

Document of
The World Bank
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Report No: ICR00004799

IMPLEMENTATION COMPLETION AND RESULTS REPORT
ON A LOAN FROM THE IBRD (78830-MX)
IN THE AMOUNT OF US\$150 MILLION
AND A
LOAN FROM THE CLEAN TECHNOLOGY FUND
IN THE AMOUNT OF US\$200 MILLION (TF-96291)
TO
BANOBRAS
WITH THE GUARANTEE OF THE
UNITED MEXICAN STATES
FOR A
URBAN TRANSPORT TRANSFORMATION PROGRAM (P107159)

31 OCTOBER, 2019

Transport Global Practice
Latin America And Caribbean Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective Oct 15, 2019)

Currency Unit = Mexican Peso

MXN 19.54 = US\$1

FISCAL YEAR

July 1 - June 30

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ABBREVIATIONS AND ACRONYMS

| | |
|------------------|---|
| BANOBRAS | National Development Bank for Public Works and Services (<i>Banco Nacional de Obras y Servicios Públicos</i>) |
| BRT | bus rapid transit |
| CBA | cost-benefit analysis |
| CO ₂ | carbon dioxide |
| CO _{2e} | carbon dioxide equivalent |
| CPS | Country Partnership Strategy |
| CTF | Clean Technology Fund |
| DPL | Development Policy Loan |
| EIRR | economic internal rate of return |
| ERR | economic rate of return |
| FONADIN | National Infrastructure Fund (<i>Fondo Nacional de Infraestructura</i>) |
| GHG | greenhouse gas |
| IBRD | International Bank of Reconstruction and Development |
| ICR | Implementation Completion and Results Report |
| IMTC | integrated mass transit corridor |
| ITP | integral transport plan |
| km | kilometer |
| M&E | monitoring and evaluation |
| MASTU | Environmental and Social Management Framework (<i>Marco Ambiental y Social para el Transporte Urbano</i>) |
| MTR | midterm review |
| NPV | net present value |
| PAD | Project Appraisal Document |
| PDO | project development objective |
| PIMUS | Integrated Sustainable Urban Mobility Plans (<i>Plan Integrado de Movilidad Urbana Sostenible</i>) |
| PPP | public-private partnership |
| PROTRAM | Federal Program to Support Mass Transport (<i>Programa Federal de Apoyo al Transporte Masivo</i>) |
| SHCP | Secretariat of Finance and Public Credit (<i>Secretaría de Hacienda y Crédito Público</i>) |
| SITEUR | Urban Electric Train System (<i>Sistema de Tren Eléctrico Urbano</i>) |
| SITT | Tijuana's Integrated Transport System (<i>Sistema Integrado de Transporte Tijuana</i>) |
| SPV | special-purpose vehicle |
| TA | technical assistance |
| UC | Coordinating Unit (<i>Unidad de Coordinación</i>) |
| UNOPS | United Nations Office for Project Services |
| UTTP | Urban Transport Transformation Program |
| VOC | value of operational costs |

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DATA SHEET

BASIC INFORMATION

Product Information

| | |
|----------------------|---|
| Project ID | Project Name |
| P107159 | MX Urban Transport Transformation Progr |
| Country | Financing Instrument |
| Mexico | Investment Project Financing |
| Original EA Category | Revised EA Category |
| Full Assessment (A) | Full Assessment (A) |

Organizations

| | |
|----------|---------------------|
| Borrower | Implementing Agency |
| BANOBRAS | BANOBRAS |

Project Development Objective (PDO)

Original PDO

The objective of the Project is to contribute to the transformation of urban transport in Mexican cities toward a lower carbon growth path.



FINANCING

| | Original Amount (US\$) | Revised Amount (US\$) | Actual Disbursed (US\$) |
|---|-------------------------------|------------------------------|--------------------------------|
| World Bank Financing | | | |
| TF-96291 | 200,000,000 | 200,000,000 | 62,015,668 |
| IBRD-78830 | 150,000,000 | 150,000,000 | 52,023,359 |
| Total | 350,000,000 | 350,000,000 | 114,039,027 |
| Non-World Bank Financing | | | |
| Borrowing Agency | 767,500,000 | 0 | 0 |
| Local Govts. (Prov., District, City) of Borrowing Country | 737,500,000 | 0 | 0 |
| Private Commercial Sources (identified) | 839,000,000 | 0 | 0 |
| Total | 2,344,000,000 | 0 | 0 |
| Total Project Cost | 2,694,000,000 | 350,000,000 | 114,039,027 |

KEY DATES

| Approval | Effectiveness | MTR Review | Original Closing | Actual Closing |
|-----------------|----------------------|-------------------|-------------------------|-----------------------|
| 25-Mar-2010 | 15-Dec-2010 | 06-Oct-2014 | 30-Jun-2017 | 30-Apr-2019 |

RESTRUCTURING AND/OR ADDITIONAL FINANCING

| Date(s) | Amount Disbursed (US\$M) | Key Revisions |
|----------------|---------------------------------|---|
| 22-Aug-2012 | 16.28 | Other Change(s) |
| 03-May-2013 | 27.10 | Change in Procurement |
| 16-Jul-2016 | 111.17 | Change in Results Framework Change in Components and Cost Reallocation between Disbursement Categories Change in Institutional Arrangements Change in Procurement |
| 21-Dec-2016 | 113.53 | Change in Loan Closing Date(s) |



KEY RATINGS

| Outcome | Bank Performance | M&E Quality |
|----------------|---------------------------|------------------------|
| Unsatisfactory | Moderately Unsatisfactory | Modest |

RATINGS OF PROJECT PERFORMANCE IN ISRs

| No. | Date ISR Archived | DO Rating | IP Rating | Actual Disbursements (US\$M) |
|------------|--------------------------|---------------------------|---------------------------|-------------------------------------|
| 01 | 26-May-2010 | Satisfactory | Satisfactory | 0 |
| 02 | 26-Feb-2011 | Satisfactory | Satisfactory | 0 |
| 03 | 26-Jul-2011 | Satisfactory | Satisfactory | 0 |
| 04 | 27-Mar-2012 | Satisfactory | Moderately Satisfactory | 7.86 |
| 05 | 28-Oct-2012 | Satisfactory | Moderately Satisfactory | 22.64 |
| 06 | 30-Jun-2013 | Satisfactory | Moderately Unsatisfactory | 27.10 |
| 07 | 17-Jan-2014 | Satisfactory | Moderately Unsatisfactory | 27.10 |
| 08 | 26-Aug-2014 | Moderately Unsatisfactory | Moderately Unsatisfactory | 49.24 |
| 09 | 25-Mar-2015 | Moderately Unsatisfactory | Moderately Unsatisfactory | 54.57 |
| 10 | 17-Dec-2015 | Moderately Unsatisfactory | Moderately Unsatisfactory | 54.57 |
| 11 | 26-Sep-2016 | Moderately Unsatisfactory | Moderately Satisfactory | 113.53 |
| 12 | 16-Oct-2016 | Moderately Unsatisfactory | Moderately Unsatisfactory | 113.53 |
| 13 | 27-Apr-2017 | Moderately Unsatisfactory | Moderately Unsatisfactory | 113.53 |
| 14 | 10-Nov-2017 | Moderately Unsatisfactory | Moderately Unsatisfactory | 113.53 |
| 15 | 30-May-2018 | Moderately Unsatisfactory | Moderately Unsatisfactory | 114.04 |
| 16 | 13-Dec-2018 | Moderately Unsatisfactory | Moderately Unsatisfactory | 114.04 |
| 17 | 01-May-2019 | Moderately Unsatisfactory | Moderately Unsatisfactory | 114.04 |

**SECTORS AND THEMES****Sectors**

Major Sector/Sector (%)

Transportation 100

Urban Transport 97

Public Administration - Transportation 3

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3) (%)

Urban and Rural Development 3

Urban Development 3

Urban Infrastructure and Service Delivery 3

Environment and Natural Resource Management 97

Climate change 97

Mitigation 97

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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Country Context

- 1. Rapid and inefficient urbanization, together with accelerated motorization rates in Mexican cities, had taken a toll on productivity, efficiency, and the environment.** Mexico's urban development was characterized by rapid, uncoordinated, and dispersed growth of urban and peri-urban areas, moving populations increasingly far from centers of employment and services. In the meantime, motorization rates had increased rapidly. The resulting need for longer trips, together with a lack of cleaner, safer, and more affordable alternatives, such as public transport, had prompted an increase in the use of private transportation. Long trips in private vehicles were not cost-efficient, and cut into workers' productive hours. Importantly, they also implied an increase in transport-related local and global emissions. Despite several efforts to cut fossil-fuel use, the transportation sector remained the greatest contributor to carbon dioxide (CO₂) emissions in Mexico.

Urban Transport Sector

- 2. At the time of Project preparation, most mass transport in Mexico was provided through unregulated private bus operations.** In most cities, individual private bus operators competed for passenger volumes, with their income dependent on the number of passengers carried. Individual operators—including those affiliated with bus associations and formal bus companies—had weak credit, and the majority struggled to secure necessary financing to upgrade their vehicles. This meant that most public transportation was conducted by an oversupply of aging buses and vans that provided inadequate safety, comfort, and accessibility to riders and that significantly contributed to greenhouse gas (GHG) emissions. Furthermore, road infrastructure was also deteriorating in most Mexican cities. This further caused a drop in the public transport modal share compared with private vehicles. Although incumbent private operators had different structures and levels of capacity, they were in general expected to be capable of implementing Project components (rolling stock), and to incorporate new technologies given the right incentives.
- 3. At the time of Project preparation, bus rapid transit (BRT) and low-carbon vehicles (such as hybrid buses) were considered as possible solutions to the urban mobility problems in Mexican cities, and related interventions sought to foster sectoral transformation.** After the initial success of Metrobus Line 1 in Mexico City, starting in 2005, the World Bank began supporting many other cities in the development of metropolitan transit plans oriented around BRT systems.¹ At this time, BRT was considered one of the most cost-effective modes of public transport, particularly in large metropolitan areas. BRT systems had similar carrying capacities as light rail systems, with lower implementations costs. Meanwhile, most subnational governments (with the notable exceptions of Mexico City, Guadalajara, Monterrey, and Leon) lacked dedicated public transport agencies

¹ World Bank, "Introduction of Climate Friendly Measures in Transport," World Bank, Washington, DC, 2002, <http://projects.worldbank.org/P059161/introduction-climate-friendly-measures-transport?lang=en&tab=documents&subTab=projectDocuments>.



capable of planning, organizing, and securing resources for and managing such systems. It was hoped that World Bank–supported projects would help fill this void.

Institutional Context

4. **At the time of Project preparation, the institutional context governing public transport provision and improvements involved complex and multifaceted governance structures.** Subnational governments were responsible for the implementation and provision of urban transport projects, involving the participation of numerous local agencies, such as civil works departments, and the ministries of transport, interior, public security, and environment, as well as financial departments. Preparation and implementation of urban transport projects required interactions between local and federal agencies. The National Development Bank for Public Works and Services (BANOBRAS) and the Federal Program to Support Mass Transport (PROTRAM) Coordination Unit² were expected to take the lead in supporting subnational governments in Project implementation. Many other federal agencies were also involved in supporting urban transport, and thus had an impact on the course of project implementation. These included the Secretariat of Social Development (SEDESOL), the Transport and Communications Secretariat (SCT), the Secretariat of the Environment (SEMARNAT), and the Secretariat of Finance and Public Credit (SHCP).
5. **Mexico suffered from an asymmetry in the capacity of the federal government vis-à-vis that of subnational governments.** During the preparation of early BRT and low-carbon projects, BANOBRAS and the federal government were expected to assume a leading role in project implementation, including promotion and business development as well as support in project identification, preparation, implementation, and the supervision of subnational governments. Project requirements (including the establishment of a transport authority, the creation of an integrated transport plan, private participation, and safeguards compliance) targeted key areas for improvement at the subnational level, but subnational agencies lacked an adequate and consistent framework for public transport policy making. Most cities and states did not dedicate considerable resources to training or the building of institutional capacity, nor did they manage to retain experienced staff. They were also unlikely to turn to the federal government for technical assistance, as there was an absence of federal transport authorities capable of supporting implementation and managing mass transit. Thus, most subnational governments found themselves incapable of preparing or implementing projects, or attracting private sector participation on their own.
6. **Mexican cities also lacked the financial resources to support transit interventions on their own.** In Mexico, subnational governments obtain financial resources from three main sources: federal transfers, local budgets, and public debt. In 2010, on average, approximately 80 percent of subnational governments' revenues were dependent on federal transfers (which were often already earmarked for specific development objectives); debt and local budgets accounted for only about 4 percent and 15 percent of the total revenue, respectively. This left

² The Federal Program to Support Mass Transport (PROTRAM) consists of a trust fund under the National Infrastructure Fund (FONADIN) with no institutional structure. Its implementation is governed by the PROTRAM guidelines ("Lineamientos de PROTRAM") and is carried out by PROTRAM's Coordination Unit, which is a group of people within BANOBRAS's structure. Depending on the context, when this Implementation Completion and Results Report (ICR) refers to PROTRAM, it may be referring to (i) the Federal Program to Support Mass Transport; (ii) the trust fund, or program resources; or (iii) PROTRAM's Coordination Unit.



very few resources available to the subnational governments to support urban public transport interventions without federal assistance.

Rationale for Bank and Clean Technology Fund (CTF) Support

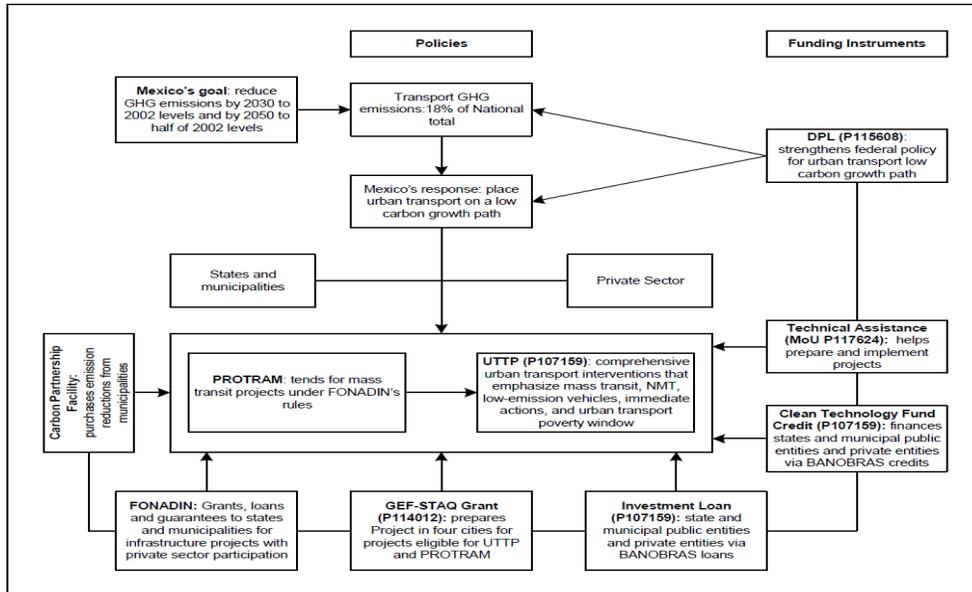
- 7. The Urban Transportation Transformation Project (UTTP, or “the Project”) continued the Bank’s long-standing engagement with Mexico’s urban transport sector and was designed to complement PROTRAM, created by the Government of Mexico and the Bank to support and finance urban transport interventions implemented by public and private entities (figure 1).** In 2008, the Bank, through a Reimbursable Advisory Service (RAS) project, MX-BANOBRAS Strategy (P104740), worked with the Government of Mexico to develop PROTRAM under the umbrella of the National Infrastructure Fund (FONADIN), to support and finance urban transport interventions that foster an urban transport modal shift through urban mass transit and nonmotorized transport in large metropolitan areas.³ PROTRAM provided nonreimbursable resources of up to 50 percent of the total cost of the proposed investments and 70 percent of required studies. Although project promoters were public entities, as PROTRAM required at least 34 percent of private investment, project components (and associated supporting instruments) were implemented by both public and private beneficiaries. The UTTP was designed to complement PROTRAM quantitatively and qualitatively. Quantitatively, the UTTP offered loans (through BANOBRAS) to subnational governments and private entities to finance their respective contributions to any of several subprojects supported by PROTRAM (see Annex 6 for PROTRAM’s objectives and requirements). The UTTP was also designed to finance technical assistance to help subnational governments and private entities comply with PROTRAM requirements. Qualitatively, the UTTP sought to boost subproject benefits by fostering a modal shift from private vehicles through nonmotorized transport interventions not eligible for direct PROTRAM support.⁴ The Bank’s activities preceding the UTTP helped to lay the groundwork for developing institutional capacity for urban transport management in Mexico. An institutional, regulatory, and business model for modern transport corridors was developed in Mexico City with the Introduction of Climate-friendly Measures in Transport Project (P059161). This also provided a useful framework for further reform of urban transport. Importantly, the preparation of the UTTP was carried out in close coordination with the US\$1.5 billion Development Policy Loan (DPL) Mexico Framework for Green Growth (P115608). The DPL helped fund PROTRAM and shape its requirements in a coordinated manner with the UTTP.

³ World Bank, “Fundamentos del programa y lineamientos para su implementación en el marco del FONADIN,” Working paper, World Bank, Washington, DC, 2008.

⁴ The Project’s original economic analysis uses a benchmark BRT project as reference for potential benefits that would be enhanced with the inclusion of additional, UTTP-financed components. As stated in the Project Appraisal Document (PAD), “While the benchmark BRT carries 154,000 rides per day, the ‘enhanced BRT’ would carry up to an estimated 220,000 depending on the mix of additional measures implemented.”



Figure 1. A Visual Representation of World Bank Engagement in Mexico’s Transport Sector at the Time of Project Preparation: The Place of UTTP



Note: BANOBRAS = National Development Bank for Public Works and Services; DPL = Development Policy Loan; FONADIN = National Infrastructure Fund; GEF = Global Environment Facility; STAQ = Sustainable Transport and Air Quality Project; GHG = greenhouse gas; MoU = memorandum of understanding; NMT = nonmotorized transport; PROTRAM = Federal Program to Support Mass Transport; UTTP = Urban Transport Transformation Program.

8. **The UTTP was well aligned with the World Bank Group’s Country Partnership Strategy (CPS) 2008–13 for Mexico (Report No. 42846-MX).** The CPS focused on providing strategic support to Mexico in specific thematic areas—furthering sustainable growth, improving competitiveness, promoting social inclusion and reducing poverty, developing infrastructure and ensuring energy security, and strengthening institutions—all of which pertained directly to the Project. The CPS recognized the need to support Mexico’s development strategy at the time, set out in the National Development Plan 2007–12. The UTTP would provide on-demand support to Mexican cities, mainly, but not limited to, those participating in the PROTRAM program.⁵
9. **The rationale for using the Clean Technology Fund (CTF) for financing was twofold: transport was the main contributor to Mexico’s carbon footprint, and the UTTP was targeting its largest component—that is, vehicle-related emissions.** Transport-related emissions constituted 18 percent of Mexico’s GHG emissions, and the sector’s emissions had grown by almost 40 percent between 2000 and 2009.⁶ The UTTP became part of a concerted government effort to increase the modal shift from private vehicles to public transport—and, specifically, toward energy-efficient, low-carbon mass transport systems—in order to change the transport sector’s carbon path, increase cost efficiency, and boost cities’ productivity. CTF concessional financing was

⁵ This support would eventually materialize in the three supported subprojects that constitute the Project scope at closure: Guadalajara’s Urban Electric Train System (SITEUR) extension of Line 1, the BRT trunk corridor implemented for Tijuana’s Integrated Transport System (SITT), and the BRT trunk corridor implemented for Monterrey’s Ecovia.

⁶ Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) and Instituto Nacional de Ecología y Cambio Climático (INECC), México: Sexta Comunicación Nacional y Segundo Informe Bienal de Actualización ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático (Mexico: SEMARNAT and INECC, 2018).



expected to reduce the initial financial barriers to the adoption of low-carbon integrated mass transit corridors, as well as the scrapping of older, inefficient public transport vehicles. Blending CTF resources with financing from the International Bank for Reconstruction and Development (IBRD) and other sources made investment capital for infrastructure and rolling stock readily available to local governments—and capital may otherwise have been difficult to obtain. The intervention targeted climate change mitigation (GHG emissions reduction) in a cost-efficient manner according to CTF standards (see section on cost efficiency in Annex 4 for details).

Project Development Objectives (PDOs)

10. As per the Loan Agreement, the objective of the Project is “to contribute to the transformation of urban transport in Mexican cities toward a lower carbon growth path.” The Project Appraisal Document (PAD) includes the following additional information on the results chain: *“This will be achieved by improving the quality of service provided by the urban transport systems in a cost-efficient manner, and by deploying equipment, infrastructure, and operational strategies that reduce CO₂ emissions. Achieving the PDO will significantly reduce the overall transport sector carbon footprint and the emission of related air toxics.”*

Theory of Change (Results Chain)

11. The transformation of urban transport includes institutional, sectoral, and technical elements that generate multiple interrelated benefits, including increased productivity, reduced operating costs, and CO₂ emissions savings. Since the Theory of Change was not presented diagrammatically in the Project Appraisal Document (PAD), this Implementation Completion and Results Report (ICR) has constructed it based on appraisal information. The transformation aimed by the PDO, “to contribute to the transformation of urban transport in Mexican cities toward a lower carbon growth path” refers to a multidimensional transformation. Both PROTRAM and the UTPP were designed to support an institutional, sectoral, and technical transformation to overcome the challenges described in the context section. The UTPP sought intervention at three levels: institutional, sectoral, and technical.

