component 1, the Bank and project counterparts have agreed to a conceptual alignment with defined avenues and streets that the BRT Central System will use, which will prevent and avoid, as well as minimize potential impacts to natural vegetation remnants and land acquisition by using existing roadways to accommodate exclusive bus lanes and associated facilities wherever feasible. The only new road construction expected is in already urbanized areas where no alternative exists, such as some segments in Itajaí and Balneário Camboriú (BC) municipalities. Between BC and Itajaí's main urban center, a binary system of roads, including exclusive bus lanes operating in a single direction, is proposed, including the use of a new parallel road under the procurement process. To avoid affection of the critical habitat (Mata Atlântica), it was agreed upon that for a 1-km segment of the existing Avenida Osvaldo Reis in Itajaí municipality, exclusive bus lanes will be built in both directions, requiring expansion of the existing road. Therefore, no critical habitat is expected to be affected by the BRT alignment, and an estimated 150 families may be affected by partial or total expropriation of properties.

¹⁶ The construction of the tunnel is not part of the proposed project.



Figure 3: BRT-AMFRI - Central, North, and South BRT Corridors



4. **Component 2 – Technical Assistance for the proposed River Tunnel between Itajaí and Navegantes.** The second component consists of technical assistance and consultancies necessary to design a proposed Immersed Tunnel for the BRT, active mobility and mix-traffic under the Itajaí-Açu River (the implementation of which is beyond the proposed project's scope). The tunnel option was selected as it has no interference with port operations. This component may include the following consultancies: (i) demand studies to support the design and operations of the tunnel and future phases of the BRT; (ii) studies for the structuring of the tunnel concession as PPP (construction and operation); (iii) elaboration of basic engineering designs, geotechnical studies and risk matrices (including traffic risks and the climate resilience / Disaster Risk Management Technical features necessary for the long-term operation); (iv) environmental and social feasibilities studies for the tunnel, including land use planning and resettlement plans, as necessary; and the (v) re-urbanization design for the low-income area in Itajaí adjacent to the tunnel (Imaruí neighborhood). Having the studies financed by the project will ensure best environmental and social practices will be followed. The component will also support the construction of (temporary) stations for the fast barges until the tunnel is built. The total costs of this component are estimated to be US\$20 million, including US\$2.5 million from the IBRD loan. Counterpart financing is expected to be used for the required expropriation for the future implementation of the tunnel and the re-urbanization of the area adjacent to the tunnel site to ensure adequate sidewalks, green areas, and utilities and minimize the negative consequences of future traffic the impact on Project Affected Population.

5. **Component 3 – Improvements to Active Mobility, Public Transportation, and Climate Resilience in economically vulnerable neighborhoods in Balneário Camboriú (BC) and connection with Beach Area.** The third component consists of the design, implementation, and supervision of active mobility, public transportation, and climate resilience improvements in BC to connect economically depressed and vulnerable areas (including low-income neighborhoods of *Jardim Iate Clube (informal settlement)*, *Nova Esperança*, *Vila Real*, *Bairro dos Municípios* and *São Judas*) to the Central Waterfront and Beach Areas. This component will include the infrastructure for a circular BRT appendix system which will link to the Central BRT and will connect those low-income areas with the Beach, complete streets, pedestrian, and cyclists' corridors, as well as bridges and underpasses (including on national road BR-101, which is one of the main physical barriers in the city) to *Avenida Atlântica* and other areas providing greater access to jobs, services, leisure, and other opportunities. The component will also support transforming road space



for cars into pedestrian-only streets, safe road crossings, and new public areas for children, the elderly, people with disabilities, and the general population. The component will include shared electric micro-mobility services (bicycles) with spaces built along the active mobility corridors and a focus on providing mobility solutions for the low-income population. The component will also improve the climate resilience of the area with climate-informed drainage works and nature-based solutions to protect the coastal and riverfront areas against potential extreme weather events and protect economically vulnerable areas against flooding. Among the design elements are new green areas, removing impervious surfaces, creating nurseries for native vegetation, using innovative low-carbon materials, protecting existing trees, and protected coastal areas to be integrated with the native vegetation to reduce the risks of flooding from sea-level rise. The estimated cost for this component is approximately US\$50 million, of which US\$23 million is expected to come from IBRD financing and the remaining from counterpart funding and private funding raised through land value capture mechanisms, subject to confirmation through ongoing studies and project preparation.