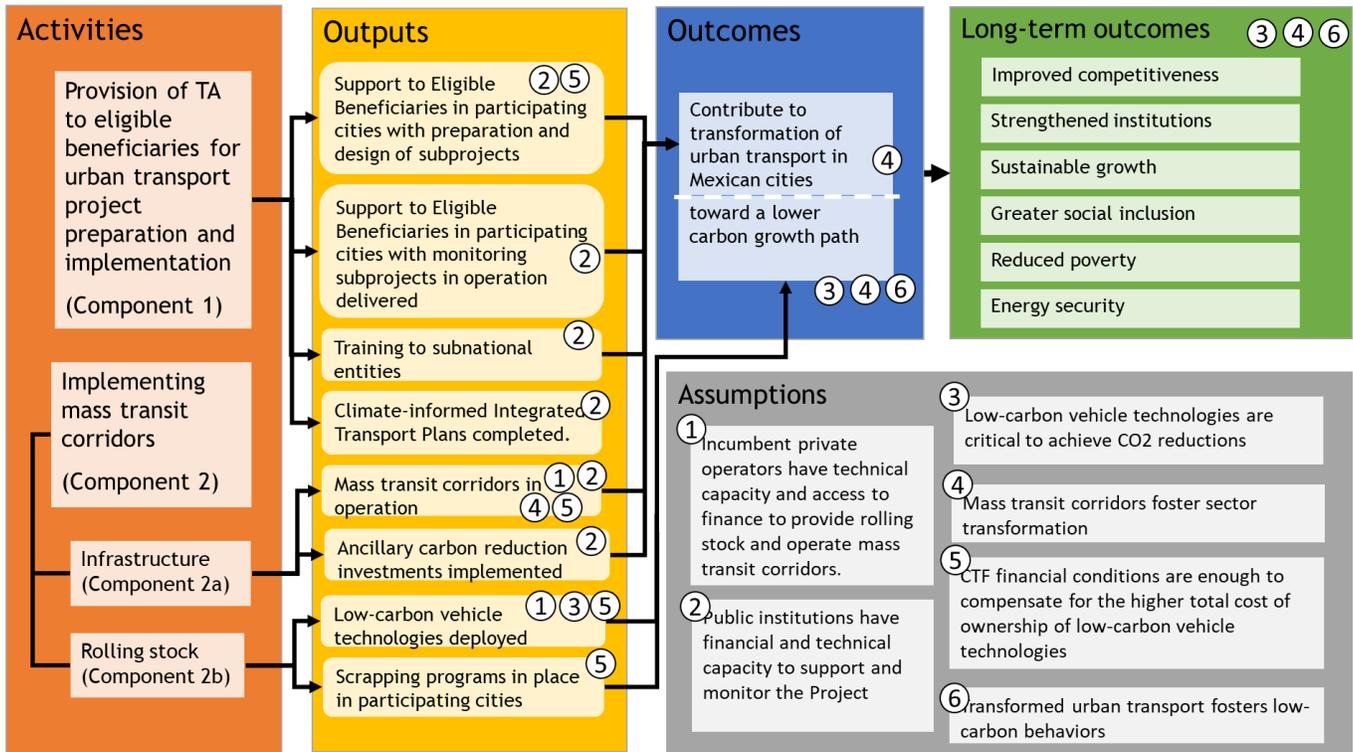
- a. *Project activities that touch on institutional elements:* These activities would help comply with requirements of defining an institutional organization, drafting an Integrated Sustainable Urban Mobility Plan (PIMUS), and complying with the Project’s Environmental and Social Management Framework (MASTU). These requirements imply institutional strengthening, including improved planning and implementation capacity.
- b. *Project activities fostering sectoral transformation:* These activities would help comply with the requirements for minimum private participation, as well as the requirement to integrate incumbent operators under a concessionaire entity. This aspect of the transformation includes the attraction of capable and active private participants (consultancy firms, providers of intelligent transport systems), and the formalization of previously atomized and heterogeneous private operators under new special purpose vehicles (SPVs).
- c. *Project activities fostering technical transformation:* These activities consist of demonstrated technical innovation in the form of mass transit corridors and reorganized bus systems improving quality services in a more cost-efficient manner, generating time savings, vehicle operating cost savings, and CO₂ and local emissions reduction as well as other benefits such as noise reduction and improved road safety.

12. Certain Project outputs aimed directly at boosting the CO₂ emissions savings achieved by the transformation. Those would occur in part because of the introduction of specific measures such as cleaner transport technologies or the scrapping of old buses under Component 2 (b) (to ensure they are removed from the system),



but mostly from the transformation of urban transport itself throughout the entire Project. Overall, transformed urban transport equals more efficient and higher-quality public transport systems, which in turn foster the most powerful tool to achieve emissions reduction: low-carbon behaviors (a modal shift from private cars to public transport). Figure 2 represents the Project’s Theory of Change. The lower-right side of the figure lists six assumptions that are linked to specific outputs, outcomes, and long-term outcomes in the Theory of Change.

Figure 2. The UTPP’s Theory of Change



Note: CTF = Clean Technology Fund; CO2 = carbon dioxide; TA = technical assistance; UTPP = Urban Transport Transformation Project.

Key Expected Outcomes and Outcome Indicators

13. The original Project outcome indicators are as follows.

- Mass transit corridors implemented:* A total of 18 Integrated Mass Transit Corridor (IMTC) Equivalents, implemented with the Bank and/or CTF loan financing, were to be in operation by 2017.⁷
- Private finance leveraged:* The Project was expected to leverage US\$2,344 million of investment from other public and private sources of financing, representing 87 percent of Project costs.⁸
- CO₂ emissions savings realized:* Approximately 1.96 million tons of CO₂ emissions were to be avoided per year by 2017, once all of the proposed investments with the Bank and/or CTF loan financing entered into operation, at US\$30 of CTF per ton per year.⁹

⁷ Integrated Mass Transit Corridor Equivalent refers to the fraction of an Integrated Mass Transit Corridor (IMTC) that results in an estimated annual reduction of 109,000 tons CO₂ in a business-as-usual scenario. For a BRT, this is estimated to represent a 15 kilometer (km) route with 220,000 passengers per day. The implementation of the corridors, following the Project requirements (see Annex 6), was expected to foster institutional, sectoral, and technical transformation in the area of intervention.

⁸ This is aligned with the PROTRAM requirement of having at least a third of the investment coming from private sources, and further measures the sectoral transformation.

⁹ The main driver for CO₂ emissions savings is the modal shift, that is, users shifting from using private cars to public transport.



Project Components

- 14. Component 1: Capacity building (estimated total financing of US\$10 million, including CTF: US\$5 million, IBRD: US\$5 million).** This very flexible component entails the provision of technical assistance and training to Eligible Beneficiaries¹⁰ for the development and/or strengthening of the local urban transport development process. It includes activities to support compliance with PROTRAM and UTPP requirements (see Annex 6) such as: (i) preparation, updating, or completion of PIMUSs or support of urban transport institutions' articulation of climate change mitigation considerations. It also includes other activities to strengthen the sector such as (ii) the development of plans for modernizing traffic management and for efficient allocation of public space for transport and nonmotorized modes, and (iii) the training of local government staff and other civil servants in areas such as transport system inventory, urban transport planning and programming, traffic management, formulation of urban transport projects (including BRT), traffic safety, nonmotorized transport modes, environmental and social evaluation, and rehabilitation and maintenance of roads. The CTF resources under this component would only be used to finance the services required in pre-investment studies related to the infrastructure for the IMTCs.
- 15. Component 2: Development of integrated transit systems that reduce CO₂ emissions (estimated total financing of US\$340 million, including CTF: US\$195 million, IBRD: US\$145 million).** This involves the development of integrated transit systems, with a focus on inducing low-carbon behavior, through the following Bank-financed activities:
- a. *Component 2a: Mass transit corridors and ancillary investments (estimated total financing of US\$216 million, including CTF: US\$106 million, IBRD: US\$110 million).*
 - i. Provision of financing for the development of IMTCs, including, among other things, the preparation, design, construction, supervision, maintenance, and rehabilitation of roads for trunk lines and feeder roads, terminals, yards, transfer and access stations, mixed traffic lanes, and the acquisition of rolling stock, signaling, control centers, information systems, environmental monitoring equipment, and fare collection systems.
 - ii. Provision of financing for ancillary carbon-reduction transport investments not eligible for PROTRAM financing, including, among other things, the adoption of traffic management measures; nonmotorized transport, design and implementation of universal access facilities; carrying out of studies and design of bike-transit integration, parking spaces and transfer stations; vehicle use restriction; public space improvements, including sidewalks; adoption of safety and security programs; design of land use density and clustering plans; intelligent transportation; transport demand management marketing and promotion; freight management; and car-free planning. CTF resources were to be deployed to co-finance IMTCs with an emphasis on the infrastructure required to induce low-carbon behavior.
 - b. *Component 2b: Low-carbon bus technologies and scrapping of displaced buses (estimated total financing of US\$124 million, including CTF: US\$89 million, IBRD: US\$35 million).*
 - i. Provision of financing for the acquisition of low-carbon rolling stock.
 - ii. Provision of finance for programs concerning the scrapping of old and displaced buses, including, among other things: (i) building institutional capacity to develop and/or adopt clean and environmentally sound scrapping strategies (collection, dismantling, and final disposal); (ii) purchasing displaced rolling stock; and (iii) financing vehicle scrapping process.

Additional CO₂ emissions savings may be achieved by increasing efficiency by reducing vehicle-km in systems with bus oversupply, and, less significantly, by improving the emissions created by bus operations with low-emission bus technologies.

¹⁰ See definition in Annex 6, Section B.



16. Component 3: Project management (CTF: US\$0 million, IBRD: US\$0 million). Provision of support (including the implementation of a technical monitoring system) to the Eligible Beneficiaries for the supervision and monitoring of the implementation of subprojects. This component was designed to be carried out by BANOBRAS and PROTRAM.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Revised PDOs and Outcome Targets

17. The PDO was not revised during implementation.

18. Outcome targets were revised in a restructuring approved on July 16, 2016, as follows:¹¹

- a. *Avoided CO₂ emissions:* Target reduced from 1.96 million tons of CO₂ annual savings to 0.34 million tons.
- b. *Integrated mass transit corridors:* Target reduced from 18 IMTC Equivalent to 9.3 IMTC Equivalent.
- c. *Private finance leveraged:* Target reduced from leveraging US\$2,344 million to US\$585 million.

Revised PDO Indicators

19. The PDO indicators were not revised.

Revised Components

20. The components were not revised.

Other Changes

21. Financial management. The first Project restructuring (approved on August 22, 2012) allowed the use of “spot starting conversions” not only for the IBRD loan, but also for the CTF loan. For currency conversions, the client had two options to choose from. First was the traditional “forward starting conversions,” linked to the execution date. After an amendment to the World Bank’s general conditions on July 31, 2010, there was the option of “spot starting conversions,” where the client could pick any date, and upon acceptance from the Bank, the conversion would enter into effect. This was originally included in the IBRD loan agreement, but not in the CTF loan agreement. The first restructuring included this conversion option in the CTF loan agreement.

22. Procurement arrangements. The second Project restructuring (approved on May 3, 2013) introduced the possibility of using commercial practices for the acquisition of low-carbon rolling stock. That restructuring clarified that “even in these situations, international competitive bidding may be the most appropriate procurement method for the purchase of large single items or in cases where large quantities of like goods can be grouped together for bulk.” The third restructuring (July 16, 2016) improved the definition of commercial practices and established a framework for conducting the assessment of acceptability of commercial practices.

23. Implementation arrangements. The third restructuring (approved on July 16, 2016) clarified coordination mechanisms, roles, and functions of different actors within the client entities, and the different phases of the

¹¹ Since the outcome indicator targets were revised, the ICR takes into consideration both the original and formally revised targets in deriving the Project’s overall outcome rating.



subproject cycle. It also established clearer criteria and processes for assessing subprojects' eligibility to receive Bank funds. It designed a tool¹² to support the client in carrying out the supervision of safeguards, and reporting of intermediate indicators.

- 24. Changes in intermediate indicators.** The third restructuring included the following changes to intermediate indicators' definitions and/or targets.
- Integration of climate change mitigation in transport plans:* The reduction of the number of cities with adopted PIMUS, policies, or strategies aimed to mitigate climate change through actions in the sector, from eight to five.
 - Travel-time indicator:* The original indicator and target (that is, nine minutes of travel-time savings for users in the corridor) was changed to a percentage reduction in perceived total travel time with a target of 5 percent.
 - Modal-shift indicator:* Change from the original 10 percent to a 5 percent modal shift—from private motorization modes to public transit.
 - Scrapping-programs indicator:* This intermediate indicator was removed.
 - Low-carbon technologies indicator:* This intermediate indicator was also removed.
- 25. Reallocation.** The third restructuring included reallocation of IBRD US\$5 million and CTF US\$5 million from Component 1 (Capacity building, from US\$10 million to zero) to Component 2a (Development of IMTC, from US\$340 million to US\$350 million). In this regard, the restructuring paper states that “capacity-building activities will be executed with counterpart funds and with the support of federal funds and programs.” It also included reallocation within Component 2: US\$10 million under the IBRD loan for the “mass transit corridors and ancillary investments” category and US\$13 million under the CTF loan for the “scrapping of buses” category were reallocated to the “rolling stock” expenditure category.
- 26. Project financing.** Eliminating the possibility of taking into account subprojects with no CTF/IBRD financing as part of the scope of the Project meant that the Project's costs went down from the initially estimated US\$2.694 billion to US\$541,800. This figure includes counterpart financing.
- 27. Economic evaluation.** The third restructuring included an update of the Project's economic evaluation.
- 28. Project closing date extension.** The fourth restructuring (approved on December 21, 2016) included a 22-month extension of the Project closing date from June 30, 2017, to April 30, 2019.

Rationale for Changes and Their Implications for the Original Theory of Change

- 29. The first restructuring served to provide flexibility in currency risk management by enabling borrowers to access what were, at the time, new financial products currently offered by the World Bank: spot starting conversions.** To ease currency exchange risk management, the General Conditions of the World Bank were modified as of July 31, 2010, allowing borrowers two different options with respect to the effective date of conversions, namely (i) “forward starting” conversions, which, as described above, would become effective on the loan's interest

¹² The Bank, in agreement with BANOBRAS, drafted the Protocol for the Application and Supervision of the MASTU in PROTRAM/UTTP Projects (*Protocolo para la Aplicación y Supervisión del MASTU para los proyectos PROTRAM/PTTU*, in Spanish). The tool was intended to support the Project Implementation Units in ensuring compliance with the MASTU. It consisted of a matrix of requirements by typical component, including reference to applicable national regulations as well as guidance on how to ensure compliance with local laws and the MASTU.



payment dates; and (ii) “spot starting” conversions, which become effective on any date regardless of the loan’s interest payment dates. The first restructuring included this provision in the Loan Agreement, so the Borrower could freely choose between these two options for managing exchange rate risks associated with the use of Bank proceeds.

30. The second restructuring helped operationalize the Project’s original intention to finance bus fleets (low-carbon rolling stock) for private operators. This restructuring helped to reform the procurement practices allowed by the UTTP’s legal agreement. Previously, there was a difference between the language used in the PAD and the legal agreement, and it was unclear if the World Bank could lend directly to private consortiums involved in managing fleets in subprojects. The restructuring aligned the language of the two by adding this possibility to the legal agreement.

31. The third restructuring approved after the midterm review (MTR)¹³ led to several changes.

- a. *Elimination of the possibility of including PROTRAM projects with no IBRD/CTF financing in the results framework of the Project:* The Project did not have an instrument to allow the World Bank to enforce safeguards compliance in subprojects with no IBRD/CTF support. The reason was that the obligation to comply with the MASTU was included in an agreement between PROTRAM and the Beneficiary of which the Bank was not a party. The original Project design allowed the counting of PROTRAM subprojects with no IBRD/CTF financing toward Project results, subject to the Bank’s No Objection that these subprojects complied with the MASTU.¹⁴ However, after a No Objection was issued, the Bank had no instrument to enforce safeguards compliance.¹⁵ The third restructuring clarified that only subprojects implemented with Bank and/or CTF loan financing would count toward Project results. In other words, subprojects that did not receive IBRD/CTF financing were not to be included in the Project results framework.
- b. *Reduction of the three outcome targets:* The outcome targets were reduced for three reasons.
 - i. Reduction of the Project scope (paragraph 30 (a)): Since PROTRAM projects with no IBRD/CTF financing were not considered part of the Project, the expected results were reduced.¹⁶
 - ii. Slower-than-expected program implementation: The Bank analyzed the PROTRAM portfolio’s implementation pace as part of the MTR and concluded that the average subproject cycle was taking eight years from conceptualization to completion—slower than expected. Building a pipeline like PROTRAM’s may take a decade.
 - iii. Correction of the methodology for estimating the CO₂ emissions outcome target: The outcome target for CO₂ emissions was further reduced due to corrections in the methodology used to estimate it.
- c. *Reallocation of funds:* Funds were reallocated due to a lack of demand for receiving IBRD/CTF financing for technical assistance (TA) and capacity-building activities on the client side. The Bank did not expect

¹³ The MTR was formally conducted in October 2014. The process of formalizing the agreed changes took almost two years due to a restructuring process in BANOBRAS that included the reallocation of responsibilities across different departments.

¹⁴ The client did not request the incorporation of any subproject that had no IBRD/CTF financing in the results framework.

¹⁵ This contrasts with subprojects with IBRD/CTF financing, in which the subloans signed between BANOBRAS and the Borrower included provisions to enforce compliance with Project requirements, and to ensure the Bank’s right to audit and supervise the subprojects.

¹⁶ The PAD’s Annex 3, Results Framework and Monitoring, mentions in Para. 2 “projects financed by PROTRAM that in the opinion of the Bank complied with the MASTU.” This contradicts the definition of the outcome indicator definition in the main body of the PAD (Para. 28 [b]), which states that the targeted 18 corridors should be “implemented with Bank and/or CTF loan financing.” Based on interviews with former TTLs and revision of documentation during preparation and implementation, this ICR concludes that the expectation of the target of 18 corridors (and the rest of the targets associated with the corridors’ related benefits) assumed that PROTRAM projects with no IBRD/CTF financing could be included in the results framework.



any request for capacity building, given the lack of appetite of subnational entities to contract debt with perceived high transaction costs for these relatively small amounts of activities. Capacity-building activities were still conducted with counterpart funding, as well as support from federal funds and programs. The choice of the “rolling stock” category was due to an expected increase in demand for the acquisition of rolling stock. The reason for reallocating funds from “mass transit corridors and ancillary investments” and the “scrapping of buses” to the “rolling stock” reflected a lower level of expected disbursements based on the pipeline of potential subprojects in these areas at the time.

- d. *Procurement arrangements:* Initially the Project adopted a procurement method based on international competitive bidding and defined as “commercial practices.” The application of this method in the Monterrey subproject resulted in the selection of buses with a high price, and the private sector taking a technology risk that eventually materialized.¹⁷ After this experience, other clients stopped demanding resources for buses. The Bank undertook an assessment of actual commercial practices for bus acquisition by private operators in Mexico, and deemed them acceptable. The Bank agreed with BANOBRAS on a new definition of commercial practices and a framework to support BANOBRAS’s assessment of the adequacy of the procurement process and the capacity of the operator. These changes were included in the operational manual¹⁸ (see Annex 6 for details).
- e. *Implementation arrangements:* The MTR allowed for an internal revision on the client side of definitions and the Project cycle, and the allocation of responsibilities among different departments in BANOBRAS and PROTRAM for the implementation of the UTP. BANOBRAS and PROTRAM improved these aspects of the implementation arrangements to speed up subproject preparation, and improve opportunities for subprojects supported by PROTRAM to access UTP resources. The Bank supported PROTRAM and different departments at BANOBRAS directly involved in the implementation of the UTP by coming to a consensus on the terminology, subproject cycles’ set of activities, and roles for specific actors. This effort de facto improved performance at the MTR, and was formally implemented in a revised operation manual approved within the third restructuring.
- f. *Changes in intermediate indicators:* In addition to the changes in the outcome indicators, the MTR identified opportunities for improving intermediate indicators for the following reasons.
 - i. Integration of climate change mitigation in transport plans: The clarification of the Project scope (limited to subprojects supported with IBRD/CTF resources) reduced the number of cities that had adopted PIMUS—an eligibility condition for project financing—that could be considered for the project’s monitoring and evaluation (M&E) purposes.
 - ii. Travel-time indicator: The experience in the operation of Mexico’s mass-transit systems suggested that a 5 percent travel time reduction was a realistic target. The new definition (percentage of perceived travel time reduction, instead of minutes saved) made it comparable among subprojects. Travel time is the major driver for a modal shift. Therefore, this indicator was

¹⁷ The process led to the selection of a manufacturer with no local presence, with a bus model unknown to the operators. The commercial practice assessment showed that operators only buy what they know, and that the bus market was national. This is due to the importance of performance (only known by experience) and postsale services over the total life-cycle cost of the buses. In addition, the process definition of financial and technical requirements and the inexperience of local bus manufacturers in preparing bids for public tenders, led to the disqualification of the two lowest evaluated bidders, which had no local presence. The highest acquisition costs alone outweighed the savings from the lower interest rates of the IBRD/CTF. However, the operators chose to stick with the manufacturer awarded in the process.

¹⁸ Without limiting other practices, the assessment identified shopping and direct contracting as the two main methods followed by Mexican operators. It also defined economy/value for money, efficiency, and equal opportunity as the guiding principles for evaluating procurement performance. The framework itself consisted of a series of elements to help BANOBRAS evaluate the acceptability of the process, which includes eligibility, results, capacity of the operator, and the process. It also included forms so the operators could provide information to BANOBRAS to assess their capacity and process.



considered more aligned with the transformation promised in the PDO. The new indicator could be measured by cities conducting annual user or mobility surveys.

- iii. **Modal-shift indicator:** Experiences in the operation of Mexico's mass-transit systems at the time of restructuring suggested that a 5 percent modal shift—from private motorization modes to public transit—was a more realistic assumption than the original 10 percent target, according to survey data available at the time of the restructuring.
 - iv. **Scrapping-programs indicator and low-carbon-technologies indicator:** These intermediate indicators were removed due to a lack of demand for this activity, and because the analysis showed that they were not required (as implicitly assumed in the original Theory of Change) or relevant for measuring progress toward the transformation of urban transport in Mexico or reducing carbon emissions. More efficient urban-transport systems, rather than cleaner bus technologies or the scrapping of old buses, are the best instruments to achieve CO₂ emission savings and a better proxy for the PDO. A modal shift, from private cars to faster, safer, and more comfortable transit services, is responsible for more than 70 percent of emission savings in the emission-model structure. More efficient bus operations, with fewer vehicles serving the transit demand, account for most of the remaining CO₂ emission savings.
- g. *Economic evaluation:* Given the magnitude of the changes, and the existence of new Bank guidance, the Bank team updated the Project's economic evaluation to confirm that it was still economically viable, and applied the latest version of the Bank's guidance for economic analysis.