6. **Component 4 – Support for Institutional Strengthening and Project Management.** The fourth component will include consultancies and technical assistance activities for promoting inclusive development, sustainability, resilience, and safety in the Region and support for project management through the recently established Project Implementation Unit (PIU, also known as *Unidade Coordenadora do Projeto* - UCP). These may include studies and technical assistance activities such as (i) Sustainable land use plans including Transit-Oriented Development; (ii) Land Value Capture mechanisms consistent with Brazilian legislation¹⁷; (iii) Policies and planning measures to reduce forest degradation and promote forest restoration in the area; (iv) Developing a Regional Transportation Demand Model and Travel Demand Management policies to disincentive private vehicle use, including a Low-Emissions Zone and parking policies¹⁸; (v) Technical capacity building and labor training programs for women, minorities and economically vulnerable populations to promote inclusive and sustainable economic development; (vi) Studies focused on addressing barriers that women, minorities and other disadvantaged groups may face to use sustainable transportation modes and services; and (vii) Consultancies for designing and implementing transportation PPPs and concessions.
7. Regarding Project Management support, consultancies are included but are not limited to (i) managing and supervising the design and implementation of all components of the project; (ii) conducting bidding and contracting procedures following IBRD guidelines; (iii) evaluating and elaborating reports on the progress of the Project; (iv) coordinating with all other institutions and agencies involved in the project, (v) ensuring the compliance with the IBRD Environment and Social Policy for Investment Project Financing during the implementation of the project, and (vi) creating and implementing mechanisms for citizen engagement and public communications during the project lifecycle. This component is estimated at US\$5 million in IBRD financing, subject to confirmation during project preparation.

Social Inclusion

8. **Implementing integrated sustainable mobility and improved land-use policies is key to achieving socially inclusive and responsible growth in the Region.** This project and policies include promoting public transportation and transit-oriented development, disincentivizing the use of private vehicles through parking and road space management,

¹⁷ For example, Betterment Levies; Air Rights (*Outorga Onerosa do Direito de Construir – OODC*); Transfer of the Right to Build (*Transferência do Direito de Construir - TDC*)

¹⁸ Building on existing policies like the environmental toll for entering Bombinhas or the bicycle subsidy for bikers in Itajaí.



implementing low-emission zones, and other pricing policies or incentives. Support for climate adaptation of the Balneário Camboriú waterfront and low-income areas and promotion of sustainable tourism are also key priorities for the Region, including plans for sustainable real estate development, protecting the biodiversity and landscape assets, and ensuring that tourism can be inclusive in providing new well-paid jobs for the low-income population. The project's technical assistance activities are an opportunity to support the Region in these areas.

9. **Ultimately, the project is expected to benefit the bottom 40 percent of the population in the Region as they tend to rely on public transportation and active mobility to reach jobs and essential services¹⁹.** An integrated fare policy would reduce the cost of inter-municipal bus services for low-income users, which tend to make the longest trips²⁰. Increasing transportation connectivity and accessibility to more jobs and services in the Region will help the low-income population, women, and minority groups grow their job opportunities and potential income. Skills development is also critical if they are to benefit from newly created jobs in tourism, logistics, or other sectors that will benefit from the project and the future economic development of the Region. Improved transportation connectivity to major employment centers and access to skills training will increase the chances of getting better jobs. The AMFRI Consortium (CIM-AMFRI), the Project's implementing agency, has experience producing training programs in the Region and will focus on low-income and vulnerable populations.