II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

- 32. The relevance of the PDO is rated High.** The PDO was relevant to the country strategy and consistent with the Bank's previous experience in the sector.
- 33. The PDO remained consistent with country strategic objectives during the life of the Project.** The PDO was aligned with the CPS 2008–13 and is well aligned with the World Bank's current Mexico Country Partnership Strategy (CPS 2014–19, No. 80800-MX), particularly with Pillar 4: Promoting Green and Inclusive Growth. The sectoral, institutional, and technical transformation of urban transport in Mexican cities toward a lower-carbon growth path remained a key solution for addressing the root of the same crucial development issues outlined in the context section at the beginning of this ICR.
- 34. The PDO remained firmly aligned with Mexico's efforts to improve mobility and was appropriate for the country's development status and capacity.** During the life of the Project, PROTRAM remained quantitatively and qualitatively the most important effort supporting urban mobility at a national level. The relevance of the Project was high from the beginning of its preparation until closure. The preparation of the UTTP effectively targeted the institutional, sectoral, and technical challenges of the urban transport sector.
- 35. The PDO was a natural continuation of the Bank's previous transport sector experience in Mexico.** This included projects such as the 2008 MX-BANOBRAS Strategy (P104740), in which the Bank supported the design of PROTRAM, and the Introduction of Climate-friendly Measures in Transport (P059161), which addressed structural barriers to the introduction of clean technologies in transport. The UTTP was meant to support PROTRAM program implementation and brought innovative technical solutions such as the transformation of mass-transit corridors through BRT.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

- 36. This ICR conducts a split evaluation, which takes into consideration both the original and revised outcome targets in deriving the Project's overall contribution to transforming urban transport in Mexican cities toward a low-carbon path.**¹⁹ Achievement of the PDO is rated **Negligible** based on the original outcome targets and **Modest** based on the revised outcome targets. Table 1 shows that the Project achieved only 11 percent of the original target and 22 percent of the revised target for IMTC. For finance leveraged, the Project achieved 10.4 percent of the original target and 25 percent of the revised target. For CO₂ reduction, it achieved 2.4 percent of the original target, and 17.4 percent of the revised target.

¹⁹ The ICR does not consider the activities in any subprojects financed by PROTRAM (not IBRD/CTF) in assessing the Project. These projects complied with MASTU in the Borrower's view, but they were not submitted for the World Bank's No Objection. Therefore, they cannot be counted toward the results of the Project.



Table 1. PDO Indicators, Targets, and Actual Values

| PDO Indicator | Baseline | Original Target | Revised Target | Actual Value |
|---|----------|-----------------|----------------|---------------|
| Implemented Mass Transit Corridors ²⁰ (reflecting institutional, sectoral, and technical transformation in the areas of intervention of subprojects financed under IBRD/CTF) | 0 | 18 | 9.3 | 2.12 |
| Finance leveraged (\$ million) (reflecting sectoral transformation) | 0 | 2.344 million | 585 million | 243.3 million |
| CO _{2e} reduction (year) (measuring transformed urban transport overall) | 0 | 1.96 million | 340,000 tons | 46,842 tons |

Note: CO_{2e} = carbon dioxide equivalent; PDO = Project Development Objective.

37. In addition to the outcome indicators, achievement of the PDO is assessed based on evidence of institutional, sectoral and technical transformation of urban transport toward a lower-carbon growth path both on a national level (PROTRAM) and in selected Mexican cities (on a subnational, subproject level) level. In this regard, economic analysis and some intermediate outcome indicators provide evidence of multidimensional transformation demonstrated in productivity, cost efficiency, and institutional developments. PROTRAM and its supported subprojects have other, additional, associated benefits such as reducing local pollutants, improving road safety, improving universal accessibility, health benefits, and sectoral public and private sector strengthening, but the review cannot elaborate on them due to lack of information.

38. At a national level, the Project contributed indirectly to the general institutional, sectoral, and technical transformation of urban transport in Mexico by supporting PROTRAM. During preparation, the UTTP supported and had a positive impact on the design and definition of requirements of PROTRAM. During implementation, the UTTP supported PROTRAM by overseeing subproject preparation and supervision carried out by the Eligible Beneficiaries and supporting implementation of the MASTU in all PROTRAM subprojects even if they did not receive funding from the IBRD/CTF. In addition, the UTTP provided continuous general technical support for PROTRAM and facilitated knowledge exchange. The achievement of strengthened capacity and increased implementation readiness is evidenced by (i) the success of implementation in the PROTRAM portfolio, described below; and (ii) the Borrower’s own assessment (see Annex 5). Furthermore, the Bank continues to be a reliable broker for the Government of Mexico in its efforts to address the structural challenges that remain in the urban transport sector.

39. At a subnational level, the Project supported the transformation of urban transport in three Mexican cities—Monterrey, Tijuana, and Guadalajara. The Project supported institutional, sectoral, and technical transformation through the development of two new mass-transit corridors (Monterrey and Tijuana’s BRTs), and the expansion of one (Guadalajara’s electric train SITEUR). Subproject interventions financed with World Bank proceeds were completed, and achieved different degrees of success during implementation. BANOBRAS used IBRD and CTF resources to finance the acquisition of trains for SITEUR by the Government of the State of Jalisco, which allowed for the expansion of the service in SITEUR Line

²⁰ Number of corridors created when compared to standardized expectations for a BRT route (15 km in length, 109,000 tons of CO₂ emissions reduced, and 220,000 passengers a day).



1 in Guadalajara. New trains brought new capacity to the SITEUR Line 1 after 2017. In 2019 the SITEUR Line 1 civil works further expanded capacity close to expected levels. The SITEUR Line 1 subproject was still pending implementation of fare collection and signaling at Project closure. BANOBRAS also used IBRD/CTF resources to support Monterrey's Ecovia BRT with two operations: one to finance the acquisition of buses by the private concessionaire for the BRT operation, and another loan to the state of Nuevo Leon for the infrastructure of an exclusive lane in Monterrey. The subproject entered operation in 2014, although the government and incumbent operators never reached an agreement on implementing feeder services, and the trunk corridor experienced capacity issues. In Tijuana, BANOBRAS used IBRD/CTF resources to provide a subloan to the Municipality of Tijuana for the infrastructure of an exclusive lane for a trunk BRT corridor in an integrated transport system. Delays in reorganizing incumbent operators delayed the subproject operation, which started in a very limited fashion (14 buses) only in the trunk corridor²¹ (see Annex 1 for a more detailed description of outputs).

40. The Project contributed to institutional, sectoral and technical transformation of urban transport at a subnational level in the selected Mexican cities.

- a. **Institutional transformation:** All three cities improved their planning capacity and institutional organization to comply with PROTRAM and UTP requirements, which included approving an integrated mobility plan (PIMUS) and an institutional organization (see Annex 6, Section A). In terms of improving institutions and planning, the three cities have a transport authority. In the city of Monterrey, a new department was created within the Ministry of Sustainable Development to manage the new BRT system. In the city of Tijuana, two new departments were created, a new city-level secretariat for general mobility and a SITT for managing the new integrated transport system. SITEUR (the state-owned company created for the management of the Urban Electric Train System) existed in the city of Guadalajara before the subproject was identified. However, the UTP contributed to SITEUR's strengthening through World Bank support, particularly in areas related to road safety, disability accessibility, and technical assistance to engineer rolling stock design. The three cities approved a PIMUS, which is a positive achievement and an indication of better planning and implementation capacity.
- b. **Sectoral transformation:** The Project achieved sectoral transformation by increasing private participation and fostering sectoral reorganization. Regarding increased private participation, the Project achieved it at different levels in the three cities. Monterrey's Ecovia included an innovative structure that allowed for private investment not only for buses, but also for fare collection and part of the infrastructure. A special purpose vehicle (SPV) for the operation accessed UTP financing to acquire 80 buses for a total of Mex\$324 million (US\$16.5 million). Ecovia also incorporated an innovative mechanism to structure savings from shifting from diesel to the cheapest and cleanest compressed natural gas (CNG) to partially finance stations and intelligent transport systems by the private sector. A private concessionaire for stations and intelligent transport systems invested Mex\$467 million (US\$23.8 million) in infrastructure and equipment. On the other hand, Guadalajara's SITEUR failed to leverage the expected private investment during the life of the Project. SITEUR was expected to attract private investment to concession the fare collection system (estimated investment US\$7.5 million) and to finance a new signaling system by providing availability payments to a private investor (estimated investment US\$15 million). Those investments are still needed, and the government still plans to foster private provision. Tijuana falls in between Ecovia's success and Guadalajara's. Although the concessionaire made a significant

²¹ During the preparation of this ICR, the local media reported that the operator suspended operations in August 2019, shortly after Project closure. No official information or confirmation was received from the local authorities or PROTRAM.



acquisition of buses (110 buses), so far only 14 operate in the BRT trunk corridor, which corresponds to an amount of Mex\$45 million (US\$2.3 million). The Tijuana SITT subproject also leveraged private investment for yards and depots and intelligent transport systems, totaling Mex\$174 million (US\$8.9 million). With respect to fostering sectoral reorganization, as required by PROTRAM and UTTP, the local governments fostered a reorganization of incumbent operators into SPVs that would be the concessionaires for bus provision and operation. In the case of Tijuana, formerly competing operators successfully established the SPV SITT S. A. de C. V., which acquired a significant number of buses. However, as the operation in the subproject's corridor was limited, the SPV started to transfer the buses (and the associated portion of the loans) to its stakeholders. Monterrey's Ecovia is operated by the SPV, Servicio de Transporte Tecno Ecológico S. A. de C. V. Although establishing the concessionaire is a significant achievement, the collaboration only affects the trunk corridor and not the whole area, because the feeders were not successfully incorporated into the system. Guadalajara's SITEUR is publicly operated. Therefore, it did not contribute to the achievement of a sectoral transformation from the point of view of operators' transformation.

- c. *Technical transformation:* The three subprojects achieved technical transformation with differing degrees of success, which in turn depended on their degree of implementation. Guadalajara achieved results close to expectations (only pending some ITS components). Monterrey achieved acceptable results below expectations (pending feeder services). Tijuana achieved very limited and unsustainable results (very limited implementation of trunk corridor and pending feeder services). All three systems' benefits stem mainly from the users shifting from older, less efficient systems to the new system, and—especially relevant for emissions reduction and efficiency—from private cars to the new system. Therefore, benefits associated with the technical transformation depend almost directly on the level of demand (ridership) achieved by the subproject. In this sense, the ridership of subprojects is key to assessing their efficacy in achieving expected benefits. In this sense, Guadalajara was the only subproject that met expectations. Monterrey achieved an acceptable level of ridership but below original expectations. Tijuana barely reached 10 percent of the ridership expected in the trunk corridor. Table 2 illustrates this correlation between achievement of expected ridership and benefits.



Table 2. Key Items in Benchmark IMTCs, and the Three Subprojects' Estimated vs Actual Impacts

| Item (first year) | IMTC | Guadalajara | | Monterrey | | Tijuana | |
|---|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|
| | | <i>Estimated</i> | <i>Actual</i> | <i>Estimated</i> | <i>Actual</i> | <i>Estimated</i> | <i>Actual</i> |
| Daily ridership ²² | 154,000–220,000 ²³ | 129,965 | 132,848 | 132,870 | 78,000 | 124,000 | 14,000 |
| Time savings | n/a | US\$5.76 m | US\$8.35 m | US\$4.22 m | US\$3.5 m | US\$6.73 m | US\$0.39 m |
| VOC reduction | n/a | US\$0.36 m | US\$0.65 m | US\$2.65 m | US\$0.92 m | US\$26.6 m | US\$3.76 m |
| Annual CO _{2e} emissions savings | 34,521 ²⁴ | 18,686 CO _{2e} tons | 19,429 CO _{2e} tons | 70,570 CO _{2e} tons | 21,960 CO _{2e} tons | 59,457 CO _{2e} tons | 6,197 CO _{2e} tons |
| EIRR | 22.9%–32.9% | 16.29%–26.36% | 20.90% | 16.29%–21.27% | 12.7% | 18.96% | (2.94%) |

Note: CO_{2e} = carbon dioxide equivalent; EIRR = economic internal rate of return; IMTC = Integrated Mass Transit Corridor; VOC = value of operational costs; n/a = not applicable.

Justification of Overall Efficacy Rating

- 41. **The overall efficacy rating is Negligible based on the original targets, and Modest based on the revised targets.**
- 42. **The Project fell short of achieving its original and revised outcome targets and expected benefits.** The number of supported subprojects was far from enough to reach the outcome targets. Among the supported subprojects, the Project contributed to transforming urban transport toward a lower-carbon path to a mixed degree. The three cities improved planning capacity. Sectoral transformation was more profound in Monterrey, where a viable SPV grouped formerly competing operators. In terms of benefits directly linked to the technical transformation, Guadalajara did achieve the expected level of benefits. Monterrey showed a modest achievement, yet below expectations, and benefits from Tijuana were negligible. Monterrey and especially Tijuana did not achieve the full potential benefits expected from these interventions because expected transport demand did not fully materialize. A deeper level of institutional and sectoral transformation would have created the conditions to fully implement the subprojects and achieve the expected demand.

C. EFFICIENCY

Assessment of Efficiency and Rating

- 43. **Overall, the efficiency of the Project is Modest.** The cost-benefit analysis (CBA) results suggest Modest efficiency at a subproject level on average, while a cost-efficiency analysis for CO₂ reduction would support a Substantial rating. However, when taking into consideration the resource-intensive supervision, the delays in implementation and the unutilized loan resources, the overall assessment of efficiency is Modest.
- 44. **The CBA suggests a Modest efficiency rating.** The economic analysis for the UTPP includes the three subprojects that received financing. Guadalajara and Monterrey are economically viable. Guadalajara shows the expected efficiency of an operation in urban transport, while the efficiency of the Monterrey subproject is acceptable, but below expectations. The analysis of the Tijuana subproject shows a negative economic return. Because of the

²² Average number of trips in the trunk corridor during the first year of operation according to the original cost-benefit analysis.

²³ The Project's original economic analysis is based on a hypothetical IMTC that serves as a benchmark—154,000 passengers a year, which was to rise to 220,000 if additional measures maximized the modal shift.

²⁴ The estimation of 34,521 CO₂ tons savings results from adjusting from the original 107,898 (rounded up to 109,000 in the definition of the IMTC) by using the latest methodology and including assumptions more consistent with the actual situation in Mexican cities. Only modifying the methodology but maintaining assumptions would result in savings of 51,390 CO₂ tons.



uncertainty of the subprojects that would eventually be financed, the original Project included an economic analysis of a hypothetical benchmark IMTC, which was used to assess expectations. The economic internal rates of return (EIRRs) for this benchmark IMTC ranged from 22.9 percent to 32.9 percent depending on whether ancillary investments to boost the modal shift were included or not. The Bank reviewed and updated the economic analysis as part of the MTR. This adjusted analysis resulted in an average EIRR of 12.43 percent. This review considers Guadalajara's efficiency to be Substantial, Monterrey's to be Modest, and Tijuana's to be Negligible, which justifies an overall Modest efficiency rating.

- 45. A cost-effectiveness analysis of CO₂ emissions reduction supports a Modest to Substantial efficiency rating depending on whether a correction is applied to the methodology used to calculate the cost-effectiveness criteria.** The original Project target was to reduce 1 ton of CO₂ emissions for every US\$30 of CTF dollars invested (considering subprojects financed by the CTF). The three subprojects implemented received US\$46.88 from CTF per ton reduced.²⁵ The US\$30 indicative target would correspond to US\$62.98 if adjusted with the corrected methodology for CO₂ savings calculations, which supports a Modest rating at US\$46.88. CTF had an additional two criteria for assessing cost-effectiveness. The first is an expected reduction in the cost of the supported technology, which the Project cannot claim because it did not support low-carbon bus technologies. The second is a marginal abatement²⁶ cost threshold of US\$200 per carbon dioxide equivalent (CO_{2e}) ton,²⁷ which the Project complies with.
- 46. Delays in implementation, a high amount of unutilized loan resources, and delays and a high cost of supervision indicate Negligible efficiency.** The slow Project implementation required a 22-month extension of the closing date. Still, the Project closed with two-thirds of undisbursed proceeds. In addition, supervision was resource intensive. The original definition of the Project scope—being any subproject supported by PROTRAM that in the opinion of the World Bank (as evidenced by a No Objection) complied with the MASTU—and the on-demand nature of the Project required the Bank to basically supervise subproject implementation. This included supporting the preparation, and conducting business development for dozens of subprojects that were in preparation within the PROTRAM pipeline at the time, and that had expressed interest in UTP financing. Despite these efforts, only three subprojects materialized. Resource wise, supervision consistently required far more resources than usual, at a level comparable to preparation.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

- 47. The overall outcome rating of the UTP is Unsatisfactory.** The PDO remained highly relevant overall and the overall efficiency was modest. The number of subprojects financed was much lower than initially expected and this greatly reduced the efficacy of the Project. This meant that the Project's overall contributions to the transformation of Mexican cities and a shift toward a lower-carbon path were much lower than expected. In addition, although the Project influenced institutional, sectoral, and technical aspects of urban transformation on the national and subnational level, it is hard to measure the outcomes. Therefore, the outcome rating before the restructuring is unsatisfactory due to a negligible efficacy rating. After the restructuring, the efficacy of the Project improved as the targets for indicators were scaled down and the overall rating improved to Modest efficacy, giving an overall

²⁵ Corresponds to dividing the total CTF disbursed (US\$62.015 million) by the Project's total annual emissions reduction of 46,842 CO_{2e} tons over 25 years, growing annually at 1 percent.

²⁶ The marginal abatement cost is an economic concept that refers to the economic cost of reducing an additional CO_{2e} ton. In the case of urban transport subprojects, which used to be economically viable, the marginal abatement cost used to be negative, because the implementation of the Project generates economic benefits.

²⁷ According to the guidelines developed by the CTF Trust Fund Committee in October 2013.



outcome rating of Moderately Unsatisfactory. The weighted average of the two periods is 2.44, giving the Project an Unsatisfactory rating overall.

Table 3. Outcome Ratings

| | | Before Restructuring | After Restructuring (July 16, 2019) |
|-------------------------|--|-----------------------|-------------------------------------|
| Relevance of PDO | | High | |
| Efficacy | | Negligible | Modest |
| Efficiency | | Modest | |
| 1 | Overall outcome rating | Unsatisfactory | Moderately Unsatisfactory |
| 2 | Numerical value of the outcome ratings | 2 | 3 |
| 3 | Disbursement | US\$62,420,581.62 | US\$48,754,062.84 |
| 4 | Share of disbursement | 56.15% | 43.85% ²⁸ |
| 5 | Final outcome rating | Unsatisfactory (2.44) | |

E. OTHER OUTCOMES AND IMPACTS

48. The UTPP was designed to support a program (PROTRAM) that has been very successful. During preparation, the UTPP supported PROTRAM’s design and the definition of program requirements. During implementation, the included instruments supported the whole program and most of its subprojects regardless of the support of IBRD/CTF resources. In addition, due to the on-demand nature of Bank support, the Bank supported the preparation of many subprojects that eventually decided not to use World Bank proceeds. PROTRAM keeps a strong pipeline of more than 40 projects²⁹, and has successfully accompanied 9 subprojects to their operation while 11 are under construction. PROTRAM has approved support for infrastructure exceeding the equivalent of US\$700 million.

Gender

49. Although the Project did not include a specific gender component, complementary activities targeting gender dimensions were incorporated in one subproject that eventually did not access UTPP financing. In early 2017, for instance, the UTPP was providing technical assistance to Mexico City for the preparation of the Metrobus Line 5 extension subproject. Although the subproject was never financed, the work was originally expected to be complemented by safe, gender-informed design for BRT stations. This activity was expected to be further complemented with the execution of gender-based violence analytical work, which is expected to be used to develop recommendations to address gender-based violence in urban mobility and public spaces associated with transit systems in Mexico.

Institutional Strengthening

50. Even though many cities did not eventually access the UTPP financing, all cities participating in the PROTRAM complied with the program’s eligibility criteria, which helped to achieve the following results in terms of institutional and sectoral transformation.

²⁸ There was a significant disbursement in July 2019, one week after the formal approval of the restructuring. We are considering this disbursement as after the restructuring for the purposes of calculating shares because it better represents the results of the MTR and the time the targets were modified.

²⁹ <https://www.fonadin.gob.mx/productos-fonadin/programas-sectoriales/programa-federal-de-apoyo-al-transporte-urbano-masivo/>



- a. *Improved public transport institutional framework and capacity:* The program required the creation of transport authorities. During the UTTP's lifespan, 17 new permanent departments/units for managing urban public transport were created in Mexico. A good example of this is the creation of the Mexican Association of Transport Authorities, an initiative of subnational governments to improve the sustainability of urban transport systems.
- b. *Improved legal framework:* The UTTP contributed to the introduction of new norms to the sector, including improving road safety, introducing accessibility measures, and addressing emission standards. During the life of PROTRAM, 28 states created or revised existing urban transport regulations toward a more technical-oriented approach to decision making.
- c. *Improved transport and land use planning:* PROTRAM required the approval of an integrated master mobility plan with a long-term vision for public transport, with the consideration of climate change and urban development. Although in many cases cities developed these plans (but only implemented the foreseen corridor), this did increase planning capacity. At least 19 cities in Mexico have approved PIMUS with climate change considerations.
- d. *Improved governance and capacity among local private operators:* PROTRAM required the establishment of corporations to operate the subprojects. This fostered a transition from an atomized low-capacity sector to more formalized corporate structures.
- e. *Improved capacity in the local consultancy market:* Consultancy opportunities to support the design and implementation of subprojects and integrated mobility plans not only attracted international expertise, but also fostered the creation of local companies and strengthened their capacity.
- f. *Improved social and environmental risk management:* The Borrower voluntarily adopted a framework for social and environmental risk management (MASTU) agreed on with the Bank. Regardless of whether the subprojects received UTTP financing (and thus were part of the Project), they had to comply with the MASTU to receive the nonreimbursable resources from the PROTRAM program. Applying the MASTU not only eased compliance with the World Bank's safeguards policies but also strengthened local frameworks. Although the UTTP financed three subprojects, all subprojects participating in the program had to apply the MASTU. At least 19 cities have used the MASTU to manage social and environmental risk in their subprojects.

Mobilizing Private Sector Financing

51. Mobilizing private sector financing is an explicit objective of the PROTRAM program, and has been successfully achieved beyond the three subprojects supported by the loan. The program made it compulsory that at least 33 percent of a subproject's planned investment came from private stakeholders. This conditioned subproject design in a way that maximizes private participation. As a result, within the scope of the Project, PROTRAM supported the implementation of UTTP subprojects totaling an investment amount of US\$243.3 million, of which a total of US\$51.5 million (21.17³⁰ percent) was privately financed. When looking at the whole PROTRAM portfolio, the total private investment in projects that are in operation and implementation total the equivalent of US\$514 million³¹.

³⁰ PROTRAM requirements imply at least 34 percent of financing structure come from private sources in supported subprojects. In the case of the three projects supported by the UTTP the average is lower due to privately financed components still pending implementation in Guadalajara.