Gender

10. **This project expects to address gender issues or gaps, especially women's safety concerns when using public transportation and bike paths.** To address the issue of women's safety concerns and GBV within the transportation, the project will (i) incorporate female passenger-friendly features such as women-only waiting areas, breastfeeding rooms, and sanitation facilities in the design of the BRT stations; (ii) install a Kiosk in the terminals to include specific referral mechanisms for women and girls to report sexual harassment experienced during travel and within the terminal; (iii) establish a dedicated hotline or application to record and refer cases of sexual harassment to the required law enforcement authority; (iv) extensive training of public transportation workers and users of cycle paths and awareness campaigns on measures to support women and girls at risk or in situations of harassment and violence; and (v) women and youth will be priority groups in training activities for access to better jobs (Component 4).
11. **The effectiveness in addressing safety and GBV concerns will be measured by the following indicators:** (i) women who perceive improved safety in public transportation and cycle paths, (ii) percentage of complaints related to sexual harassment in public transportation received through the channels available referred to relevant authorities or service providers. Due to the construction components of the project, a GBV risk assessment was conducted, and the project received a low-risk rating of 8. The project will sensitize the implementing agency to GBV risks and reflect them in the social and environmental risk management instruments to (i) integrate GBV reporting in the GRM and (ii) specify the requirements for a code of conduct to address GBV in the bidding documents.

Citizen Engagement

¹⁹ The Bank has hired a consultant to analyze the expected beneficiaries of the project during preparation.

²⁰ The pre-feasibility study for the BRT system estimates that the user fare for the longest intermunicipal trips will decrease from R\$25 currently to about R\$10 once the integrated system is implemented and that the average fare will be R\$5, which is less than the current cost of a bus ticket.



12. **The project will take a robust citizen engagement approach to contribute to the realization of the PDO. Continuous consultations** will be held on the project with all key stakeholders, especially to include suggestions on safety improvements for pedestrians, cyclists, and passengers (with a special focus on women and people with disabilities). As part of the continuous engagement strategy, satisfaction and perception surveys are carried out, such as perceptions on reducing travel times, improved access to services and work, safety, personal protection, and suggestions for service improvements.
13. **The Stakeholder Engagement Plan (SEP) for the project will provide further information on planned citizen engagement activities.** It is being drafted in a participatory manner. It will identify the key stakeholders to be engaged in disseminating information and consultations, the information requirements of each stakeholder group, the planned methods of consultation, the entities responsible for carrying out the consultations, and the resources needed to implement the SEP. Feedback indicators from project beneficiaries include: (I) User satisfaction with works implementation and public transportation services, including quality and security, differentiated by income and gender (ii) the percentage of complaints related to the Project addressed.

Enabling Private Capital Mobilization

14. **The project will also enable private capital mobilization and other innovations.** Preliminary studies, engagement with the IFC upstream team working in electromobility in Brazil, and international experience with similar projects support the plan to structure PPPs or concessions for private sector financing and provision of a modern bus fleet and operation of the BRT Corridors (primarily through user fares), the provision and operation of barges for the temporary crossing of the river during the first years of the BRT operation (which may be used as water taxis after the tunnel is implemented), land value capture mechanisms for real estate development in the Beach Area (such as betterment levies), and a PPP to Design-Build-Finance-Operate-Maintain a tunnel in a user-pay scheme through tolls. The proposed project is expected to include electric buses, which will reduce transportation GHG emissions, prompt an energy transition towards the use of renewable energy in the transportation sector, and promote public transportation in the Region. It will be the first regional bus system in Brazil using an electric bus fleet²¹. The existing conventional bus fleet will be integrated with the planned BRT system to create a trunk-feeder system.

Climate

15. **The project has a strong climate focus, supporting mitigation of CO2 emissions and ensuring that designs and new infrastructure are resilient to reduce climate risks in the future.** For mitigation, the different components will provide innovative solutions to increment public transportation and active mobility modes across the Region, shifting trips from private motorized transportation models (mostly motorcycles and cars), thus reducing air pollution and CO2 equivalent emissions.
16. Construction and operation of the BRT and the bike paths will trigger urban transportation and active mobility modal shift, contributing to mitigation co-benefits. Additionally, the construction of pedestrian priority corridors connecting low-income areas with the Beach, the similar bike paths, and the e-bus line in the Balneário Camboriú Municipality will also provide modal shift and bring mitigation co-benefits. Finally, the Master plan designs for establishing

²¹ Currently, few Brazilian cities have electric buses in their public transportation service, the largest one is São Paulo, which operates with a pilot fleet of 18 battery-powered e-buses.



restrictive car-use policies for transportation demand management, supporting the Transit-Oriented-Development, and reducing the impact of real estate development on forested areas bring long-term mitigation benefits.

- 17. **During the pre-feasibility studies, it was estimated that the project will reduce air (PM, NOX, and VOC) and GHG emissions (CO2) due to optimization of the current public transportation network reduced congestion.** The estimation of the emission reduction is based on the curves of the Software VISUM. The emission benefits accounted for improved general traffic performance due to better service speed brought by the BRT corridor. Emission reduction caused by increased public transportation choice is quantified during the project lifetime, considering zero emissions from the bus-electric fleet. The assessment estimated that for 25 years (2024-2048), the GHG average yearly emissions without the Project are 10,866 tons. Total emission reduction, including air pollutants, amounts to 243,018 tons during the project lifetime.
- 18. **Improved infrastructure designs will be resilient and adapted to future climate risks of the Region.** According to the climate risk screening, they are high due to high precipitation and the potential rise of the sea level. Drainage and Resilient designs will be incorporated not only along the BRT corridor but in the Municipality of Balneário Camboriú (along the Beach area, on low-income areas and along the pedestrian and cyclist corridors connecting to low-income neighborhoods), with nature-based solutions on the coastal protection line and the river protection line and climate-informed designs in infrastructure. Resilient solutions are extremely necessary and relevant as a result of the high vulnerability of the Region to climate change. Finally, technical assistance will also support reducing climate risks in the Region and reducing forest degradation, which can lead to benefits in climate adaptation by preserving the environment and preventing erosion.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

The Environmental risk assessed at the concept stage is Substantial due to the future immersed tunnel risks. For Component 1, the alignment of the BRT system will not affect the Parque Natural Municipal da Ressacada (PNMR) on the Atlantic Rainforest (Mata Atlântica). This critical habitat is legally protected. The BRT will follow new and existing roads that will pass in urbanized areas, not affecting critical habitats. This alignment has been agreed upon with the Municipality of Itajaí and will need an enlargement of the existing Osvaldo Reis Avenue when passing between the two protected areas. No deforestation of the Atlantic Rainforest is expected, and the project should only affect vegetation along the road. The widening of streets, BRT terminals, and bus stops would be constructed in modified areas. Most of the impacts would be local, temporary, reversible, site-specific, and with a low probability of causing significant negative environmental effects. Their management is well established. A significant positive impact would be the construction of wildlife corridors, fauna bridges, and road fencing to protect fauna. The other planned civil works are of moderate risk since they will be implemented in an urban area; impacts would be local, temporary, reversible, and site-specific. This includes access to the barges for river crossing because they are temporary and removable facilities (floating piers). Although the project will not finance any construction under Component 2, the potential environmental risks of the future tunnel on the river and the related risks of the disposal of the excavation materials during future construction are substantial. Even though it is in an