³¹Presentation by Priego, M. in Euroclima, Costa Rica. March 2019. Available https://www.cepal.org/sites/default/files/presentations/la_experiencia_del_protram_en_mexico_-_marco_priego.pdf



Poverty Reduction and Shared Prosperity

- 52. Fostering and prioritizing affordable public transport benefits the poor.** Public transport increases poor people's ability to access economic and social opportunities; therefore, it contributes to economic growth and poverty reduction. The inefficient urban development pattern described in the context affected primarily the poor because they face more barriers to accessing private mobility, and a lack of resources push them to the areas most disconnected from social and economic opportunities, creating a vicious cycle. The solutions supported by the Project directly addressed these issues.
- 53. In addition, the Project fostered road safety improvements in participating cities.** First, improved public transport improves road safety in the affected corridors. Data show a significant reduction in transit-related accidents in these corridors.³² Second, the Project included activities specifically targeting improvement in road safety, such as road safety audits. These audits include compulsory recommendations to improve road safety. Project preparation included an audit of road safety of the Project designs irrespective of the source of funding or the involvement of the Bank. Follow-up during operation was lower due to lack of resources. However, there are plans to start a national transport observatory to monitor road safety in urban transport subprojects, among other support.

Other Unintended Outcomes and Impacts

- 54. Technical transformation.** The BRT was an innovative, cost-efficient solution to provide mass transit in the context of demand density and capacity requirements that could not be served by conventional buses, but would not justify an urban rail project. With the BRT, there came technical innovations, including intelligent transport systems (smart signaling, electronic fare collection, user information systems). However, stand-alone BRT systems in medium-sized cities often face sustainability problems. These systems must walk a fine line between serving a corridor dense enough to justify the BRT, and facing greater demand than the system can absorb. Therefore, BRT systems best operate in a system with a network of complementary features such as secondary and feeder conventional bus routes that branch off the main trunk BRT route(s). The UTTP's partnership with PROTRAM helped to orient it to support more integrated transport systems than isolated BRT routes.
- 55. Improved development policy design and implementation capacity pertaining to climate change and the local project cycle:**
- Climate change:* Analysis conducted by the Bank for the Project clarified that the modal shift from private vehicles to public transport is the main driver for CO₂ emissions mitigation (more than bus technology or fleet rationalization).
 - Knowledge about the local project cycle:* The program helped stakeholders understand that the large learning curve in implementing these kinds of integrated urban transport programs and that the average length of the project cycle for a PROTRAM subproject was eight years, and it takes time to build a sound pipeline.
 - Knowledge exchange:* PROTRAM and the UTTP became a reference for urban transport programs regionally and globally. The program has received several recognitions and international awards such as the Latin American Association of Development Financing Institutions that recognize BANOBRAS for implementation of the UTTP in coordination with PROTRAM. PROTRAM was also one of the three finalists

³² Subprojects like Leon or Metrobus in Mexico City report a reduction of public-transport-related accidents in the intervened corridor of up to 40 percent.



in the 2013 Transport Achievement Awards by the International Transport Forum. The PROTRAM team has participated in numerous knowledge exchange activities both by receiving international delegations and participating in international congresses.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOMES

A. KEY FACTORS DURING PREPARATION

56. The Bank leveraged lessons learned in previous projects and ongoing transport activities in Mexico to support an effective PROTRAM design toward the targeted transformation. One of the most significant achievements of PROTRAM is the definition of requirements for accessing the program that ensure Beneficiaries are taking steps toward an institutional and sectoral transformation. In turn, these steps make the technical transformation proposed by PROTRAM more likely. In this sense, the UTTP and other activities were instrumental in the definition of PROTRAM requirements and design. These definitions, as explained in the Theory of Change, are closely linked to the benefits of PROTRAM and the UTTP.

57. The Project's design was informed by the following assumptions that proved wrong, inaccurate, or not always true:

- a. *Concessional financing conditions:* It was believed that these would generate an appetite for IBRD/CTF resources among subnational governments. In reality, Eligible Beneficiaries welcomed the Bank's technical support in coordination with PROTRAM but had little appetite for UTTP resources. This was due to a combination of factors: (i) a lack of indebtedness capacity or an effort to reduce indebtedness; (ii) the availability of other resources that were in some cases nonreimbursable (for example, many subnational governments accessed Fondo Metropolitano, which provided resources for interventions to improve urban productivity, resilience, and improved urban development, which in practice included all eligible components of the UTTP); and (iii) in some cases, perceived high transactional costs of the use of IBRD/CTF resources.
- b. *Financial capacity of incumbent operators:* It was expected that the UTTP would be able to accommodate the inclusion of incumbent operators into subproject financing. However, incumbent operators often lacked the necessary capital and business acumen to secure loans from large national lending institutions. In addition, operators that had access to other sources of financing (local banks or bus manufacturers with a long-standing relation with the bus operator) or nonreimbursable resources (for example, the Secretary of Environment program to foster compressed natural gas buses) had no incentive to enter into an agreement with the Bank, often perceived as slow and implying high transaction costs.
- c. *National government capacity:* BANOBRAS and PROTRAM were responsible for leading Project promotion and implementation with limited resources. In addition, frequent changes in staff in BANOBRAS and conflicting incentives among different departments recurrently made BANOBRAS restart the learning curve related to the Project's promotion and implementation. The Project's design did not allow for the provision of financial support for subproject management, which would have supported PROTRAM with the resources available for a dedicated safeguards team and technical support to strengthen subproject preparation and supervision.
- d. *Local government capacity:* Although a lack of local government capacity was an expected risk heading into the Project, certain aspects were not anticipated. This included a high administrative turnover, a lack of understanding of World Bank-specific norms and procedures, especially when they differed from national norms, and a lack of capacity to prepare subprojects to become eligible for PROTRAM/UTTP.
- e. *Nonfinancial barriers to introducing low-carbon buses:* The World Bank's approach to introducing clean technology to bus operations focused on financial incentives. However, nonfinancial barriers such as operators' risk aversion and learning curve in using new technologies imposed further costs to utilizing this technology beyond the sticker prices, which contributed to the absence of low-carbon bus technologies.



- f. *CTF financial incentives were undermined by high up-front costs:* CTF funds provided financial incentives for purchasing low-carbon buses, but often they were not enough to make up for the high up-front costs of these vehicles. These higher up-front costs made it difficult and at times impossible for private operators to participate, even when the low-carbon technology buses had lower lifetime costs, since the higher amount of financing required to make the initial purchase of the buses required more debt, which was impossible for them to acquire.

58. The following factors related to the design of the Project—and hence subject to control of both the Bank and the Borrower—led to the low utilization of UTTP funds.

- a. *Complex design and institutional arrangements, not corresponding with the nature of the Project:* The Bank was in a position corresponding to the setup of an intermediary loan (that is, with indirect access to the final beneficiaries, and BANOBRAS as an intermediary, responsible for the enforcement of Bank policy). However, the design of the Project implementation did not use intermediary loan arrangements, but called for the application of Bank policies as in a traditional loan. The Borrower was made responsible for the final beneficiaries' compliance with the Bank policy in traditional terms. In addition, the Project did not provide special provision or resources to support this responsibility.
- b. *The complex definition of the UTTP as an instrument missed the opportunity to piggyback on a well-designed PROTRAM:* The UTTP was designed to support PROTRAM, which was designed with the support of the Bank. This was an opportunity to propose a mechanism to support PROTRAM, utilizing its own processes, structures, and instruments. However, the Bank agreed with the client on a specific instrument (the UTTP) that required additional decisions, requirements, and the formalization of legal instruments (subloan agreements) to activate.
- c. *Low readiness for implementation:* The Project was designed to support subprojects on demand, as put forward by subnational governments and private entities. The Project defined a pipeline at approval, out of which only Monterrey materialized. A Project cycle that was longer than expected, and lower than expected demand, made it difficult to find subprojects to support during implementation.
- d. *Unrealistic plan for subproject monitoring and completion:* PROTRAM focused on subproject preparation and had few resources left for subproject supervision. PROTRAM reported the need for more resources to carry out a comprehensive technical supervision and support of all elements of subprojects in the pipeline. Similarly, PROTRAM defined a three-year period for follow-up and supervision of operations once investments were implemented, which proved a short period to monitor operations.

B. KEY FACTORS DURING IMPLEMENTATION

59. The main factors during implementation that were subject to the Bank's control were as follows.

- a. *The vague definition of Project scope for supervision purposes:* Before the third restructuring, the Bank conducted active supervision and support of the entire PROTRAM portfolio. This included promotion of the Project and on-demand technical support. The Bank also provided extensive support to implement and supervise compliance with the MASTU in all PROTRAM subprojects, so they could eventually be included in the results framework. This meant that the Bank was virtually supporting the preparation supervision of dozens of subprojects in the PROTRAM pipeline and portfolio, while conducting identification missions to new prospective cities. This caused unusually high administrative costs for supervision, and spread resources in a way that jeopardized adequate supervision of the actual subprojects supported by the Bank.
- b. *The application of the procurement guidelines for rolling-stock acquisition by private operators:* The application of commercial practices to rolling-stock acquisition was by private operators, but the interpretation of commercial practices was not. The Project required private operators in Monterrey to follow an international competition for fleet acquisition in order to access IBRD/CTF financing. Despite the extensive experience of the



operators in the procurement of buses, the process led to suboptimal results. The selected buses were unknown to the operators, more expensive than known models, and did not have the capacity promised in the technical specifications, which delayed project implementation. After this experience, the Bank conducted an assessment of commercial practices in Mexico, and aligned the application of the procurement guidelines in the Project with the actual practices of private operators (see Annex 6, Section C).

60. The main factors during implementation subject to the Borrower's control were as follows.

- a. *A lack of resources in BANOBRAS to assess and take financial risks associated with financing fleets run by private operators:* BANOBRAS's department in charge of the risk evaluation of private borrowers was tasked with assessing the risks of private operators. The greater complexity associated with these operations and the relatively small amount of deals did not allow the department to always prioritize the processing of those deals. This had a negative effect on the demand for UTPP funds from potential private borrowers, who may have considered the facility as having high transaction costs and lacking flexibility.
- b. *Slow promotion of the Project among potential subnational borrowers:* This negatively affected the demand for UTPP funds from potential public borrowers. Within BANOBRAS, the unit responsible for promoting the UTPP lacked the incentives and resources to promote the UTPP within BANOBRAS and with subnational partners in Mexico, which reduced the demand for UTPP funds from potential public borrowers. At a subproject level, BANOBRAS was not able to perform roles delegated to it during the Project's implementation, including collecting data for M&E or creating a team dedicated to supporting safeguards in PROTRAM projects.
- c. *Lack of consensus among operators implementing subprojects:* This factor affected subprojects in Tijuana and Monterrey that required incumbent operators' reorganization. It had a particularly severe impact in Tijuana, where the subproject advanced fast in its infrastructure design and implementation but did not receive enough support to help engage the incumbent operators and prepare them for the transformation in time. As a result, the transformation occurred with severe delays, and in a disorganized manner.

61. Other factors not subject to any party control were as follows.

- a. *The indebtedness capacity of potential subnational borrowers:* Although there was a lot of disparity among the actual capacity of potential subnational borrowers, subnational indebtedness capacity was a key factor for determining the appetite of UTPP resources. State laws initially (see Annex 6, Section D, for detailed information) and national regulations since 2013³³ coupled with BANOBRAS's risk exposure limits did not allow the use of UTPP resources in some cases.
- b. *The 2017 earthquake:* In September 19, 2017, an earthquake struck and significantly affected two planned subprojects in Mexico City and Cuernavaca, Morelos. Quite understandably, this event shifted priorities within local governments. The subproject in Morelos was cancelled and the Mexico City Line 5 faced numerous delays and changes that ended up pushing it back past the closure of the UTPP.

³³ "Law on Fiscal Responsibility and Public Debt."



IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISKS TO DEVELOPMENT OUTCOMES

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

- 62. The M&E design was a good instrument to measure the degree of PROTRAM's implementation and the reduction of CO₂ emissions, but missed some elements of the transformation as described in the Theory of Change.** The outcome indicators for integrated mass transit corridors and total investment leverage depend on a focus on the volume of support through the UTP. Avoided CO₂ emissions provide a good measure of one expected benefit from the Project. On the other hand, time savings and a reduction in the value of operational costs (VOC) were the main components that economically justify the Project. Time savings were included as an intermediary indicator, and VOC was not included. Moreover, the high-level goal of transforming Mexico's transportation sector included institutional and sectoral transformation. There was, however, no indicator for measuring any aspect of the sectoral transformation, and only the development of PIMUS is defined as an intermediate indicator of institutional transformation. Finally, many of the achievements of the UTP, such as reducing local pollutants, improving road safety, improving universal accessibility, health benefits, institutional development, and private sector strengthening were not reflected in the PDO or the M&E framework.
- 63. On the other hand, the design included an innovative indicator to compare progress in the PROTRAM program by normalizing corridors,³⁴ which is adequate for this Project.** This method of normalization can be applied to other projects with differently sized subprojects. In addition, accessing PROTRAM (complying with the program requirements) ensures a certain level of institutional and sectoral transformation. The normalized corridor (benchmark IMTC) is a technically correct indicator to evaluate the volume of the program, and hence to quantify the reach of the transformation. In this case, the IMTC indicator results are especially useful.
- 64. The following were missed opportunities for improving the M&E for the program.** First, the subprojects have available or easy-to-collect information that could have been considered as outcome indicators to capture the targeted transformation in a more integral manner (e.g., VOC or time savings, which was included as an intermediate indicator). Second, a clearer definition of indicators would have avoided any confusion about what subprojects to include in the analysis. The UTP supported various projects through nonfinancial, technical-assistance-oriented means. However, it was not clear in the M&E annex of the UTP's PAD that these projects should be added as subprojects.³⁵ Finally, implementation arrangements may have foreseen a higher allocation of resources in BANOBRAS to support the UTP implementation, so it had adequate resources to work with and support final beneficiaries in their responsibilities of collecting and providing data for the M&E.

³⁴ Because passenger demand is more important for driving benefits than corridor length, the proposed normalization mechanism uses a formula that assigns demand a higher weight (2/3) than it assigns to length ($IMTC = Length/15 * [1/3] + Daily\ Demand/220,000 * [2/3]$). In this sense, a corridor doubling the 15 km of the benchmark IMTC but carrying the same 220,000 daily passengers will count for 1.33 IMTCs, while a 15 km corridor doubling the daily demand with 440,000 daily passengers will have a higher contribution to the indicator (1.66).

³⁵ As stated above, the third restructuring clarified (reduced de facto) the scope of the Project. The M&E annex states that all PROTRAM projects complying with the MASTU can be considered for the M&E regardless of the source of financing, but the specific IMTC indicator called originally for 18 corridors with CTF financing.



M&E Implementation

65. The Borrower faced difficulties implementing the M&E. Although the Borrower was responsible for M&E activities, the Project did not include formal project management financing support to help the Borrower fulfill its duties. As a result, BANOBRAS had difficulties in implementing M&E and final beneficiaries seldom carried out data collection for the agreed-upon M&E for the Project. For instance, the Eligible Beneficiaries did not implement the surveys required to collect data to report modal shift and time savings intermediate indicators. However, when a new subproject received UTPP support, the Bank team, in collaboration with BANOBRAS, was able to reach out directly to subnational clients to acquire data used in feasibility studies conducted for projects for national requirements to conduct M&E analysis. This had two limitations: (i) these were not actual data, but estimations; (ii) the data posed limitations for the analysis. For instance, in Tijuana, the Bank did not have data on bus routes operating in parallel to the trunk BRT routes of the subproject. This meant that it is difficult to fully account for all time savings and operations costs in the CBA for that subproject.

M&E Utilization

66. Although the Bank used the M&E system for monitoring subprojects' progress, the M&E did not fully inform Borrower's decisions. The M&E was exclusively used for monitoring the progress of subprojects. As the information recorded in the M&E was not actual, but based on estimates from feasibility studies, it had to be complemented with field visits, secondary sources of information, and interviews with Eligible Beneficiaries.

Justification of Overall Rating of Quality of M&E

67. The overall rating of the quality of M&E is Modest. There were significant shortcomings in the M&E system's design, implementation, and utilization. However, the design includes innovation that is especially useful for this Project. Moreover, the efforts to update and conduct additional analyses when subprojects received UTPP financing allowed BANOBRAS and the Bank to keep the M&E updated and provide a modest sense of the progress toward the PDO.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

Safeguard Compliance

68. This was an Environmental Category A project. It triggered safeguard policies for Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Settlement (OP/BP 4.12). An Environmental and Social Framework (ESMF) and a Resettlement Policy Framework (RPF) were prepared. The Bank provided technical support for the introduction of social and environmental management systems. This also included support to ensure that all subproject components, regardless of their funding sources, also complied with World Bank safeguard policies. In particular, this work was conducted with the train yards and areas for maintenance of the SITEUR Line 1 system financed with UTPP proceeds. The Tijuana and Jalisco subprojects are performing at a good standard, and have no safeguard issues pending. Conversely, the Ecovia (Monterrey) subproject has continued to see ongoing issues related to the government's requisition of services and safeguards. Metrorrey, the state-owned enterprise responsible for the metro, continues to be responsible for the operation and maintenance of the buses but has yet to introduce adequate procedures, according to World Bank norms, for maintaining and repairing the rolling stock. The Bank recommended that Metrorrey officials build a new bus



terminal to rectify the situation; plans are in place but due to budget constraints, construction has not started yet. The Bank also raised the issue of safety in the BRT corridor with Nuevo Leon's authorities. As of 2018, the corridor had experienced a significant number of traffic accidents. The Bank provided technical support to conduct a road safety assessment in the corridor. Results obtained from this assessment were shared and socialized with state authorities, who committed themselves to introducing measures to improve safety.

69. Regarding social safeguards, the Project's social risk rating at Project closure was Moderate, with brief periods of High (2018). Social safeguards performance at Project closure was Satisfactory, with a temporary downgrading and challenges due to missing documentation in 2018. These challenges were resolved together with the client counterparts, and important institutional capacity was developed regarding safeguards documentation. Each UTP subproject included a social management plan with a communications strategy and grievance redress mechanisms (GRMs). These GRMs were administered by subnational government entities in charge of subproject implementation. Furthermore, supervision missions showed that GRMs related to the overall implementation, managed by the transport authorities, were functioning and feedback was received and dealt with in a timely manner by the subproject implementors. Additionally, the Project was able to secure important social cobenefits further described in the "Other Outcomes and Impacts" section of this ICR.

Procurement

70. The implementation of the Project procurement plan resulted in savings. The procurement plan included 17 activities following national competitive bidding for an estimated amount of US\$87,956,647.31 actually awarded by US\$84,893,757.74 (97 percent), representing some savings; and three activities following international competitive bidding for an estimated amount of US\$105,159,712.00 awarded by US\$89,811,790.08 (85 percent of the estimated amount), representing significant savings. Despite some difficulties, procurement processes under the UTP complied with Bank policies and were handled in an adequate manner. The procurement plan was revised during the Project's second restructuring to better align with commercial practices. This change did not compromise World Bank procurement standards. Prior reviews of procurement took place as defined in the procurement plan. Reviews of all procurements processed during the UTP were reviewed regularly and no instances of violations of procurement practices were declared.

Financial Management

71. The financial management of the Project was conducted in accordance with arrangements stipulated in the legal agreement. The financial management risk rating was Moderate up to the year 2015 and remained Substantial from 2016 through 2019, until the closing of the operation, due to considerable implementation challenges that involved several actors at the subnational level. A Substantial risk rating provided the opportunity for the Bank Financial Management Specialist to dedicate more time and attention to the operation.

72. While early performance ratings for financial management were Satisfactory up to the year 2015, the operation received Moderately Satisfactory ratings from 2016 until the closing of the operation, mostly due to delays in processes and low disbursement levels. The Project identified by then that it may not execute completely the funds available due to delays in agreements with the subnational governments and some bidding processes that, at the end, left significant undisbursed funds in both financing sources. For the loan 7883-MX, undisbursed funds amounted to US\$97,976,640.82; and for the TF-96291-MX, undisbursed funds reached US\$137,984,332.24 at the closing of the operation. Planning was less than optimal in terms of the procurement and preparation of subprojects at the subnational level (states), which affected the timely execution of available budget resources.



Weaknesses in planning had to do with the timely use of available resources (already approved in the budget), with some procurement processes and a significant delay in the signing of loan contracts between BANOBRAS and participating subnational levels (states).

73. Annual audits received unqualified audit opinions throughout the life of the Project, and interim financial reports (IFRs) were conducted on time and were of satisfactory quality in general.

C. BANK PERFORMANCE

Quality at Entry

74. The Quality at Entry by the Bank is rated as Moderately Unsatisfactory. Despite several design shortcomings that affected implementation, the effective support in designing and defining PROTRAM requirements have had a significant positive impact beyond the scope of the project.

75. The UTTP had a high strategic relevance during preparation; the Project leveraged past and ongoing programs to support the highly impactful PROTRAM design and defining requirements that addressed the political and institutional aspects most relevant to supporting the objective of the Project. The Bank successfully leveraged its long-standing partnership with Mexico in the transport sector to develop its approach. It was also believed that the Bank, PROTRAM, and BANOBRAS were well aligned to implement the UTTP as set out in the PAD. As shown through the document, PROTRAM design and requirements address key issues related to fostering an institutional, sectoral, and technical transformation of the transport sector in Mexico and complementing sectoral developments that directly preceded the program's initiation.

76. The preparation of the UTTP supported the incorporation of Bank standards to manage environmental and social risks in all subprojects supported by PROTRAM. As the preparation of the UTTP advanced, officers in the PROTRAM program saw in the MASTU a safeguards framework defined and implemented in the structuring of projects with public and private financing. The ultimate decision, made by the Technical Committee, of applying the MASTU to all PROTRAM-financed projects makes de facto World Bank safeguards the law of the land for federally supported urban transport projects in Mexico.

77. On the other hand, despite the extensive sectoral knowledge possessed by the Bank and the Borrower from past operations, the design of the Project did not anticipate several key challenges that arose during implementation. As previously described in Section III above, these challenges included barriers to subnational governments seeking UTTP funds for projects, such as the need for resources to support BANOBRAS's promotion of the project, supervision, and implementation of Bank policy. The design also failed to anticipate lack of financial capacity of subnational governments or private agents to procure debt, or constraints in BANOBRAS to assess the financial risk of small bus operators. Although the Bank worked with BANOBRAS in identifying a pipeline, the identified projects proved to have a low degree of preparedness.

78. The definition of the UTTP as a stand-alone financial instrument allowed it to support PROTRAM, but it was not fit to achieve its own implementation. After 10 years of implementation, and despite the many lessons learned and opportunities for improvement, the success of PROTRAM cannot be disputed. PROTRAM keeps a strong



pipeline of more than 40 projects (see Annex 6, Section D), and has successfully accompanied 9 subprojects to their operation while 11 are under construction. PROTRAM has approved nonreimbursable support for infrastructure exceeding the equivalent of US\$700 million (including all subprojects with approved support, regardless of IBRD/CTF participation). The UTPP was successful in supporting and accompanying PROTRAM, and most of its subprojects' preparation, implementation, and supervision. However, it did not provide significant financial support to the program.

Quality of Supervision

79. The quality of the Bank's supervision is rated as Moderately Satisfactory. The Bank undertook very proactive supervision, identifying and addressing issues affecting implementation and outcomes. This included regular supervisory missions and the creation of a transport specialist position in Mexico to provide closer supervision of the Project. However, the Project's design and an inability to implement more aggressive changes prevented the successful utilization of the UTPP resources.

80. At a program level, the World Bank team proactively identified and addressed issues arising during implementation to improve Project implementation. Through different restructurings, the team addressed issues that held back subnational governments from seeking UTPP financing and introducing more realistic expectations for the program. These are described in Section III. The following are examples of proactive supervision in tackling specific Project issues:

- a. *Complex design:* The team worked with BANOBRAS in aligning processes and requirements of the UTPP with those of PROTRAM and coordinating responsibilities between different departments. This effort eliminated duplicities or inconsistencies in requirements, only referring to UTPP-specific processes or requirements when not covered by PROTRAM. It also allowed BANOBRAS to improve internal coordination. Finally, eliminating the possibility of including subprojects with no CTF/IBRD financing into the results framework mitigated the risk of the Bank being held accountable for a subproject in which it had no mechanism to ensure compliance with Bank policy.
- b. *Low implementation readiness and Project promotion:* The Bank coordinated with BANOBRAS in an analysis of implementation readiness, including aspects such as indebtedness capacity and stages of project preparation. It also proactively proposed and supported BANOBRAS in carrying out identification and preparation visits to subprojects. This allowed for more effective targeting of potential UTPP subprojects by avoiding promotional actions in subprojects that were not able to access UTPP resources.
- c. *Lack of resources for Project management on the client side:* Bank safeguards specialists supported the MASTU implementation, and prepared a tool to ease the reporting of safeguards compliance and BANOBRAS's supervision. Bank procurement specialists provided continuous support to BANOBRAS and the Eligible Beneficiaries to help achieve compliance with the Bank requirements. The technical team supported BANOBRAS and PROTRAM in Project preparation and supervision, revising methodologies for accounting for reduced CO₂ emissions. The Bank worked with BANOBRAS in improving the M&E framework, although it overestimated future data availability. The work during the third restructuring improved the M&E significantly by providing realistic targets and defining indicators in such a manner that the data could be collected. However, some indicators relied on surveys that the Eligible Beneficiaries never carried out.
- d. *Application of procurement guidelines for rolling-stock operators:* The Bank led a market analysis of Mexican operators' actual commercial practices and modified the definition of commercial practices in



the UTTP operations manual in a manner adapted to actual practices. It also developed a framework to support BANOBRAS's assessment of the acceptability of these practices (see Annex 6, Section C).

- e. *Choice of financial instrument not fit for implementation:* During the life of the Project, the Bank and BANOBRAS discussed more aggressive changes to ease the implementation of the UTTP resources. In the spirit of piggybacking on an existing successful mechanism, during the MTR the Bank and BANOBRAS discussed the possibility of on-lending UTTP resources to private financial institutions already providing loans to private operators. The Bank interviewed several financing institutions that showed a great deal of interest in accessing IBRD/CTF resources. Despite the prospects for faster implementation, this would have resulted in higher financial costs for the operators compared with BANOBRAS lending directly, due to the additional intermediation. BANOBRAS was conducting an internal restructuring at the time that was expected to generate more flexibility in lending to private operators with IBRD/CTF. Therefore, this change was not implemented. In similar terms, in the latest stages of the project BANOBRAS and the Bank studied the possibility of using the project resources to finance PROTRAM contributions to avoid cancellation of resources. Given the proximity of the closing date, the parties deemed it more appropriate that such an instrument be discussed as a separate new operation.

81. At a subproject level, the team worked closely with the three subprojects financed by the UTTP. This included work with Monterrey and Tijuana to develop new departments to manage the new BRT systems in these cities introduced by UTTP financing. The team also worked to build the capacity of SITEUR in Jalisco to complement the subproject there. Team members further worked with other subnational entities to build their capacity to manage non-UTTP-financed projects.

Justification of Overall Rating of Bank Performance

82. The overall rating of the World Bank's performance is Moderately Unsatisfactory. There was a considerable number of challenges in the preparation of the Project that produced unforeseen issues, but also significant achievements such as the definition of PROTRAM's impactful requirements or the agreement to use the MASTU in all PROTRAM projects irrespective of the source of financing. Regarding the quality of supervision, although not always managing to completely solve the unforeseen issues, the team worked proactively in addressing all the issues identified. Given the disconnect between the quality at entry and the supervision, we are rating the overall Bank performance as Moderately Unsatisfactory for consistency with the outcome rating.

D. RISKS TO DEVELOPMENT OUTCOMES

83. Long-term support from the national government to ongoing subprojects mitigates the risk of not achieving objectives. Public transit projects such as stations and fleets need regular investments to avoid deterioration or even increased investment/expansion if demand were to increase dramatically. Respective transport authorities will thus need to be continually maintained and reinvested in by their managing institutions to maintain appropriate levels of service. Additional interventions are needed in the Monterrey subproject to lease new bus depots to perform repair/maintenance, and the current fleet's quality has already suffered from the lack of an adequate facility. The Tijuana subproject also needs further interventions to get all of its features in operation, including the control center. Furthermore, the level of benefits received by each subproject will depend on the urban transport systems they exist in and whether these will be further invested in. In Guadalajara, the opening of the Line 3 in SITEUR will help the subproject to expand passenger demand and therefore increase the value of its benefits, in terms of time savings, CO₂ emissions avoided, etc. The same is true for the BRTs in Tijuana, such as



SITT, which is planning further expansion of its secondary and feeder bus routes.

- 84. Institutional and sectoral transformation elements at a national level will prove sustainable only if the central government makes a continuous effort to keep implementing, perfecting, and upgrading the national urban transport policy.** The ability of the national government to foster transformation is linked to a continuous implementation of the national urban transport policy in a manner adapted to current needs at different levels of government.

V. LESSONS AND RECOMMENDATIONS

- 85. Defining simple institutional arrangements and piggybacking on existing successful instruments and processes, instead of creating new instruments and processes, allows for faster implementation with a similar developmental impact.** When working to support existing programs, the Bank is encouraged to identify existing organizational processes, structures, and instruments (especially when the Bank has collaborated in their design) to minimize the creation of new instruments, requirements, or responsibilities. For those new responsibilities that the client cannot carry out under an existing mechanism, the Bank should identify capacity/resources gaps and provide solutions to bridge them. For instance, though the very similar P117947 Support to the National Urban Transport Project supports a similar program in Colombia, the Bank finances the national government with nonreimbursable contributions for infrastructure. If the Bank had followed a similar approach and piggybacked on PROTRAM and provided financed to existing instruments (i.e., PROTRAM's nonreimbursable national contributions) instead of financing a new instrument (sub-loans from BANOBRAS for unfunded subprojects components), the UTPP would have disbursed faster and reached the same developmental impact. However, the UTPP ended up competing directly with other financial support offered by BANOBRAS or with nonreimbursable resources from other national programs. BANOBRAS faced difficulties in performing roles delegated to it during project implementation. Despite successfully and proactively providing support to most of PROTRAM's participant projects, and promoting the UTPP, the UTPP was never able to take advantage of PROTRAM's success in order to ease or accelerate Project implementation.
- 86. On-demand projects pose a high risk of slow or partial implementation.** To mitigate this risk, the Bank and the Borrowers are encouraged: (i) to confirm potentially interested Borrowers as early as possible in the Project's preparation; and (ii) to conduct a market assessment to properly evaluate demand and factors affecting demand, so the Project can anticipate specific risks and include mitigation measures. Referring again to the similar Support to the National Urban Transport Program (P117947), the Bank approved the loans with a clear definition of the subprojects that they would finance, with previous authorization by the national government. Ensuring implementation readiness before approving the operation helps both mitigate the risks of delayed implementation and anticipate specific problems in already prepared and defined projects. The design of the UTPP was on demand, which was taken for granted. During Project implementation, different factors (as explained in previous sections) had a negative impact on demand for funds by potential public and private borrowers. PROTRAM subprojects' typical project cycle was around 8 years, and it may have taken a decade to build as strong a pipeline as PROTRAM's is today. The Project could have prevented these problems, first, by confirming more potential borrowers before approval, so implementation readiness was higher. This was the case of Monterrey, in which the Bank had a longer relationship, and had expressed interest in financing before approval. Second, the Project could have conducted a market analysis to analyze and mitigate risks of low demand for Project funds. Third, it could have allowed BANOBRAS to on-lend to private commercial banks, with confirmed demand and capacity for processing loans to private operators.



- 87. Inflexible technical requirements may lead to suboptimal technical solutions that do not adapt to the context and local needs.** Policy makers designing national programs to support urban transport are encouraged to balance requirements to ensure appropriate planning and institutional development with flexibility for subproject design by subnational governments, with an aim of fostering institutional improvements without limiting the flexibility for subnational governments to design and implement the most appropriate solutions to their specific contexts. PROTRAM requires all subprojects' promoters to create a transport authority, and to approve an integrated mobility plan. It also requires an appropriate technical, economic, and legal structure and assessment. All those requirements are reflected in enhanced planning and institutional strengthening in participant cities. However, the program also included a minimum of 34 percent of private investment. In addition, the program offered support for developing infrastructure. This rigidity in the program conditions the definition of solutions for mobility around the idea of a BRT with heavy infrastructure and private participation. The reality of many of the cities receiving support may have benefited from less infrastructure-focused solutions, such as citywide interventions and integrated land use and mobility planning, which were not provided. Also, for many contexts, structures involving public provision could have generated more benefits.
- 88. Focusing on hybrid buses and other newly developed clean bus technologies, which have not yet been adopted by the market, may jeopardize project implementation and divert attention from other benefits associated with a clean urban bus project.** Low-emissions programs should focus on maximizing benefits through improving public transport, and only consider the introduction of low-carbon vehicles for additional climate and environmental benefits when the costs associated with their introduction do not outweigh the benefits. When it is too costly to reduce costs for low-carbon transportation technologies, programs should provide clear, detailed information about vehicle performance in order to mitigate any perceived risks of higher operating costs, and allocate technology risks to the bus provider when possible. Quality urban transport and the modal shift are the main drivers for reducing CO₂ emissions. The focus on low-carbon vehicle technologies added complexity that hampered the effectiveness of the Project. Higher potential investment costs, and technology risks associated with low-carbon vehicles, deterred private operators from seeking UTTP resources for bus acquisitions. Focusing too much on introducing newer clean bus technology may be counterproductive in activating the general benefits associated with a clean urban bus project, which can greatly reduce emissions by encouraging modal shifts from private vehicle usage.
- 89. Mitigating incumbent operators' risk is critical to avoid delays and achieve the successful operation of urban bus projects.** Planners should consider incumbent operators early in the first stages of a project, and agree on implementation arrangements before being tied up in the starting of infrastructure development. Projects can also benefit from incorporating operators' tangible and intangible assets (such as knowledge about context and operations). Many of PROTRAM's projects, including the UTTP's subprojects, experienced delays, or failed to be implemented as planned once the infrastructure was complete due to an inability to organize incumbent operators into a consortium to provide operations. Lack of buy-in from the incumbent operators, a weak regulatory framework, and various political economy elements prevented the incumbent operators from joining operations as expected. This left regulators with a difficult path forward as they faced political difficulties if these incumbent operators were not included in operations, as well as potential operational competition. Therefore, reaching consensus among incumbent operators is a very important element in the Project's critical path.
- 90. Urban bus projects have specific features that make public-private partnership (PPP) structuring and the achievement of bankability especially challenging.** Planners are encouraged to consider a range of technical solutions that might make a PPP unnecessary. They are also guided in understanding a few key requirements before considering a PPP. A PPP is not a goal, or a technical solution, but a means of delivering a solution. Planners



should carefully select technical solutions that are suitable to solve the objectives of a project, given the context, without creating any limits for the definition of the solution. In some cases, the objectives of reforms have shifted from improving urban bus services, to other objectives, sometimes related to saving costs or achieving efficiency to accommodate PPPs. Urban bus transactions are usually relatively smaller than in other sectors; the nature of related projects (with numerous modular components and the need to integrate technical definitions with risk and functional allocations) make them more complex to structure PPPs with; and the existence of incumbent operators with different features may elevate the perceived combination of risks and transaction costs of potential investors. Furthermore, there is a tendency of project organizers to overestimate projections of passenger demand. This tends to make projects vulnerable as they often don't produce the revenues that were expected of them.



ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Contribute to the transformation of urban transport in Mexican cities toward a lower carbon growth

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|-----------------------|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| Avoided CO2 emissions | Number | 0.00 | 1960000.00 | 340000.00 | 46842.00 |
| | | 25-Feb-2010 | 25-Feb-2010 | 16-Jul-2016 | 30-Apr-2019 |

Comments (achievements against targets):

The project’s main component (Development of Integrated Transit Systems that reduce CO2 emissions) did not reach expected performance outcomes. Towards the end of the Project, various subproject beneficiaries, particularly those for the subprojects in Monterrey and Tijuana, were implementing different actions that were expected to significantly increase the passenger demand for both subprojects (e.g. in Monterrey it was expected that more buses would be repaired and that this would help the Ecovia system to reach the expected demand of 133,000 passengers a day; in Tijuana it was expected that the demand in the main corridor was going to increase to 124,000 passengers a day with the introduction of new feeder routes to the SITT). At the time of the last supervisory mission, the current demand sat at 80,000 and 14,000 daily trips for Ecovia and SITT (trunk route), respectively.

The original target includes 18 generic IMTC. The formally revised target includes the three subprojects that received IBRD/CTF funding (i.e. Monterrey, Guadalajara and Tijuana). It also includes subprojects that eventually did not received financing in Mexico City (Metrobus L5), Cuernavaca, Queretaro,



Merida and Acapulco. In addition, the contribution to emissions in the actual achievement from Monterrey, and specially in Tijuana is significantly lower as demand did not materialize as expected.

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|-----------------------------------|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| Integrated mass transit corridors | Number | 0.00 | 18.00 | 9.30 | 2.12 |
| | | 25-Feb-2010 | 25-Feb-2010 | 16-Jul-2016 | 30-Apr-2019 |

Comments (achievements against targets):

Lower demand than expected has made the contribution to this indicator of the three subprojects lower than anticipated. Integrated Mass Transit Corridors (IMTC) is an instrument to normalize measuring the extend of implementation of the PROTRAM program. The normalization is based on the length of the corridor (1/3) and the demand carried by the corridor (2/3).

The revised target included subprojects in Monterrey, Guadalajara and Tijuana. It also included subprojects that eventually did not received UTPP financing in Mexico City (Metrobus L5), Queretaro, Cuernavaca, Merida, and Acapulco.

The actual achieved at completion includes Monterrey, Guadalajara, and Tijuana. The contribution to IMTC is lower than expected in Monterrey and Tijuana, because of the lower than expected demand.



| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|---|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| Investment leverage | Amount(USD) | 0.00 | 2344.00 | 585.00 | 243.30 |
| | | 25-Feb-2010 | 25-Feb-2010 | 16-Jul-2016 | 30-Apr-2019 |
| <p>Comments (achievements against targets): The original target includes the investment for 18 generic IMTC. The fomally revised target includes the three subprojects that received IBRD/CTF funding (i.e. Monterrey, Guadalajara and Tijuana). It also includes subprojects that eventually did not received financing in Mexico City (Metrobus L5), Cuernavaca, Queretaro, Merida and Acapulco. The contribution of Guadalajara to the Actual achieved at completion is lower than expected due to pending private investments for fare collection and signalling in the extension of the first line of SITEUR</p> | | | | | |

A.2 Intermediate Results Indicators

Component: Development of Integrated Transit Systems that reduce CO2 emissions: (i) Mass transit corridors and ancillary investments; (ii) Low

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|--|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| Percentage reduction in perceived total travel time | Percentage | 0.00 | 5.00 | | 0.00 |
| | | 25-Feb-2010 | 16-Jul-2016 | | 30-Apr-2019 |
| <p>Comments (achievements against targets):</p> | | | | | |



Actual achieved at completion marked as 0 due to lack of information. This indicator was introduced in the third restructuring.

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|------------------|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| % of modal shift | Percentage | 0.00 | 10.00 | 5.00 | 0.00 |
| | | 25-Feb-2010 | 04-Dec-2018 | 16-Jul-2016 | 30-Apr-2019 |

Comments (achievements against targets):

Revised from 10percent to most realistic 5 percent based on surveys for other projects in Mexico.

Actual achieved at completion marked as 0 due to lack of information.

Component: Capacity Building: Provision of TA and training to the Eligible Beneficiaries

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|---|-----------------|-------------|-----------------|-------------------------|-------------------------------|
| Integration of climate change mitigation in transport plans | Number | 0.00 | 8.00 | 5.00 | 3.00 |
| | | 25-Feb-2010 | 25-Feb-2010 | 30-Apr-2019 | 04-Dec-2018 |



Comments (achievements against targets):

There is no information available that justify the modification to five, which is not consistent with the revision of outcome indicators.



B. KEY OUTPUTS BY COMPONENT

| Indicator /Output | Before Restructuring | After Third Restructuring | At Closing |
|---------------------------------|--|---|---|
| Outcome Indicators | <ol style="list-style-type: none"> 1. CO₂ emissions: Approximately 1.96 million tons of CO₂ emissions avoided per year, by 2017 at US\$30 of CTF per ton a year. 2. Integrated Mass Transit Corridor Equivalent: 18 Integrated Mass Transit Corridors are in operation by 2017. 3. Investment leverage: A total of US\$2,344 million of investment from other public and private sources of financing. | <ol style="list-style-type: none"> 1. CO₂ emissions: Approximately 0.34 million tons of CO₂ emissions avoided per year, by 2019 at US\$9.95 of CTF investment per ton. 2. Integrated Mass Transit Corridor Equivalent: 9.3 Integrated Mass Transit Corridors are in operation by 2019. 3. Investment leverage: A total of US\$585 million of investment from other public and private sources of financing by 2019. | <ol style="list-style-type: none"> 1. CO₂ emissions: Approximately 0.047 million tons of CO₂ emissions avoided per year at Project closing at US\$46.88 of CTF investment per ton, and US\$104.7 of total investment per ton. 2. Integrated Mass Transit Corridor Equivalent: 2.12 Integrated Mass Transit Corridors are in operation at Project closing. 3. Investment leverage: A total of US\$243.3 million of investment from other public and private sources of financing at Project closing. |
| Intermediate Results Indicators | <ol style="list-style-type: none"> 1. Integrated Transport Plans: Number of cities (8) with updated Integrated Transport Plans that include climate change considerations. 2. Travel time saved: Minutes of travel time saved (9 minutes) per trip for public transit users on corridors with mass transit interventions. 3. Modal shift: % users of the new mass transit systems that were formerly private vehicle users equal to 10% | <ol style="list-style-type: none"> 1. Integrated Transport Plans: Number of cities (5) with updated Integrated Transport Plans that include climate change considerations. 2. Travel time saved: Percentage of travel time saved (5%) for public transit users on corridors with mass transit interventions per trip. 3. Modal shift: % modal shift of mass transit system users that were | <ol style="list-style-type: none"> 1. Integrated Transport Plans: Number of cities (3) with updated Integrated Transport Plans that include climate change considerations. 2. Travel time saved: Percentage of travel time saved for public transit users on corridors with mass transit interventions per trip. NOT AVAILABLE |



| | | | |
|--|---|---|---|
| | <p>4. Bus scrapping project: Cities/municipalities that have a bus scrapping project in place that is leading to a reduction in oversupply of buses equal to 5.</p> <p>5. Low-carbon vehicle technologies: Cities/municipalities where the private sector deploys low-carbon vehicle technologies as part of the mass transport corridors, eventually representing approximately one-third of the passenger capacity of the corridors equal to 5.</p> | <p>formerly private vehicle users equal to 5%.</p> | <p>3. Modal shift: % modal shift of mass transit systems users that were formerly private vehicle users. NOT AVAILABLE. The ICR assumed 5% for economic analysis.</p> |
| <p>Key Outputs by Component (linked to the achievement of the Objective)</p> | <p>1. Kilometers of dedicated lanes 2. Transport authorities created 3. Number of SPVs created</p> | <p>1. Kilometers of dedicated lanes: 134 km 2. Transport authorities created: 3 3. Number of SPVs created: 3</p> <p><i>146 km includes: 30 km in ECOVIA; 33 km in Tijuana; 1 km in Jalisco; 18 km in Mexico City; and 52 km in Cuernavaca.</i></p> | <p>1. Kilometers of dedicated lanes: 64 km, including 30 km in ECOVIA; 33 km in Tijuana; 1 km in Jalisco. 2. Transport authorities: 2 authorities 3. Number of SPVs created: 2</p> <p>Three updated Integrated Transport Plans that include climate change considerations.</p> |



ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

| Name | Role |
|--------------------------------|---|
| Preparation | |
| Walter Vergara | Task Team Leader |
| Arturo Ardila Gomez | Task Team Leader |
| Emmanuel James | Lead Transport Specialist |
| Maria Elena Castro | Senior Social Scientist |
| Maria Catalina Ochoa | Junor Proffesional Associate |
| Oswaldo Patino | Consultant |
| Carla della Maggiora | Consultant |
| Jorge Rebelo | Lead Transport Specialist (Peer Reviewer) |
| John Rogers | Consultant (Peer Reviewer) |
| Samuel L. Zimmerman | Senior Transport Specialist |
| Georges B. Darido | Young Professional |
| Gabriela Elizondo | Consultant |
| M. Dolores Lopez Larroy | Senior Financial Officer |
| Seraphine Haeussling | Consultant |
| Juan Carlos Serrano | Financial Management Analyst |
| Jose M. Martinez | Senior Procurement Specialist |
| Tomas Socias | Senior Procurement Specialist |
| Supervision/ICR | |
| Abel Lopez Dodero | Task Team Leader |
| Felipe Targa Rodriguez | Task Team Leader |
| Maria Catalina Ochoa Sepulveda | Task Team Leader |
| Shomik Mehndiratta | Task Team Leader |
| Arturo Ardila Gómez | Task Team Leader |
| Francisco Rodriguez | Procurement Specialist(s) |
| Daniel Chalupowicz | Financial Management Specialist |
| Aracelly G. Woodall | Team Member |
| Angelica Calderon | Team Member |
| Dora Patricia Andrade | Environmental Specialist |
| Gabriel Penaloza | Team Member |
| Carlos Alberto Molina Prieto | Social Specialist |
| Diana Gabriela Jimenez Cruz | Team Member |
| Dorothee Georg | Social Specialist |
| Gabriela Grinsteins | Counsel |



| | |
|-------------------------------|-------------------|
| Alejandro Hoyos Guerrero | Team Member |
| Karla Dominguez Gonzalez | Team Member |
| Arelia Jacive Lopez Castaneda | Social Specialist |