area of intense cargo movement (near the Port of Itajaí), the site is an estuary and important for local biodiversity. Some risks can be significant, such as fish mortality during sediment movement and increased turbidity in the water. In the tunnel section, no endemic or endangered species are expected, and mitigation measures would be taken to reduce the environmental impact of the tunnel construction, including the restoration of a green area to the native vegetation in the adjacent area. The other project activities, such as the component 3 activities (pedestrian & cyclists' corridors, street connections with low-income areas, and re-urbanization of existing streets), are moderate or low risk. The civil works under Component 3 will be carried out in the streets connecting the Avenida Atlántica to the low-income areas in the Municipality. New pedestrian corridors, street connections (bridges and connections over the river or under the BR 101 motorway), bike paths, exclusive streets for pedestrians and new squares, shared electric micro-mobility stations, and parking (bicycles and scooters) and new green areas are the interventions expected. The risk of these interventions is predictable and expected to be temporary and reversible, low in magnitude, site-specific, without the likelihood of impacts beyond the actual footprint of the Project, and low probability of serious adverse effects on human health and the environment. The recovery of the native restinga vegetation on the river side has a positive and significant impact on local biodiversity, and these impacts are moderate risk.

The Social risk of this project is Substantial. The social risks are mainly related to the necessary expropriation and reallocation of up to 250 families in Itajaí, Camboriú, Navegantes, and Balneario Camboriú. For Component 1, the potential adverse social impacts relate to streets in a few areas where the BRT will circulate which are not yet built or might need expropriation for their required expansion. This may also require (i) temporary restrictions in access to residential, commercial, and social infrastructure buildings and (ii) social risks related to community health and safety during construction. Component 2 includes studies and technical assistance for an immersed tunnel which may lead to adverse downstream effects related to land acquisition. Therefore, the studies and designs shall preferably rely on the acquisition of empty areas which cannot be defined yet. Improvement works (sidewalks, bike paths, and squares) are also planned for the urban area and vulnerable communities near the area planned for the tunnel, which may also cause temporary impacts but should have longer-term social benefits. Component 3 includes works to connect the seafront with low-income areas, with improved accessibility for people with disabilities and improvements in the conditions of local businesses, including their regularization. However, this action can reduce the current number of businesses (formal and informal) and can result in negative economic impacts due to interruption, displacement, or closure of commercial activities, especially affecting street vendors. There is a risk of excluding vulnerable groups and the poor population from benefiting from the improvements, which will be addressed through proper designs and public consultations for the project. Other social issues that have been identified and will be addressed include the following: (i) project workers' exposure to OHS risks or outbreaks of COVID-19 and other virus transmissions to local communities nearby works supported by the project; (ii) sexual exploitation and abuse and sexual harassment risks during construction are rated Low following an assessment using the SH/SEA risk screening tool for major works; (iii) ensuring a two-way meaningful and inclusive engagement with stakeholders, particularly the most vulnerable groups, such as local communities with high poverty rates in the project areas, women, afro descendants and people with disabilities, throughout the project implementation. People with disabilities are expected to experience positive impacts, as the project is expected to improve accessibility to the transportation system following universal access standards.

The social and environmental management instruments to be prepared by the Borrower, including a supplementary assessment of economic and indirect social impacts, are expected to address these risks, in particular will need to consider the potential adverse impacts on households and businesses in the area of the project, and improved based on the consultation process. While the ability of the PIU to manage the social and environmental of the project in accordance with the Bank's Environmental and Social Safeguards Framework (ESF) was initially low, the PIU is currently hiring an experienced team of three social and two environmental specialists to support the project. There is also a risk associated with the interinstitutional coordination needed to manage the social impacts generated and/or exacerbated by the project,



regarding which the PIU will need to establish formal agreements. The Bank will support the Client to conduct an assessment of the Borrower's social and environmental risk management capacity, which will be completed during project preparation. This assessment will identify areas of improvement and define specific institutional strengthening measures, with funding arrangements. Some of these measures will be included in the project's Environmental and Social Commitment Plan (ESCP), promoting the strengthening of the Borrower's capacity.

Key aspects that will need to be strengthened are meaningful consultations, citizen engagement activities, and the project's grievance redress mechanisms, based on a Stakeholder Engagement Plan and a gender assessment, in addition to preparing Resettlement Plans, after defining the technical drawings for the works.

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