B. STAFF TIME AND COST

| Stage of Project Cycle | Staff Time and Cost | |
|------------------------|---------------------|--|
| | No. of staff weeks | US\$ (including travel and consultant costs) |
| Preparation | | |
| FY08 | 11.258 | 46,880.08 |
| FY09 | 37.068 | 244,752.06 |
| FY10 | 48.600 | 254,951.89 |
| FY18 | 0 | 1,854.64 |
| Total | 96.93 | 548,438.67 |
| Supervision/ICR | | |
| FY10 | 10.142 | 62,620.26 |
| FY11 | 19.462 | 94,551.48 |
| FY12 | 32.636 | 219,047.56 |
| FY13 | 23.355 | 231,233.38 |
| FY14 | 56.711 | 288,616.28 |
| FY15 | 85.774 | 361,226.35 |
| FY16 | 70.598 | 363,844.35 |
| FY17 | 62.719 | 372,012.17 |
| FY18 | 48.028 | 344,662.68 |
| FY19 | 45.080 | 268,066.67 |
| FY20 | 4.810 | 28,826.06 |
| Total | 459.32 | 2,634,707.24 |



ANNEX 3. PROJECT COST BY COMPONENT

| Components | Amount at Approval (US\$M) | Actual at Project Closing (US\$M) | Percentage of Approval (%) |
|---|---------------------------------------|--|---------------------------------------|
| Capacity Building: Provision of TA and training to the Eligible Beneficiaries | 10 | 0 | 0% |
| Development of Integrated Transit Systems that reduce CO ₂ emissions: (i) Mass transit corridors and ancillary investments; (ii) Low | 2684 | 357.34 | 13.31% |
| Project Management | 0 | 0 | 0% |
| Total | 2694 | 357.34 | 13.26% |



ANNEX 4. EFFICIENCY ANALYSIS

1. INTRODUCTION

- 1. This analysis comprises an update of the economic analysis conducted as part of the third restructuring, and a cost-effectiveness analysis.** At appraisal, the economic analysis for the original Project included a standard cost-benefit analysis (CBA) of a benchmark corridor. The analysis was updated as part of the third restructuring of the Project (approved in July 2019). This update included four specific subprojects. It also incorporated the latest guidance and methodologies recommended by the World Bank Group for the economic analysis of transport projects.^{36 37} The analysis presented in this annex includes an update of the 2016 analysis. This update reduces the number of subprojects to the three actually financed by the Urban Transport Transformation Program (UTTP).
- 2. The updated economic analysis confirms the conclusions of the original analysis regarding the UTTP's economic viability.** The Project's objective is to contribute to the transformation of urban transport in Mexican cities toward a lower-carbon growth path. The incremental CBA used to reach these conclusions is based on time savings and reductions in vehicle operating costs (VOC) as well as other measurable and nonmeasurable benefits. Under very conservative assumptions, the results show a weighted combined economic internal rate of return (EIRR) of 13.07 percent. The combined subprojects have a net present value (NPV) of US\$377,310,056.24 at a 4.5 percent discount rate. In addition, the cost-effectiveness analysis shows an average funding of US\$46.88 from the Clean Technology Fund (CTF) per CO₂ saved, and a negative marginal abatement cost (MAC). A negative MAC is expected for this kind of intervention, which is economically viable.
- 3. Justification for Bank support.** The use of World Bank resources is justified for five reasons: (i) The Project is economically viable, as shown in this annex, and exceeds the traditional requirement of having an EIRR over 12 percent, which could be understood as a rationale for utilizing scarce World Bank resources. (ii) The Project is consistent with the country's current Country Partnership Strategy (CPS) for FY2014–FY2019. This CPS supports Project-related strategies such as: (a) the provision of new urban layouts needed to promote public and nonmotorized transport; (b) the development of mass transit in appropriate corridors and the creation of a sustainable urban mobility strategy; and (c) the enhancement of energy efficiency through the promotion of labels, standards, and green technologies in the transport sector. (iii) The Bank has extensive experience in supporting Mexico's urban transport agenda. In 2008, the Federal Government hired the Bank to support the creation of a federal program to support urban mass-transit projects, the Federal Program to Support Mass Transport (PROTRAM). PROTRAM's portfolio comprises more than 40 projects (including its pipeline), 7 of which are already in operation, with total investments costs of around US\$3.5 billion. The Global Environment Facility (GEF) (P0591610,

³⁶ World Bank, "Discounting Costs and Benefits in Economic Analysis of World Bank Projects," 2016.

³⁷ World Bank, "Investment Project Financing Economic Analysis Guidance Note," 2014.



approved in 2002) and carbon finance (P082656, approved in 2005) projects enabled the implementation of the first bus rapid transit (BRT) system in Mexico, and the GEF-STAQ grant for Sustainable Transport and Air Quality Project (P114012) has continued this effort in supply-side strategies. Besides the UTTP, the Bank is also worked on the technical assistance project of the Mexico Informal Transit Reform Support (P156729). (iv) Good financial conditions strengthen the Project's financial viability, especially for the private sector. The Project included a loan from the CTF in with concessional conditions, available to the National Development Bank for Public Works and Services (BANOBRAS) to provide below-market interest rates to private and public beneficiaries. In addition to incentivizing interventions that mitigate climate change, it helps to improve the financial condition of projects that traditionally experience financial strain. (v) There is a need to strengthen capacity and improve institutional arrangements in local institutions under the development agenda. Lessons learned from past projects in the country, and also this Project, advocate the importance of coordination among all parties involved in the project (Bank, BANOBRAS, Secretariat of Agrarian, Land, and Urban Development [SEDATU], participating cities, and consultants) to mitigate any political changes that may affect client engagement or implementation pace. The Bank is providing technical assistance for the implementation of the safeguards supervision. Mexico has agreed to adopt a framework consistent with World Bank safeguards for all urban transport projects supported by federal resources, regardless of Bank participation. In addition, the Project is promoting coordination among BANOBRAS and federal and subnational institutions in supported subprojects.

- 4. Public sector provision.** Through BANOBRAS, the UTTP can provide financing to both the private or public sectors. The rationale for public sector provision is justified by two market failures. First, given the positive externalities of public transport projects, private provision would result in a quantitative and qualitative level of service that is lower than the social optimum. Second, these interventions require some degree of monopolistic structures that justify the participation of the public sector in the provision transit services. Particularly, competition in the transit corridors, combined with regulated fares, may generate undesired effects related to oversupply, such as increased accidents or inefficient networks, due to a lack of coordination in planning and operation. Some degree of consolidation mitigates this risk, but it is achieved through the creation of monopolistic structures that require public regulation and intervention.

2. COST-BENEFIT ANALYSIS UPDATE: METHODOLOGY AND ASSUMPTIONS

- 5. The original analysis and its updates follow a standard incremental CBA methodology in compliance with World Bank Operational Policy (OP) 10.04.** For each benefit, the analysis compared the likely outcomes with and without the subprojects. It then calculated the social NPV of estimated costs and benefits and the economic rate of return (ERR), defined as the rate at which the discounted costs and benefits over the life of the subprojects are equal. The client performed an initial economic analysis without Bank participation and in accordance with local standards and methodology. The Bank has



reviewed the available information, updated assumptions and parameters, and standardized them to the extent possible to better meet the Bank's best practice standards and to fit with the Bank's understanding of project scope. Data limitations caused the team to apply several conservative adjustments that may underestimate the subprojects' potential benefits but keep the results within a credible range of expected benefits. Even at the low end of the range, the subprojects provide acceptable net benefits.

- 6. The Project's original economic analysis provided a benchmark for a BRT-type mass transit project, involving an infrastructure and rolling-stock component.** The benchmark project is a trunk-and-feeder BRT corridor, which would comprise 15 kilometers (km) of exclusive lanes for buses, stations at which passengers board the buses at grade, transfer terminals, and bus depots. It would carry 220,000 riders per day, assumes a 1 percent annual growth demand, and a time value consistent with Mexican authorities' estimates. The analysis included five different scenarios depending on ancillary investments and the use of hybrid technology. The standard scenario assumed a 10 percent modal shift from private cars (linked to ancillary investments), and a 3.5 percent induced demand due to the project. The analysis results in a positive NPV for all scenarios, and an ERR ranging from 22.9 to 33.1 percent. The use of hybrid technologies reduces the Project's socioeconomic performance (increased economic costs exceed increased economic benefits).
- 7. The update during the third restructuring recognizes a conservative approach when reviewing original subproject analyses undertaken by the promoters as part of feasibility studies.** Although most of these assumptions took conservative estimates about the financial viability of projects, the Bank's adjustments were even more conservative, adopting a narrower definition of Project scope. The most important assumptions refer to the demand estimate, the definition of the without-Project situation, and the exclusion of external beneficiaries from Project considerations. In addition, the shadow prices for cost estimates may overestimate economic costs. These assumptions that the original analysis started from were as such:

 - a. *The demand estimation and the analyses in general are not based on detailed demand studies.* Instead, they assume a demand for the first year of the operation equal to the current demand in the intervened corridor. We consider this assumption conservative because it does not take into account the modal shift of private car users to the new system (estimated as 10 percent in the original Bank analysis), or induced demand from users who start traveling because of the new system (3.5 percent in the original Bank analysis).
 - b. *The definition of the without-project situation considers an unrealistic and highly conservative "optimized situation" in the BRT projects.* This optimized situation involves a drastic reduction in the fleet, minor infrastructure improvements, and an improvement in the operational strategy. It is unrealistic because it is not supported by detailed demand studies, and the political economy would make its implementation very unlikely in some of the subprojects. It produces conservative effects in the analysis because it drastically reduces the costs (time and VOC) in the without-project situation, causing a reduction in the estimated benefits.



- c. *The analysis does not consider the potential positive externalities from reduced congestion that other road users would enjoy.* The modal shift from private vehicles and the reduction of the public transport fleet due to the Project will reduce congestion, which—at least in the short term—produces significant benefits. The most important benefits related to reduced congestion are time savings, VOC reduction, health benefits from the reduction of local pollutants, and road safety. Less congestion is also related to fewer CO₂ emissions and less noise, among others.
- d. *The shadow prices only consider the removal of taxes and subsidies.* The only adjustment that the analysis incorporated in investment prices is the removal of taxes. Usually, in addition to the removal of taxes and subsidies, shadow prices include a reduction that can reach an additional 10 percent reduction with respect to the financial or market price to reflect other direct or indirect factors that distort the economic cost of inputs for the Project.

8. The update during the Project’s third restructuring included modifications of the original analyses of four subprojects.³⁸

- a. *Discount rate:* The analysis used a social discount rate of 4.5 percent, which is based on three elements: (i) estimated economic growth (g); (ii) elasticity of marginal utility (θ); and (iii) intertemporal (rate of time) preference (ρ). The three elements correspond to the components of the Ramsey equation, as recommended by the Bank’s latest guidance on the social discount rate. Regarding estimated economic growth, we have selected 3 percent. Economic growth is included to represent (i) the fact that beneficiaries will be richer in the future; and (ii) the marginal utility of an additional dollar decrease. The use of 3 percent is consistent with the country’s gross domestic product (GDP) performance and forecasts. Mexico averaged less than 2.5 percent of GDP growth over the past 10 years. The Organisation for Economic Co-operation and Development (OECD) had forecasted a 3 percent growth for 2017.³⁹ Elasticity of marginal utility represents how much the marginal utility decreases as the beneficiaries become richer, usually considered between 1 and 2. Due to the lack of a better estimate, we are using 1.5. The last element, intertemporal preference, is usually defined between 0 and 0.2. For purposes of calculating the discount rate of the analysis, we have selected 0, which reflects equal preference for current and future beneficiaries.

Box A4.1 Ramsey Equation

| |
|--|
| $ERR = \rho + \theta g = 0 + 1.5 \times 0.016 = 0.24$ <p>ρ: Intertemporal preference = 0 θ: Elasticity of marginal utility = 1.5 g: Growth rate = 0.016</p> |
|--|

³⁸ The update shifted from a benchmark BRT project to four specific subprojects, including Monterrey, Guadalajara, Tijuana, and Metrobus L5.

³⁹ Although in the time since this first analysis GDP growth has slowed (OECD forecasted a 1.6 percent growth rate for 2019), the analysis keeps the 3 percent GDP growth as our baseline.



- b. *Evaluation horizon:* The team adjusted the horizon of the analysis to 20 years. The original feasibility studies used a standard 30-year evaluation. The team adjusted it for two reasons: First, demand-growth assumptions implied the need to increase system capacity in some projects over the longer term. The analysis did not reflect any capacity increase in costs, and this would not be possible in some scenarios. Second, not all analyses reflected reinvestment in its equipment, which is usually necessary after 10 to 15 years of operation.
- c. *Other minor adjustments:* The Bank team made other minor adjustments per subproject, such as eliminating infrastructure maintenance costs in the without-project situation or adjusting maintenance costs when needed. The team eliminated infrastructure maintenance costs in the without-project situation in one subproject to conservatively ensure consistency among subprojects.

9. This update for the ICR evaluation includes the following modifications.

- a. *Subprojects:* The analysis consider subprojects eventually financed with IBRD/CTF proceeds, including Monterrey, Guadalajara, and Tijuana. The team updated the latest available economic feasibility studies with information received from the respective Project Implementation Units (PIUs). The subprojects are Ecovia (Monterrey, Nuevo León)—a 24.8-km BRT corridor with demand of 78,000 daily passengers; Light Rail TLG-1 (Guadalajara, Jalisco)—increased capacity of the LRT Line 1, with an expected initial demand of 136,000 daily passengers; Corridor 1 (Tijuana, Baja California)—an Integrated Transport System including a 33-km exclusive lane for articulated buses, and an initial demand of 14,000 daily passengers.
- b. *Subprojects' scope:* The team adjusted the scope of transport activities included in each subproject's analysis to be more conservative in assumptions in regard to secondary and feeder routes. Each subproject's feasibility analysis included data from feeder and secondary bus routes. The team's updates removed data regarding these routes as they never got implemented, and only included data for the principle/trunk routes in the CBA.
- c. *Data:* The team updated the estimations made for feasibility studies with actual data from the subprojects' initial operations. It also incorporated projections for each subproject based on a more up-to-date understanding of the projects. In each subproject, this meant adjusting the following:
 - i. *Monterrey*—daily passenger demand, fleet size, and vehicle cost data.
 - ii. *Guadalajara*—adjustments included incorporating more up-to-date daily passenger demands. It also included incorporating expected demand changes due to the Line 1 subproject expansion, as well as for the addition of Line 3 in 2020. The team also added more conservative projections for demand changes for busing operations in the corridor. The initial feasibility study predicted the full shutdown of these routes; however, this has not yet occurred. Therefore, the team developed a demand factor to adjust demand based on projected modal shifts from Line 1 changes (a decrease in project scenario and an increase in the without-project scenario).



iii. *Tijuana*—daily passenger demand data and fleet size.

- 10. The adjustment of subproject data responds to differences between the project design assumed at feasibility and what was actually implemented.** The updated analysis covered the following for each subproject.
- a. *Monterrey*: the team focused the analysis on the trunk routes in the “with project” scenario and the principle routes in the “without project” scenario (which the BRT route replaced) exclusively. All other routes that were included in the revised analysis, including secondary and feeder routes, were dropped in the updated analysis because they had not been implemented. This affected all data for costs and benefits.
 - b. *Guadalajara*: the analysis does not include the planned phased restructuring of bus routes, which had not been implemented. Instead the analysis assumes that these routes would continue to operate, but with adjusted passenger demand.
 - c. *Tijuana*: The original estimate analysis covered the costs and benefits of all bus routes that were covered in the new Integrated Transport System (SITT). However, full operation of this system has yet to come into effect. Therefore, the analysis included only data from the current BRT Trunk routes of the SITT (the routes using buses financed by the UTPP) in the subprojects’ CBA. The analysis also assumed a new baseline consistent with the current demand in the trunk corridor.

3. COST-BENEFIT ANALYSIS RESULTS

- 11. The updated economic analysis confirms that at least two of the subprojects are solidly economically viable, with a third being slightly in the red (due largely to the incomplete status of the Project).** Under these conservative assumptions, the Project’s total discounted economic benefits exceed total economic costs. The analyzed results from each subproject show a weighted combined ERR of **13.07** percent. The combined subprojects represent a NPV of **US\$377,310,056.24** at a 4.5 percent discount rate. Table A4.1 summarizes the combined results, and table A4.2 shows the combined analysis’ economic flows.



Table A4.1 Summary of Combined Results (US\$)

| | Program Total | Monterrey | Guadalajara | Tijuana |
|---|-----------------------|-----------------------|-----------------------|------------------------|
| Total discounted economic costs | 361,414,086.38 | 66,919,149.46 | 112,911,345.21 | 104,861,715.85 |
| Investment costs | 211,642,000.57 | 100,684,002.16 | 55,913,704.02 | 55,044,294.38 |
| Rolling stock and other equipment | 78,968,612.37 | 1,222,849.57 | 56,997,641.18 | 20,748,121.61 |
| Operation and maintenance (O&M) costs | 41,633,809.84 | 2,359,203.09 | 23,195,638.50 | 17,077,823.50 |
| Infrastructure salvage value | (27,562,220.37) | (39,950,146.01) | (1,234,166.00) | (9,716,984.32) |
| Economic costs associated to works activity | 56,731,883.98 | 2,603,240.65 | 32,420,182.65 | 21,708,460.68 |
| Total discounted economic benefits | 738,724,142.62 | 309,465,492.89 | 389,848,073.62 | 56,198,292.20 |
| Time savings | 585,853,044.56 | 251,387,957.01 | 344,564,369.73 | 4,738,417.95 |
| Value of operational cost (VOC) savings | 152,871,098.06 | 58,077,535.88 | 45,283,703.89 | 51,459,874.25 |
| Net present value (NPV)@2.45% (benefits - costs) | 377,310,056.24 | 219,906,667.13 | 161,493,566.51 | (48,663,423.65) |
| Economic internal rate of return (EIRR) | 13.07% | 17.15% | 13.65% | -2.94% |



Table A4.2 Summary of Economic Analysis (US\$)

| Year | Investment Costs | Rolling Stock and Other Equipment | O&M Costs | Infrastructure Salvage Value | Nuisance during Construction | Total Cost | Time Savings | Value of Operational Costs (VOC) | Total Benefits | Total |
|------|------------------|-----------------------------------|------------|------------------------------|------------------------------|-------------|--------------|----------------------------------|----------------|-----------------|
| 0 | 179,287,381 | 51,442,642.63 | 0.00 | 0.00 | 32,122,383 | 262,852,406 | 0.00 | 0 | 0.00 | -262,852,406.94 |
| 1 | 33,810,577 | 29,768,037.02 | 135,205 | 0.00 | 25,716,928 | 89,430,748 | 5,162,285 | 1,380,127 | 6,542,413.00 | -82,888,335.35 |
| 2 | 0.00 | -3,533,326.78 | 1,987,901 | 0.00 | 0.00 | -1,545,425 | 14,612,267 | 7,121,051 | 21,733,319.25 | 23,278,744.60 |
| 3 | 0.00 | -3,604,575.19 | 3,230,597 | 0.00 | 0.00 | -373,977 | 18,330,920 | 8,226,220 | 26,557,140.70 | 26,931,118.25 |
| 4 | 0.00 | -3,677,260.30 | 1,987,901 | 0.00 | 0.00 | -1,689,358 | 50,861,591 | 11,702,814 | 62,564,405.67 | 64,253,764.54 |
| 5 | 0.00 | -3,167,572.24 | 3,862,740 | 0.00 | 0.00 | 695,168 | 49,143,192 | 12,476,471 | 61,619,663.53 | 60,924,495.41 |
| 6 | 0.00 | -3,243,346.40 | 1,987,901 | 0.00 | 0.00 | -1,255,444 | 51,149,548 | 13,328,190 | 64,477,739.39 | 65,733,184.36 |
| 7 | 0.00 | -3,320,539.90 | 3,230,597 | 0.00 | 0.00 | -89,942 | 51,736,435 | 14,241,649 | 65,978,084.66 | 66,068,026.92 |
| 8 | 0.00 | -3,399,290.37 | 1,987,901 | 0.00 | 0.00 | -1,411,388 | 53,522,295 | 15,221,932 | 68,744,228.53 | 70,155,617.47 |
| 9 | 0.00 | -3,479,629.22 | 1,987,901 | 0.00 | 0.00 | -1,491,727 | 55,353,454 | 16,274,534 | 71,627,988.61 | 73,119,716.41 |
| 10 | 0.00 | 21,504,135.30 | 5,679,865 | 0.00 | 0.00 | 27,184,001 | 50,481,684 | 13,075,865 | 63,557,549.88 | 36,373,548.68 |
| 11 | 0.00 | -4,224,282.95 | 1,987,901 | 0.00 | 0.00 | -2,236,381 | 52,265,494 | 13,263,388 | 65,528,883.04 | 67,765,264.56 |
| 12 | 0.00 | -1,584,180.75 | 15,386,619 | 0.00 | 0.00 | 13,802,438 | 52,977,211 | 13,451,487 | 66,428,698.99 | 52,626,260.75 |
| 13 | 0.00 | -4,394,930.60 | 3,230,597 | 0.00 | 0.00 | -1,164,333 | 54,827,228 | 13,640,167 | 68,467,396.28 | 69,631,729.25 |
| 14 | 0.00 | -4,482,822.38 | 1,987,901 | 0.00 | 0.00 | -2,494,921 | 56,724,819 | 13,829,435 | 70,554,255.55 | 73,049,176.51 |
| 15 | 0.00 | 19,162,548.78 | 3,862,740 | 0.00 | 0.00 | 23,025,289 | 53,948,454 | 13,190,257 | 67,138,712.55 | 44,113,423.42 |
| 16 | 0.00 | -4,140,339.45 | 1,987,901 | 0.00 | 0.00 | -2,152,438 | 55,883,034 | 13,491,679 | 69,374,714.64 | 71,527,152.66 |
| 17 | 0.00 | 4,800,854.43 | 1,987,901 | 0.00 | 0.00 | 6,788,755 | 57,076,820 | 13,793,921 | 70,870,741.94 | 64,081,986.09 |
| 18 | 0.00 | -4,350,147.13 | 3,230,597 | 0.00 | 0.00 | -1,119,549 | 59,085,423 | 14,096,991 | 73,182,414.87 | 74,301,964.37 |
| 19 | 0.00 | -4,458,519.73 | 1,987,901 | 0.00 | 0.00 | -2,470,618 | 61,144,157 | 14,400,897 | 75,545,055.06 | 78,015,673.36 |
| 20 | 0.00 | 21,917,634.42 | 5,679,865 | -66,472,193 | 0.00 | -38,874,693 | 57,693,604 | 7,994,423 | 65,688,027.38 | 104,562,720.49 |



12. **The composition of benefits and costs varies depending on the nature and characteristics of the subproject, but is categorized the same in all subprojects.** Regarding benefits, time and VOC savings are the two quantified sources of benefits. VOC is more prevalent in subprojects with lower demand densities, such as the Tijuana BRT and integrated systems. On the other hand, time savings are relatively more important in projects with high demand density, such as Guadalajara’s Urban Electric Train System (SITEUR) L1, in which the intervention is more focused on high-demand and high-speed trunk corridors with exclusive lanes. Also, the positive effect of the fleet reduction (already diminished with the assumptions of the optimized situation for the without-project situation) is lower than the time savings derived from increased speeds. Similarly, cost composition depends on the nature of the intervention, with rolling stock and equipment being relatively more important in those projects with lower demand densities, and infrastructure in those more focused on corridors. Table A4.3 includes a summary of results. Tables A4.4, A4.5, and A4.6 include a summary of results per subproject.

Table A4.3 Summary of Results

| Subproject | ERR | NPV at 2.4% (US\$) |
|-------------------------|--------|--------------------|
| Monterrey (Ecovia) | 17.15% | 219,906,667.13 |
| Tijuana (SITT) | -2.94% | -48,663,423.65 |
| Guadalajara (SITEUR L1) | 13.65% | 161,493,566.51 |

Table A4.4 Summary of Results: Ecovia Subproject (US\$)

| | |
|---|-----------------------|
| Total Discounted Economic Costs | 66,919,149.46 |
| Investment costs | 100,684,002.16 |
| Rolling stock and other equipment | 1,222,849.57 |
| O&M costs | 2,359,203.09 |
| Infrastructure salvage value | -39,950,146.01 |
| Economic costs associated with works activity | 2,603,240.65 |
| Total discounted economic benefits | 309,465,492.89 |
| Time savings | 251,387,957.01 |
| VOC savings | 58,077,535.88 |
| NPV @0.045 (Benefits - Costs) | 219,906,667.13 |
| ERR | 17.15% |

Table A4.5 Summary of Results: Tijuana Subproject (US\$)

| | |
|---|-----------------------|
| Total Discounted Economic Costs | 104,861,715.85 |
| Investment costs | 55,044,294.38 |
| Rolling Stock and other equipment | 20,748,121.61 |
| O&M costs | 17,077,823.50 |
| Infrastructure Salvage value | -9,716,984.32 |
| Economic costs associated with works activity | 21,708,460.68 |
| Total discounted economic benefits | 56,198,292.20 |
| Time savings | 4,738,417.95 |
| VOC savings | 51,459,874.25 |
| NPV at 1 (Benefits - Costs) | -48,663,423.65 |
| ERR | -2.94% |



Table A4.6 Summary of results: SITEUR L1 Subproject (US\$)

| | |
|---|-----------------------|
| Total Discounted Economic Costs | 112,911,345.21 |
| Investment costs | 55,913,704.02 |
| Rolling stock and other equipment | 56,997,641.18 |
| O&M costs | 23,195,638.50 |
| Infrastructure salvage value | -1,234,166.00 |
| Economic costs associated with works activity | 32,420,182.65 |
| Total discounted economic benefits | 389,848,073.62 |
| Time savings | 344,564,369.73 |
| VOC savings | 45,283,703.89 |
| NPV at 1 (Benefits - Costs) | 161,493,566.51 |
| ERR | 13.65% |

13. The sensitivity analysis shows that the results are robust. Table A4.7 shows the effect of using different discount rates in the NPV. Table A4.8 reflects the combined effect on the results of a reduction in expected benefits and an increase in costs. The analysis shows that the Project would still be viable with a 20 percent cost increase combined with a 30 percent reduction in expected benefits. This analysis, together with the switching values reflected in the previous table, confirms the robustness of the analysis results.

Table A4.7 Sensitivity Analysis on Discount Rate ('000)

| Discount Rate | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% |
|---------------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|--------|-------|
| NPV (US\$) | 596,738 | 499,425 | 415,177 | 341,983 | 278,175 | 222,360 | 173,374 | 130,243 | 92,145 | 58,388 | 28,387 | 1,645 |

Table A4.8 Combined Sensitivity Analysis on Benefit Reduction (%) and Cost Increase (%)

| NPV | \$377,310.06 | Benefit Reduction | | | | | |
|---------------|--------------|-------------------|---------------|---------------|---------------|----------------|----------------|
| | | 0% | 5% | 10% | 20% | 30% | 50% |
| Cost Increase | 0% | \$377,310.06 | \$359,239.35 | \$341,168.65 | \$305,027.24 | \$268,885.83 | \$196,603.01 |
| | 5% | \$340,373.85 | \$322,303.14 | \$304,232.44 | \$268,091.03 | \$231,949.62 | \$159,666.81 |
| | 10% | \$303,437.64 | \$285,366.94 | \$267,296.23 | \$231,154.82 | \$195,013.42 | \$122,730.60 |
| | 20% | \$229,565.23 | \$211,494.52 | \$193,423.82 | \$157,282.41 | \$121,141.00 | \$48,858.18 |
| | 30% | \$155,692.81 | \$137,622.11 | \$119,551.40 | \$83,410.00 | \$47,268.59 | (\$25,014.23) |
| | 50% | \$7,947.98 | (\$10,122.72) | (\$28,193.42) | (\$64,334.83) | (\$100,476.24) | (\$172,759.06) |



| ERR | Benefit Reduction | | | | | | |
|---------------|-------------------|--------|--------|--------|--------|-------|-------|
| | 13.07% | 0% | 5% | 10% | 20% | 30% | 50% |
| Cost Increase | 0% | 13.07% | 12.39% | 11.77% | 10.63% | 9.62% | 7.90% |
| | 5% | 12.36% | 11.70% | 11.09% | 9.98% | 8.99% | 7.30% |
| | 10% | 11.63% | 10.99% | 10.40% | 9.31% | 8.34% | 6.69% |
| | 20% | 10.11% | 9.50% | 8.93% | 7.90% | 6.98% | 5.41% |
| | 30% | 8.47% | 7.90% | 7.36% | 6.38% | 5.51% | 4.02% |
| | 50% | 4.73% | 4.22% | 3.75% | 2.90% | 2.13% | 0.83% |

4. COST-EFFECTIVENESS OF CARBON EMISSIONS’ REDUCTION METHODOLOGY

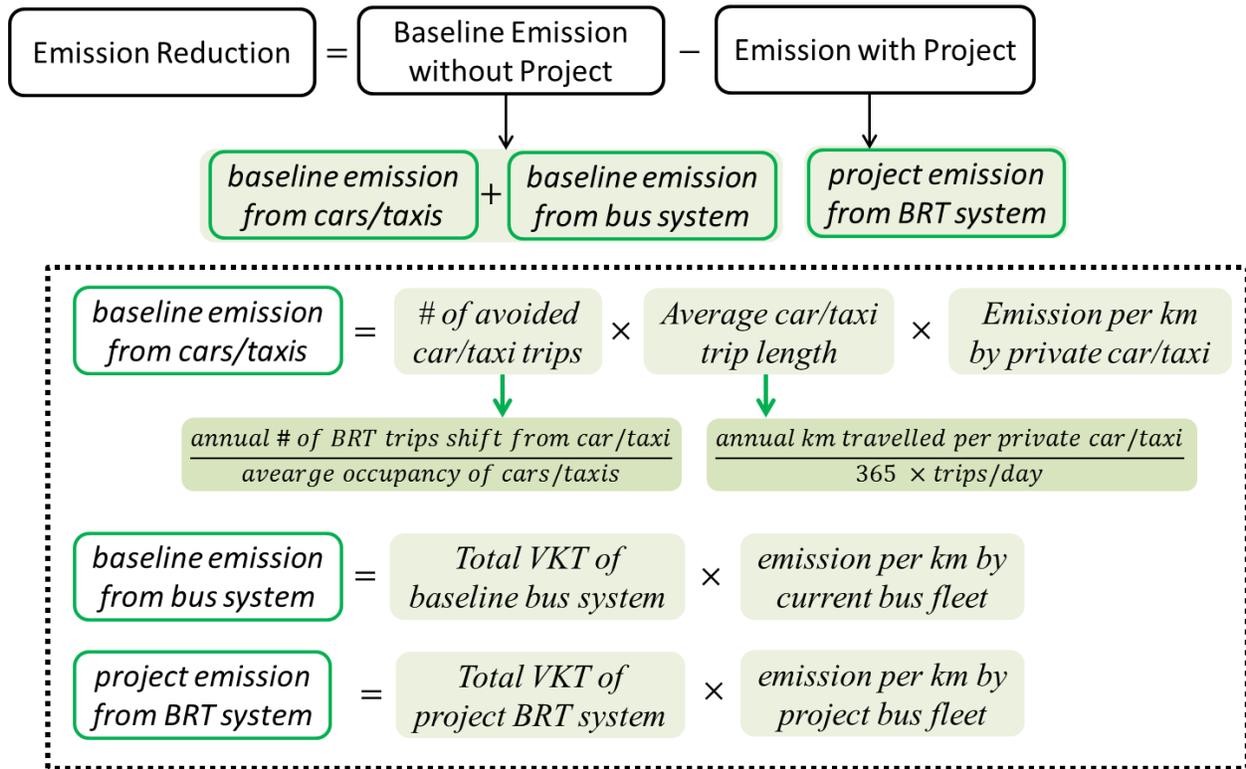
- 14. **Cost-effectiveness refers to the benefits, in this case CO₂ emissions reduced, achieved by a given level of economic cost or, as in this case, financial (CTF) expenditure.** For the cost-effectiveness assessment of the UTTP’s subprojects, the team performed a cost-effectiveness calculation for the use of CTF funds as per the original calculations at design. The team measured the cost of each estimated ton of CO₂ reduced over a 25-year lifespan by each UTTP subproject. The team did not conduct a MAC analysis because, although it is a more standard methodology. The MAC will be negative, and hence, less informative because the Project is economically viable.

- 15. **The model used to estimate emissions reduction by the UTTP was based on the “ASIF (Activity-mode Share–Intensity–Fuel mix)” framework, and was tailored to the context of the UTTP.** This model assumes that there are three main sources of emissions reduction:⁴⁰ (i) activity—efficiency gains from changes in activity, by reducing the number or length of trips; (ii) (modal) share—changes in the modal share, achieving more efficiency by fostering a modal shift from private vehicles and taxis to more efficient public transport; (iii) (energy) intensity—changes in vehicle efficiency that allow for efficiency gains by achieving more efficient energy use, allowing for more vehicle-kilometers with the same consumption of fuel; and (iv) fuel—changes in efficiency allowing for more production with less emissions by changing the used fuel. Figure A4.1 describes the formula used to estimate emissions differences between a baseline and a situation with the project.

⁴⁰ The model does not include the long-term emissions reduction potential of land use/car ownership changes or the congestion reduction benefits, which would depend on the implementation of policies to achieve them.



Figure A4.1 Model for Estimating Emissions Reduction (for a BRT System)



16. **The model used for estimating emissions reduction was adjusted during the implementation of the Project.** The original model included mistakes that doubled the emissions savings estimations. In addition to these corrections, in the third restructuring the Bank incorporated some adjustments to the assumptions to provide more realistic estimates for these assumptions. These adjustments included: (i) the original model included benefits from the speed change of private vehicles in the corridor, but did not account for the rebound effect (which would counteract these gains); (ii) the original model assumed that 50 percent of a new BRT fleet would be made up of hybrid vehicles, which did not happen; and (iii) finally, the original model assumed there would be a 10 percent modal shift from private trips to public transit, which was adjusted to 7 percent based on more up-to-date data from BRT systems around Mexico.

5. COST-EFFECTIVENESS OF CARBON EMISSIONS' REDUCTION RESULTS

17. **Total CO₂ emissions savings at closing were estimated to be 47,586 CO₂ tons per year, resulting in a cost efficiency of the use of CTF funds of US\$46.88 per CO₂ ton saved.** The estimations correspond to adjusting former estimations with known demand levels for Tijuana (6,197 CO₂ tons per year), Ecovia (21,959.59 CO₂ tons), and Guadalajara SITEUR L1 (18,685.70 CO₂ tons).⁴¹ The cost-effectiveness of the

⁴¹ For Tijuana, this estimate assumes 14,000 daily passengers in the trunk corridor, which is expected to increase.



UTTP was calculated by projecting these CO₂ emissions reduction estimates out to a 25-year lifespan and then dividing subproject financing (specifically just for CTF and project financing on a whole) by that 25-year lifespan CO₂ emissions reduction estimate. The final results for the cost-effectiveness of each subproject and the UTTP on the whole are described in table A4.9. The original Project target was to reduce 1 ton per US\$30 CTF dollars invested (both over a 25-year project lifetime). The three subprojects received US\$46.88 from the CTF per ton reduced.⁴² The US\$30 indicative target would correspond to US\$62.98 if adjusted with the corrected methodology for CO₂ savings calculations. The CTF had an additional two criteria for assessing cost-effectiveness. The second is a MAC⁴³ threshold of US\$200 per ton of CO₂ emissions,⁴⁴ which the Project complies with, as it has negative MAC.

Table A4.9 Cost-effectiveness of Carbon Dioxide Emissions' Reduction

| Subproject | CO ₂ Tons Savings (Saved First Year) | CO ₂ Tons Savings (25-Year Estimate In Tons) | CTF Funds (USD) | CTF Cost-effectiveness (USD) |
|----------------------|---|---|-----------------|------------------------------|
| Monterrey (Ecovia) | 21,960 | 620,209 | \$29,614,118.63 | 47.75 |
| Guadalajara (SITEUR) | 19,429 | 527,744 | \$24,377,031.42 | 46.19 |
| Tijuana (SITT) | 6,197 | 175,023 | \$8,024,517.71 | 45.85 |
| Total | 47,586 | 1,322,976 | \$62,015,667.76 | 46.88 |

6. DIFFERENCES BETWEEN ORIGINAL ESTIMATES AND FINAL RESULTS

18. **Unfinished implementation explains the significant differences between the estimated results and the initial economic analysis , especially in the Monterrey and Tijuana subprojects (see table A4.10).** Both Monterrey and Tijuana failed to implement (partially and fully, respectively) the much-needed restructuring of bus routes in the areas of intervention. This resulted in a lack of feeder services, and competition from conventional and informal services running parallel to the trunk corridor. Eventually, this had a significant negative impact on estimated daily ridership, which in turn affected the potential economic benefits achievable by the subprojects. In the case of Monterrey, the subproject also experienced deteriorating BRT infrastructure. Traffic signaling that was supposed to prioritize BRT routes has not been fully implemented. Restrictions to left turns in the BRT corridor have not been introduced.

For Ecovia, 80,000 daily passengers are accounted for. For SITEUR, the estimate considers an additional 27,000 passengers after the system capacity increase.

⁴² This corresponds to dividing the total CTF disbursed (US\$62.015 million) by the Project's total annual emissions reduction of 46,842 CO_{2e} tons over 25 years, growing annually at 1 percent.

⁴³ Marginal abatement cost is an economic concept that refers to the economic cost of reducing an additional CO_{2e} ton. In the case of urban transport projects, which use to be economically viable, the MAC is negative, because the implementation of the Project generates economic benefits.

⁴⁴ According to the guidelines developed by the CTF Trust Fund Committee in October 2013.



Ecovia has also suffered from reduced total fleet size from traffic accidents and improper BRT infrastructure, but has continued to try to address issues in the system.

Table A4.10 Key Items in Benchmark IMTCs, and the Three Subprojects' Estimated vs Actual Impacts

| Item (first year) | IMTC | Guadalajara | | Monterrey | | Tijuana | |
|---|-------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------|
| | | Estimated | Actual | Estimated | Actual | Estimated | Actual |
| Daily ridership ⁴⁵ | 154,000–220,000 ⁴⁶ | 129,965 | 132,848 | 132,870 | 78,000 | 124,000 | 14,000 |
| Time savings | n/a | US\$5.76 m | US\$8.35 m | US\$4.22 m | US\$3.5 m | US\$6.73m | US\$0.39 m |
| VOC reduction | n/a | US\$0.36 m | US\$0.65 m | US\$2.65 m | US\$0.92 m | US\$26.6m | US\$3.76 m |
| Annual CO _{2e} emissions savings | 34,521 ⁴⁷ | 18,686 CO _{2e} tons | 19,429 CO _{2e} tons | 70,570 CO _{2e} tons | 21,960 CO _{2e} tons | 59,457 CO _{2e} tons | 6,197 CO _{2e} tons |
| EIRR | 22.9%–32.9% | 16.29%–26.36% | 20.90% | 16.29%–21.27% | 12.7% | 18.96% | -2.94% |

19. Another reason demand is lower than expected in Tijuana is that passenger demand was expected to shift from parallel corridors to the new BRT routes. These parallel corridors have traditional bus routes running and have continued to operate in competition with the SITT routes. These routes were expected to be phased out with the introduction of the new SITT system, but this has not been the case. These parallel routes siphon passengers from the new BRT routes. It is unlikely that these routes will ultimately be fully phased out in favor of the SITT routes.

⁴⁵ Average number of trips in the trunk corridor during the first year of operation according to the original cost-benefit analysis.

⁴⁶ The Project's original economic analysis is based on a hypothetical IMTC that serves as a benchmark—154,000 passengers a year, which was to rise to 220,000 if additional measures maximized the modal shift.

⁴⁷ The estimation of 34,521 CO₂ tons savings results from adjusting from the original 107,898 (rounded up to 109,000 in the definition of the IMTC) by using the latest methodology and including assumptions more consistent with the actual situation in Mexican cities. Only modifying the methodology but maintaining assumptions would result in 51,390 CO₂ tons savings.



ANNEX 5. BORROWER, COFINANCIER, AND OTHER PARTNER/STAKEHOLDER COMMENTS

1. COMMENTS FROM BANOBRAS/PROTRAM

- 1. The Urban Transport Transformation Program (UTTP) supported the Government of Mexico by funding sustainable urban mass transport interventions with high financial and environmental impact and assisting the modernization of the infrastructure.**
- 2. UTTP funds supported the National Infrastructure Fund (FONADIN) in leveraging private investment in mass transit.**
- 3. One of the most important achievements of the Government of Mexico with the UTTP was the conceptualization of sustainable mass transportation projects in cities.** With the support of the UTTP, the Federal Program to Support Mass Transport (PROTRAM) was able to promote sustainable urban mobility through financial and technical support to state governments and municipalities, as well as to public transport concessionaires, and it has developed an environmental and social safeguards management framework.
- 4. The World Bank also supported PROTRAM with high-level technical support to implement technical and programmatic criteria to develop:** (i) Integrated Sustainable Urban Mobility Plans (PIMUSs); (ii) conceptual project designs, including technical feasibility studies; (iii) demand analysis, including the physical and operational design of transport interventions; (iv) selection of Intelligent Transport Systems (ITS) equipment and cleaner bus technologies; (v) the application of the Environmental and Social Management Framework (MASTU); (vi) cost-benefit analyses (CBAs); (vii) financial analysis, including considerations for project structuring utilizing public-private partnership (PPP) schemes; (viii) plans for the creation/strengthening of public transport authorities; (ix) plans for the formalization of public transport special purpose vehicles (SPVs); and (x) new regulatory, legal, and institutional frameworks.
- 5. The UTTP supported the introduction of guidelines for the monitoring of the mass transit interventions in PROTRAM.** With the MASTU, it was possible to identify mitigation measures for the preservation of the country's historical, cultural, and environmental heritage and implement environmental and social management plans. The MASTU is a mandatory tool for all projects financed by PROTRAM.
- 6. With the UTTP, the World Bank team supported the capacity-building activities (including the development of toolkits) of all levels of government (federal and local), including support to the private sector.** The World Bank also supported the Government of Mexico in its efforts to design a National Strategy for Sustainable Urban Mobility. The UTTP made it possible for PROTRAM's officials to share national and international best practices applicable to urban public transport.
- 7. With the closure of the UTTP, the World Bank leaves a legacy of accumulated experience in structuring transport projects with a socially, environmentally, economically, and financially sustainable approach.**



2. COMMENTS FROM GUADALAJARA'S SITEUR LINE 1 REPRESENTATIVES

On the Assessment of the Project as a Whole

8. **Representatives of the Urban Electric Train System (SITEUR) stated that they are very happy with the outcomes of the project so far.** However, there were some issues that occurred during the project. The biggest challenges of this project were in relation to civil works progress, improvements in communications, and upgrading of the catenary. They also mentioned that they had encountered problems with the firm in charge of the civil works for extending the platforms at stations and it took a year to terminate their contract with them.
9. **All planned activities and the delivery of the rolling stock were executed in a timely manner.** Since the project was initiated, there has been greater perceived security, comfort, cleanliness, and accessibility by users and operators. There have been no security issues so far. Furthermore, there have been a number of measures introduced to promote accessibility at stations and demand has seemed to increase.

On Lessons Learned

10. **SITEUR believes that it needs to conduct more due diligence when selecting firms for contract services, particularly civil works services.**
11. **SITEUR believes it is important to have all technical aspects of the equipment perfectly defined ahead of time.**
12. **SITEUR learned that growth in demand increases rapidly when quality of service is improved.** The three-car trains are already filling up due to increased demand.

On Best Practices Implemented in the Project

13. **SITEUR referred to the best practices followed during the construction of stations.** During construction, service was never suspended on Line 1 due to good planning and work execution. The distance between stations guaranteed that SITEUR could offer a minimum level of coverage at all times so that disruption was not concentrated throughout a single region. Furthermore, most civil works were performed at night. Moreover, to reduce hazards to workers during construction, frequency standards were relaxed so as to not increase risks.

Advice for Those Cities That Lack Experience

14. **City representatives highlighted the importance of having support from departments experienced in the management of large interventions.** If this experience cannot be found internationally, planners should hire people who do have experience and should seek support from national or international financial entities.



On Experience with the United Nations/World Bank/BANOBRAS/PROTRAM

15. **Regarding the World Bank support, representatives of Guadalajara stated that, on the positive side, becoming familiar with the Bank's guidelines was relatively easy.** The experience of implementing environmental safeguards has been very beneficial for the SITEUR. There was already an internal culture of responsible waste management. The Bank has been helpful by raising issues that had not been raised before, including issues of road safety and success stories.
16. **They also stated that the Bank could improve on two things:** (i) the Bank should offer a credit line to buy more trains; and (ii) the Bank could improve its dialogue at a much higher level, so that, better results could be achieved, particularly in areas of system integration. SITEUR Line 3, which is still under construction, includes equipment that is not compatible with that of Line 2 and Line 1. The Bank could advise the government on the advantages of ensuring compatibility.

3. COMMENTS FROM MONTERREY'S ECOVIA BRT

On the Assessment of the Project as a Whole

17. **Representatives from the State of Nuevo Leon stated that users have had a long time to become familiar with Ecovia.** Overall, they consider Ecovia a very good solution and they recognize that there is a high demand to be served in the corridor. Users' perceptions regarding service provision are generally very positive, meaning that Ecovia is responding to demand needs.
18. **Government officials recognize that a few ongoing issues need attention.** (i) The terminals are too long, impacting system operations. Ecovia representatives indicated that this could have been avoided if the terminal had been built parallel to the corridor. (ii) Upon requisitioning of the concession, the government has observed that there is a systematic overpricing of operating costs, in particular with spare part suppliers. (iii) The project was designed by an architect (not by an engineer). They highlighted the massive amount of concrete utilized while constructing the terminals/stations. (iv) The procured rolling stock (buses) allegedly did not have the capacity indicated in the technical specifications. (v) The demand of the corridor is also affected because the government has not advanced in the process of restructuring feeder routes. Ecovia is currently serving five routes within the corridor. This service could be enhanced if more transit units could be available for service provision or if the capacity of the procured rolling stock would have been that indicated in the technical specifications.
19. **Government officials indicated that they are still working on the identification of both the technical solutions to improve service provision by maximizing fleet availability, and available resources to improve Ecovia's infrastructure (rights of way, workshops, accessibility, and system information).** Government officials stated that, on top of this, they are still trying to identify the resources needed to acquire more buses (with capacities of over 100 passengers).



On PROTRAM and BANOBRAS

20. Regarding PROTRAM and the National Development Bank for Public Works and Services (BANOBRAS), state representatives stated that both PROTRAM and BANOBRAS should improve their process for accessing grants.

Regarding Ecovia's Rolling Stock (Buses)

21. State representatives indicated that the procurement process for buses led to suboptimal results. The selected buses were unknown to the operators and allegedly did not meet the expected capacity. This is the main problem observed since the system started operations. The government has advanced in the acquisition of new buses. Only 55 of the 80 Hyundai buses (procured buses) are in operation. The main problem with these Hyundai buses has been the maintenance costs, which have doubled the original/expected targets.

On Road Safety

22. Representatives stated that Ecovia faces road safety issues. They stated that they have worked with the municipalities to ask them to penalize car users who are not respecting Ecovia's right of way more severely. Furthermore, they stated that if they could do it over, they would have changed the entire corridor design. State representatives also indicated that the problem with Ecovia was the implementation design.

BANOBRAS on the Road Safety Assessment

23. Representatives of BANOBRAS indicated that there is one area of the corridor that has no sidewalk, and this is generating a road safety issue in that area. They stated that another problem is that there are no car restrictions on left turns in the corridor. Traffic fines need to be stronger as there are only two types of infractions that can make a person lose their license: driving under the effect of alcohol and not respecting school area speed limits.

On Lessons Learned

24. State authorities indicated that the Ecovia investment would have achieved a much better outcome if PROTRAM/World Bank could have provided more flexibility in the use of UTP proceeds for the procurement of buses. The use of commercial practices in the selection of the rolling stock would have resulted in a much better outcome. In addition, the Ecovia project would have benefited from the improved participation of Metrorrey, the state-owned company that operates Metro and bus services. They have dedicated departments with vast experience in the implementation of mass transit solutions.



4. COMMENTS ON TIJUANA'S INTEGRATED TRANSPORT SYSTEM (SITT)

On the Assessment of the Project as a Whole

25. **Municipal representatives indicated that the Tijuana's bus rapid transit (BRT) has benefited the city.** They also referred to the need to reinvest in it and expand service coverage. Because of the size/form of the city of Tijuana, the Tijuana-BRT needs to include more trunk routes, in order to provide a service that responds to origin and destination pairs. They believe they should have analyzed urban transport regulations before initiating the civil works. These soft elements have become more important than those related to the infrastructure.
26. **The City Council has transport regulations that are not linked to the work performed by the Tijuana's Integrated Transport System (SITT), which is in charge of scheduling service, and monitoring is done according to that scheduling.** However, SITT is not legally authorized to introduce fines for noncompliance. They indicated that the legal structuring should have granted the SITT powers to reorganize mass and collective transport.
27. **The Secretariat of Mobility was created in August 2018.** This has added more confusion in terms of the role of the different departments that participate in planning, provision, and service monitoring. They also realized that there was a problem related with the length of the concession. For example, the Tijuana-BRT concession was granted for a period of 30 years.
28. **SITT representatives believed that there should have been a better estimate of the demand.** They did not know how to conduct a study of the destination origin pairs nor did they reach consensus or consult with carriers. As for station design, they should have invested in something simpler. The design generated high maintenance costs. The project should have been implemented in stages (incremental implementation) following the growth in demand.
29. **SITT representatives also indicated that they are not happy with the collection system.** It is seen as a very complex fare collection system. A simple and practical collection system could have been used that could have been increased in complexity as the system grew.
30. **There are facilities that can be used for advertisements, both within buses and in the stations, but these have not yet been utilized.**

On PROTRAM and BANOBRAS

31. **SITT's representatives also indicated that they still have a good relationship with authorities at the national government, BANOBRAS, and World Bank representatives.** They stated that FONADIN and PROTRAM have been following up on the project's progress and working with SITT on the closure of the trust fund created to finance the project.



On Lessons Learned

32. **SITT representatives also indicated that World Bank representatives have been excellent in their participation and support during project implementation.** Whenever the Bank visited the city, they always provided good comments and guidance on how to resolve problems. The Bank should have been more present in the city and overseen the designs and commissioning of the project. Moreover, the World Bank should have operated independently from BANOBRAS so that it could make its evaluations without having to coordinate with BANOBRAS or FONADIN. The Bank's opinions seemed to be filtered or limited by BANOBRAS and FONADIN.



ANNEX 6. SUPPORTING DOCUMENTS

A. PROTRAM OBJECT, ELIGIBILITY CRITERIA, AND REQUIREMENTS

1. **This is a summary of the Federal Program to Support Mass Transport's (PROTRAM's) object and eligibility criteria.** For expanded information, the document "Lineamientos de PROTRAM" is available online.⁴⁸
2. **PROTRAM is an infrastructure fund created in 2008 that provides on-demand support to mass transit projects promoted by subnational governments (states or municipalities responsible for the provision of urban transport services in their jurisdiction).**
3. **PROTRAM can provide support through the following instruments:**
 - a. Non-reimbursable
 - i. Studies and technical assistance (up to 50 percent).
 - ii. Investment associated to project execution (up to 50 percent of infrastructure cost).
 - iii. Subsidies to help project reach financial closure.
 - b. Reimbursable
 - i. Senior debt for studies and technical assistance (up to 70 percent).
 - ii. Subordinated and mezzanine debt.
 - iii. Guarantees for commercial bank and capital markets financing.
 - iv. Performance bonds and political risk guarantees.
 - v. Equity for concessionaires or specialized investment funds.
4. **The following are the requirements to access PROTRAM funds:**
 - a. *Type of intervention.* Eligible projects must be among the eligible technology options, which include:
 - i. Integrated bus rapid transit (BRT) trunk corridors, including exclusive lanes, automatic fare collection systems, terminals, and stations averaging 400 meters distance from each other.
 - ii. Trams from two to six cars, in general with electric traction and stations averaging 500 meters distance from each other.
 - iii. Light trains, from 2 to 10 cars, in general with electric traction and stations averaging 1 to 2 km distance from each other.
 - iv. Metro, high-capacity trains for big metropolitan areas.
 - v. Suburban trains, modern passenger trains usually using existing right of way for other rail, and stations averaging 2 to 3 km distance from each other.
 - vi. Terminals or multimodal transfer centers to connect mass transit corridors with feeders and other transportation services.

⁴⁸ FONADIN (National Infrastructure Fund), "Proyecto de Lineamientos del Programa de Apoyo Federal al Transporte Masivo Fideicomiso 1936 Fondo Nacional de Infraestructura (fondo) lineamientos del programa de apoyo federal al transporte masivo," last accessed September 30, 2019, http://www.fonadin.gob.mx/wp-content/uploads/2016/08/Lineamientos_Programa_Transporte.pdf.



- b. *Area of intervention.* Eligible projects must be interventions in big cities or metropolitan areas expected to have reached a population level of 500,000 by 2010.
- c. *Prepare an application including the following:*
 - i. Diagnostic of mobility in the area of intervention.
 - ii. Integrated Sustainable Urban Mobility Plans (PIMUSs) with climate change considerations.
 - iii. Project structure including:
 - Technical feasibility study
 - Economic feasibility study (through cost-benefit analysis)
 - Financial feasibility and structure (with a minimum private participation of 34 percent)
 - Legal feasibility study
 - iv. Institutional organization to implement and operate the project, which includes the strategy to implement the works and operation; and the scheme of incorporation of the current permit holders or licensees in the new concessionary company, as well as regulation and restructuring measures on the public side for the administration of mass transport and its integration with feeders and other modes.
 - v. Environmental impact assessment including expected positive impact.
- d. *Complies with the Environmental and Social Management Framework (MASTU).*⁴⁹

B. ELIGIBILITY CRITERIA OF THE UTPP PROJECT AND SUBPROJECTS

5. **This is a translation of the corresponding part of the operational manual describing eligibility criteria of the UTPP project and subprojects.** A full version of the operation manual is available in the Bank's records.

(...)

IV. BORROWERS (ELIGIBLE BENEFICIARIES)

The governments of the states, municipalities and the government of Mexico City (CDMX), or their respective parastatal or paramunicipal agencies and entities, as well as private sector entities can borrow from Credits of the UTPP (Sub-loans). They will be responsible for providing infrastructure or providing public urban transport services. They will formalize a Sub-Loan, through a Credit Agreement with BANOBRAS, to finance an Eligible Project and its Subprojects. They will comply with the procedures and eligibility criteria established in this Operation Manual.

The granting of the Sub-Loan to the Eligible Beneficiary will be subject to the analysis and approval of the respective decision instances of BANOBRAS and the World Bank.

V. ELIGIBILITY REQUIREMENTS OF PPPU PROJECTS

All UTPP Projects must meet the following conditions to be considered part of the project for the purpose of evaluating results and must have the favorable opinion of BANOBRAS and the World Bank regarding compliance with the eligibility requirements, which include:

⁴⁹ As explained in the P115608 Framework for Green Growth DPL ICR, through a modification of the PROTRAM guidelines adopted by the National Infrastructure Fund's (FONADIN's) Technical Committee on May 14, 2010, it was determined that projects must be prepared using the MASTU, therefore including climate change considerations and a baseline measure of greenhouse gas emissions.



- a. Compliance with the requirements of the MASTU, including the World Bank's No Objection to those actions with environmental category A in accordance with the provisions of the MASTU.
- b. The socioeconomic, environmental, technical and financial/budgetary viability of the project.

In the case of Projects with PROTRAM support, notwithstanding the supervision obligations on the UTTP projects, in all those projects supported with PROTRAM resources, the World Bank delegates the evaluation of socioeconomic, environmental, technical and financial viability to the UC of PROTRAM. In these cases, BANOBRAS will verify that the projects have the favorable opinion of the PROTRAM UC regarding socio-economic, environmental, technical and financial viability in accordance with the PROTRAM guidelines.

In the case of Projects not belonging to PROTRAM, BANOBRAS and the World Bank must evaluate their eligibility to receive support with UTTP Resources. To do this, the Eligible Beneficiary must provide the following information:

1. Diagnosis of the current urban transport situation and justification of the project.
2. Summary of PIMUS, ITP or its equivalent where the Eligible Project is framed.
3. Comprehensive Feasibility Study of the proposed urban public transport project that should contain:
 - a. Description of the Project or Study of technical feasibility, which describes, among others: the main characteristics of the infrastructure and equipment of the project, the estimation of the demand, the selection of the corridor of mass transport and technology, as well as the estimation of costs of investment and operation.
 - b. Analysis of the urban context of the project that demonstrates its consistency with the PIMUS, ITP or its equivalent.
 - c. Cost-benefit analysis that demonstrates the social profitability of the project.
 - d. Scheme and financial structure with the requested support that demonstrates the financial viability of the project.
 - e. Legal framework and institutional organization, which guarantees the proper planning, construction and operation of the project, defining, where appropriate, the public-private partnership model and the managing and regulatory body of urban transport.
4. Documentation proving compliance with social and environmental safeguards according to MASTU.

VI. SUBPROJECT ELIGIBILITY REQUIREMENTS

BANOBRAS may grant financing with UTTP Resources to a Subproject as long as it meets the eligibility criteria described below:

1. Be part of an Eligible Project in accordance with the opinion of BANOBRAS and World Bank.
2. Have the favorable opinion of BANOBRAS regarding credit capacity.
3. Have the favorable opinion of BANOBRAS regarding financial management capacity.
4. Have a Subproject Implementation Unit.
5. Comply with the World Bank procurement regulations, described in this Operation Manual, for all those actions financed totally or partially with resources from the UTTP.



- 6. Comply with the requirements of the MASTU, including the World Bank’s No Objection to those actions with environmental category A in accordance with the provisions of the MASTU.
- 7. Have the World Bank’s No Objection to the Credit Agreement between BANOBRAS and the Eligible Beneficiary.
- 8. Comply with the World Bank’s Policies on Fraud and Anti-corruption, including guaranteeing BANOBRAS and/or the World Bank and/or the agents they designate access to information related to the Subproject, including accounts, files and/or other related documents.

B. ANALYTICAL FRAMEWORK FOR DETERMINING THE ACCEPTABILITY OF WELL-ESTABLISHED PRIVATE SECTOR PROCUREMENT METHODS OR COMMERCIAL PRACTICES TO BE USED IN ACQUISITIONS FOR WHICH UTTP FINANCING IS REQUESTED

Acceptability Checklist

| Check Points | Compliance Yes/No | Justification / Comments / Mitigation Measures |
|--|-------------------|--|
| The beneficiary is eligible for financing with UTTP proceeds. | | |
| The goods and/or services in the beneficiary procurement plan are acceptable and meet the eligibility requirements of the UTTP. | | |
| The beneficiary has capacity to carry out procurement in an efficient manner. | | |
| Presentation of procurement procedures to be used. | | |
| The result of the process to select the supplier/s and the conditions obtained are consistent with the use of the criterion of value for money and consistent with the Principles. The price obtained is reasonable. | | |
| The award decision given the constraints and external factors, has followed the criterion of value for money and meets the Principles. | | |
| The contract/s with the supplier/s defines balanced rights, obligations, and risk allocation between the parties as well as provisions for cases of dispute or default. | | |
| The credit agreement between BANOBRAS and the beneficiary includes provisions relating to World Bank Fraud and Corruption clauses. | | |

Form for bus operators

a. Information about the project

i. Name of the project:

ii. Promoter:



- iii. Beneficiary:
 - a. Name:
 - b. Date of establishment:
 - c. Years of experience in the market:
 - d. Number of employees:
 - e. Annual turnover:

 - iv. General description of the Project.
Background, object, and scope.

 - v. Goods and/or services to be procured.
General description including basic features.

 - vi. Rationale for the features and quantity of the goods and/or services to be procured.
e.g., concession requirements, technical justification, available resources, agreement with suppliers, scale economies, market analysis, or available information.
- b. Information about the procurement process
- i. Detailed description of the procurement process.
Including, among others, actions, actors, criteria, stages, timeline, identified risks, and mitigation measures.

 - ii. Rationale for the use of the procurement process.
Including alternative procedures considered, if applicable.

 - iii. Name of the selected supplier/s.

 - iv. Negotiated conditions with the supplier
Price, delivery schedule, means and conditions of payment, ancillary services, others (attach contract).

D. STATUS OF INDEBTEDNESS IN PROTRAM PIPELINE OF PUBLIC ELIGIBLE BENEFICIARIES IN JUNE 2012

(...)

In the absence of a deeper analysis that also includes entities that have NOT been interested in the program and addresses the special case of Mexico City, the following are drawn **preliminary conclusions**:

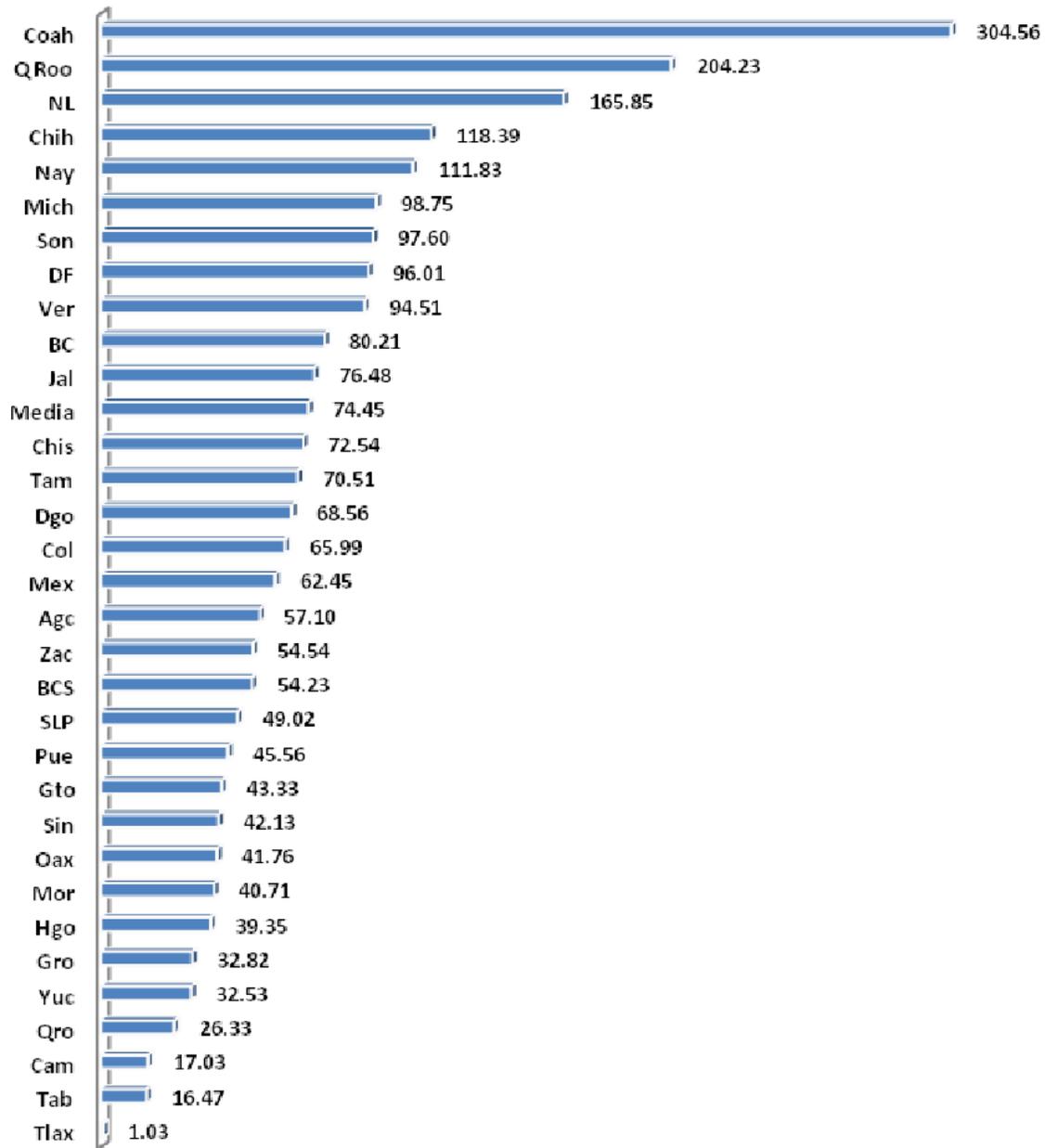
- a. In general, projects are being carried out well with entities with a good indebtedness capacity (Debt capacity ratio: Debt/Expenditures <20%) or in entities in which the project does not imply an excessive increase in indebtedness (Debt increase per project <5%).



- b. The states that are most at risk of to participate in the projects after the reform are: Nuevo León and Jalisco. The municipalities: Cancun and León de Guanajuato. In these cases, the debt ratios are > 20% and the project would have an effect on the debt that will mean an increase of more than 5%.
- c. The debt of the states and municipalities is not excessive, but its evolution worries the central government.
- d. The federal reform that will impose a debt limit on states and municipalities is a risk for the development of the program insofar as it can be a severe restriction on the possibility of the entities to participate financially in the projects. The effect of this reform on the program will depend on the indicator used to limit indebtedness and the level of severity required when choosing the maximum value thereof.



Figure A6.1 Public Debt of States as% of Federal Shares (2011)⁵⁰



⁵⁰ "La deuda pública de las entidades federativas explicada desde la perspectiva del federalismo fiscal mexicano" Reyes Tepac 2012



Table A6.1 State Regulation on Public Debt (2012)⁵¹

| State | Ratio | Limit |
|----------------------------------|--|-------|
| Baja California | 12-month debt service / expenditure point | 22% |
| Campeche | Debt / Ppto expenditures | 10% |
| Chiapas | Debt / (tax + own income) | 25% |
| Chihuahua (municipalities) | Debt / budget previous year | 10% |
| Durango | Debt / ordinary income | 5% |
| Guanajuato | Net direct debt / Ppto expenditures | 10% |
| Hidalgo* | Financing c/p / ordinary income | 5% |
| Jalisco | Net direct debt / Ppto expenditures | 10% |
| State of Mexico (municipalities) | Guarantees granted by municipalities / fiscal participations | 30% |

| State | Ratio | Limit |
|--------------------------|---|-------|
| Michoacan | Debt service / Ppto expenditures | 3% |
| Nayarit | Net/ indebtedness expenditure Ppt units | 15% |
| San Luis Potosí | Debt / authorized income | 20% |
| Sinaloa* | Financing w/p / ordinary income | 5% |
| Tabasco | Debt / ordinary income | 15% |
| Tamaulipas | Financing c/p / expenditure Ppt | 5% |
| Veracruz* | Financing w/p / ordinary income | 5% |
| Yucatán (municipalities) | Debt / participations | 30% |

Note: * C/P financing is not recorded as debt if rule is met. \

⁵¹ “Nota sobre la capacidad financiera de entidades federativas y municipios mexicanos participantes en el programa PROTRAM” Prepared for the World Bank by Hoyos Guerrero, A. 2013